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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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CONTENTS

	Abstracts, Citations	Page
PRE-CLINICAL SCIENCES		
Morphology, Cellular Structure and Histochemistry	5990-5999	741
Absorption--Excretion--Transport	6000-6025	742
Motility	6026-6031	745
Secretion and Metabolism	6032-6036	746
Stomach	6037-6058	746
Pancreas	6059-6067	749
Hepatobiliary Tract	6068-6127	750
Intestine	6128-6141	759
General	6142-6150	761
DIAGNOSTIC PROCEDURES	6151-6197	763
GASTROINTESTINAL DISEASES		
Esophagus	6198-6223	766
Stomach	6224-6260	768
Peptic Ulcers	6261-6286	770
Small Intestine	6287-6307	773
Malabsorption	6308-6321	775
Large Intestine	6322-6347	778
Ulcerative Colitis	6348-6357	782
Pancreas	6358-6376	784
Pancreatitis	6377-6392	787
Liver and Biliary Tract	6393-6434	789
Hyperbilirubinemic States	6435-6438	797
Nonviral Hepatitis and Hepatic Injury	6439-6455	798
Acute Viral Hepatitis	6456-6493	802
Chronic Hepatitis	6494-6503	810
Alcoholic Liver Disease	6504-6516	812
Cirrhosis	6517-6539	816
Gallbladder and Biliary Tract Diseases	6540-6584	821
General	6585-6639	832
Parasitology	6640-6670	837
Regional Enteritis	6671-6678	840

AUTHOR INDEX

SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5990 INFLUENCE OF THE COLONIC CONTENTS ON THE STRUCTURE AND FUNCTION OF THE RAT JEJUNAL MUCOSA. (Eng.) Menge, H.; Robinson, J. W. L.; Mirkovitch, V. (Medizinische Universitats-Klinik, Marburg-an-der-Lahn, W. Germany). *Exp. Mol. Pathol.* 26(2):204-213; 1977.

Segments of Wistar rat jejunum were transposed into the ascending colon and were examined structurally and functionally 3 weeks later to explore the influence of the colonic contents on the jejunal mucosa. For the first 3 postoperative days, the animals were nourished only with a sugared salt solution; thereafter, they received solid food *ad libitum*. The values for villus height, crypt length, villus width, epithelial cell height, and muscle thickness were 427 ± 30.1, 342 ± 13.5, 152 ± 11.5, 42.1 ± 2.4, and 235 ± 20.3 μm, resp., for the proximal region and 473 ± 18.7, 354 ± 13.1, 139 ± 9.2, 38.7 ± 1.6, and 240 ± 32.3 μm, resp., for the distal region of jejunal loops transposed into the colon. Control values were 435 ± 11.6, 185 ± 5.3, 84 ± 2.2, 28.4 ± 0.5, and 69 ± 4.6 μm, resp., for the jejunum of control rats. All of these differences between experimental and control animals were significant ($p<0.001$), except for villus height ($p>0.05$). Activities of leucine aminopeptidase, nonspecific esterase, and succinate dehydrogenase (expressed as extinction/min/μm x 10^3) were significantly lower ($p<0.001$) in the mucosae of transposed loops, being 70 ± 12, 638 ± 42, and 96 ± 10.0, resp., than control values of 341 ± 31, 1,007 ± 117, and 171 ± 9.4, resp. Sucrase activity was also significantly lower ($p<0.001$) in the mucosae of transposed loops (24.6 ± 3.6 IU/g protein) than in the jejunal mucosae of controls (47.5 ± 4.4 IU/g). Phenylalanine uptake by rings of transposed intestine was significantly ($p<0.001$) lower, being 0.211 ± 0.0344 and 0.216 ± 0.0310 μmol/100 mg fresh tissue for the proximal and distal regions, resp., than the control value of 0.519 ± 0.0123 μmol/100 mg. These results are interpreted in terms of a hyper-regenerative transformation of the mucosa of the transposed segments, induced primarily by deleterious factors present in the colonic contents.

5991 LIGHT AND ELECTRON MICROSCOPIC OBSERVATIONS OF THE AUTONOMIC INNERVATION OF THE MOUSE GALLBLADDER MUCOSA. (Eng.) Wahlin, T.; Axelsson, H.; Schiebler, T. H.; Winckler, J. (Dept. Pathology, Univ. Umea, S-901 87 Umea, Sweden). *Histochemistry* 53(2):107-116; 1977.

The autonomic nerve supply to the mucosa of the mouse gallbladder was studied by light microscopic examination of acetylcholinesterase (ACE) distribution and biogenic amine fluorescence, and by electron microscopic examination of 3% potassium permanganate-fixed tissue. Adult mice (6-7 months old, 22-28 g) were utilized. Gallbladders of 25 mice were frozen with liquid nitrogen, fixed in formalin, and incubated with 0.1 M maleate buffer (pH 6.0) containing various inhibitors, preparatory to light microscopic examination. Dense ACE reactive bundles of small nerve fascicles were noted in proximity to the basement membrane. Positive ACE activity was found in nerve-like formations perivascularly in mucosa and in the smooth muscle layer of the media. No fluorescence was exhibited by the gallbladder epithelium. In the electron microscope, fibers were seen to touch the epithelial basement membrane and, within the membrane, axonal-like varicosities with agranular vesicles were noted. No pre- or post-synaptic membrane thickenings were observed. Pilocarpine (40 mg/kg, i.p.) produced granule loss in 1.5 min, and, after continued administration at 5-min intervals for 30 min, almost complete loss of secretory granules was demonstrated. The results suggest that subepithelial connective tissue and the epithelium contain cholinergic nerves.

5992 HEPATOCYTE INNERVATION IN PRIMATES. (Eng.) Forssmann, W. G.; Ito, S. (Harvard Medical Sch., Boston, MA 02115). *J. Cell Biol.* 74(1):299-313; 1977.

5993 AN ULTRASTRUCTURAL EXAMINATION OF EVERTED RAT JEJUNUM. (Eng.) Lepper, K.; Mailman, D. S. (Dept. Biology, Univ. Houston, Houston, TX 77004). *Life Sci.* 20(10):1697-1704; 1977.

5994 ULTRASTRUCTURE OF HUMAN SUBMANDIBULAR GLAND. (Eng.) Riva, F. T. (Istituto di Anatomia umana normale, Universita di Cagliari, 09100, Cagliari, Italy). *J. Submicrosc. Cytol.* 9(2/3):251-266; 1977.

5995 THE STRUCTURE OF THE SALIVARY GLANDS OF THE HUMAN SOFT PALATE. (Eng.) Black, J. B. (Sch. Dentistry, Univ. Alabama in Birmingham, University Station, Birmingham, AL 35294). *J. Morphol.* 153(1):107-117; 1977.

5996 THE OCCURRENCE OF ELECTRON DENSE INTERCELLULAR MATERIALS AND GAP JUNCTIONS IN THE HUMAN INTESTINAL EPITHELIUM. (Eng.) Suzuki, H.; Konno, T.; Igarashi, Y.; Yamamoto, T. Y. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 121(4):301-313; 1977.

5997 ULTRASTRUCTURE OF SENSITIVE TERMINALS IN THE GALLBLADDER WALL OF THE DOG. (Rus.) Solovieva, N. A. (I. P. Pavlov Inst. Physiology, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 234(5): 1217-1219; 1977.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5998 LOCAL FEATURES OF PANCREATIC VEIN ARCHITECTURE IN THE HUMAN FETUS. (Ukr.) Dyubenko, K. A. (Kiev Medical Inst., USSR). *Pediatr. Akush. Ginekol.* (3):56-57; 1977.

5999 MORPHOLOGICAL STRUCTURE OF HUMAN LIVER DURING DIFFERENT STAGES OF EMBRYOGENESIS. (Ukr.) Antropova, G. V.; Belyaeva, N. Yu.; Egorov, O. S.; Shikhodirov, V. V. (Medical Inst., Dnepropetrovsk, USSR). *Pediatr. Akush. Ginekol.* (2):47-49; 1977.

See also, 6018, 6028, 6036, 6074, 6109, 6129, 6134, 6142, 6226, 6251, 6262, 6315, 6590.

ABSORPTION - EXCRETION - TRANSPORT

6000 PASSIVE PERMEABILITIES OF LUMINAL AND BASOLATERAL MEMBRANES IN THE ISOLATED MUCOSAL EPITHELIUM OF GUINEA PIG SMALL INTESTINE. (Eng.) Lauterbach, F. (Institut fur Pharmakologie und Toxikologie der Ruhr-Universitat Bochum, Im Lottental, D-4630 Bochum, W. Germany). *Naunyn-Schmiedebergs Arch. Pharmacol.* 297(3):201-212; 1977.

A rapid and simple method is described for the isolation of the mucosal epithelium of guinea pig small intestine and its use in flux chambers. The isolated mucosa is almost free of additional tissues, thus permitting unhindered substrate fluxes also at the basolateral membranes of the mucosal cell. The functional integrity of the preparation was confirmed by several tests. No permeation of polyvinyl pyrrolidone (molecular weight 11,500) was detected. The permeation of polyethylene glycol (molecular weight 4000) and inulin was significantly higher in the direction blood-to-lumen than in the direction lumen-to-blood, indicating the existence of a small and asymmetric flux of these molecules across paracellular shunt pathways. Transepithelial fluxes and tissue concentrations of water and thiourea, under steady state conditions, were measured. Influx and efflux coefficients, calculated from these for a three-compartment model, were as follows in the order luminal membrane k_{in}, K_{eff}; basolateral membrane K_{in}, K_{eff}: water 1.3, 1.5, 1.2, 1.3 x 10^{-4} cm/sec; thiourea 0.6, 0.5, 0.5, 0.4 x 10^{-4} cm/sec. Coefficients for water derived from short-term influx experiments were only slightly higher. As expected for passively diffusing substrates, influx and efflux coefficients in one membrane were equal. Moreover, the passive permeabilities of the luminal and basolateral membranes were nearly identical for water as well as for thiourea. The same result was obtained for mannitol, cortisol, and phenobarbital. This property of the small intestinal mucosal epithelium may solve the problem of how to facilitate transepithelial exchange without endangering the cell of losing its essential contents, since it can be shown theoretically that the transcellular flux is maximum if a given total permeability is distributed symmetrically to two membranes in series.

6001 RELATIONS AMONG TRANSEPITHELIAL SODIUM TRANSPORT, POTASSIUM EXCHANGE, AND CELL VOLUME IN RABBIT ILEUM. (Eng.) Nellans, H. N.; Schultz, S. G. (Rochester Univ., Sch. Medicine and Dentistry, Rochester, NY 14642). *J. Gen. Physiol.* 68(4):441-463; 1976.

The relationship between transepithelial sodium transport and potassium uptake across the basolateral membranes of rabbit ileum was investigated. Potassium influx across the basolateral membranes was inhibited by the addition of 10^{-3} M ouabain to the serosal solution (0.6 ± 0.0 versus 1.7 ± 0.1 $\mu Eq/cm^2/hr$ for controls, $p<0.01$) and by the near-complete depletion of cellular sodium (0.6 ± 0.1 versus 1.3 ± 0.1 $\mu Eq/cm^2/hr$ when the serosal and mucosal sodium concentrations were 140 mM, $p<0.02$). However, potassium influx across the basolateral membranes was not affected when transepithelial sodium transport was abolished (i.e., in the presence of a sodium-free mucosal solution) or stimulated (i.e., when 10 mM D-glucose or 20 mM L-alanine was added to the mucosal solution). A relationship was not observed between the ouabain-sensitive sodium-potassium exchange mechanism responsible for the maintenance of intracellular sodium and potassium concentrations and active transcellular sodium transport. The maintenance of cell volume (water content) did not appear to be dependent on transepithelial sodium transport or on the ouabain-sensitive sodium-potassium exchange pump. Although these results cannot be considered conclusive, they raise serious questions regarding the role of the sodium-potassium exchange pump (located at the basolateral membranes) in active transepithelial sodium transport and in the maintenance of cell volume.

6002 HCO_3 TRANSPORT IN RAT JEJUNUM: RELATIONSHIP TO NaCl AND H_2O TRANSPORT IN VIVO. (Eng.) Podesta, R. B.; Mettrick, D. F. (Ramsay Wright Zoological Labs., Univ. Toronto, Toronto, Ontario M5S 1A1, Canada). *Am. J. Physiol.* 232(1): E62-E68; 1977.

HCO_3^- absorption and its association with Na^+ absorption was studied in the rat jejunum *in vivo*, using a single-pass perfusion technique. The method of disequilibrium pH was used to distinguish between an HCO_3^- pump and H^+ secretion as the mechanism of HCO_3^- absorption. HCO_3^- stimulated Na^+ absorption by 34.5 μmol/g/15 min. Na^+ deletion inhibited HCO_3^- absorption, decreased luminal acidification, and decreased the level of luminal pCO_2. These results confirm an Na^+:H^+ cation exchange. Na^+-dependent HCO_3^- absorption made up a larger part of total HCO_3^- absorption as the luminal HCO_3^- concentrations diminished, although the precise degree of Na^+-dependency could not be determined because of the unstirred layer effect. The mechanism of Na^+-independent HCO_3^- absorption was not established, but it was not affected by potential difference, Cl^-, or H_2O movements. Glucose-stimulated and HCO_3^- stimulated Na^+ absorption in the acidic postprandial jejunum is probably due entirely to the effect of free CO_2 in the lumen.

6003 EFFECTS OF CALCIUM AND MAGNESIUM IONS UPON FAT ABSORPTION BY SACS OF EVERTED HAMSTER INTESTINE.

(Eng.) Strauss, E. W. (Div. Biological and Medical Sciences, Brown Univ., Providence, RI 02912). *Gastroenterology* 73(2):421-424; 1977.

Sacs of everted hamster jejunum in bile salt solutions, with and without added calcium and magnesium salts, were studied to determine if the presence of these ions affects fat absorption in experimental systems. All solutions contained sodium taurodeoxycholate (2.4 μmol/ml), 1-[^{14}C]-linolenic or oleic acid (0.6 μmol/ml), 2-monoolein (0.3 μmol/ml), and glucose (0.3 μmol/ml). Little radioactive lipid was translocated from mucosal to serosal solution during incubations in media without added Ca^{2+} and Mg^{2+}, and triglycerides were only a small part of the total radioactive lipid. However, the tissue took up a large amount of lipid from the control medium. When 2.5 mM $CaCl_2$ or 1.2 mM $MgSO_4$ was added to the incubation medium, the sacs translocated considerable lipid into the serosal fluid, which became turbid and contained as much as 10% of the tracer that was originally present in the mucosal fluid. The intestine produced very few chylomicrons without the added ions, but at physiological concentrations of the ions, the gut preparations released numerous 0.1-μ diameter, chylomicron-like particles into the serosal fluid. The results demonstrate that incubations of everted hamster intestine in media with added Ca^{2+} and Mg^{2+} may be used in studies of intestinal triglyceride secretion.

6004 ABSORPTION OF NUTRITIONAL PROTEIN DURING AN EARLY POSTOPERATIVE PERIOD.

(Rus.) Abolimov, E. V. (S. M. Kirov Medical-Military Acad., Leningrad, USSR). *Med. Radiol. (Mosk.)* 22(9):18-23; 1977.

To examine early enteral feeding, absorption of ^{131}I-labeled albumin was studied in 128 patients undergoing surgery on the stomach and duodenum. ^{131}I-albumin was included in a standard breakfast consisting of two eggs, aminopeptide, alcohol, sugar, and sodium chloride. A specially devised coefficient of absorption rate (CAR) in the blood was assessed preoperatively and on days 1 and 2 after surgery. Postoperatively, all patients had reduced ^{131}I-albumin absorption. CAR decreased from 4.30-9.60 before surgery to 0.61-4.10 on day 1 after surgery; radioactivity of the blood reached the maximum 4 hr after isotope administration. Absorption indices showed significant improvement on day 2 after surgery; CAR ranged from 0.56 to 9.80, and the peak of blood radioactivity was reached 2 hr after isotope administration, which might be indicative of recuperation of absorption in the small intestine and improvement of the evacuatory function of the stomach.

6005 EFFECT OF DIETARY LACTOSE ON THE ABSORPTION OF SODIUM TAUROCHOLATE IN THE RAT ILEUM.

(Eng.) Riottot, M.; Sacquet, E.; Leprince, C.; Mejean, C. (Laboratoire des animaux sans Germes du C.N.R.S. au C.N.R.Z., Jouy-en-Josas, 78350, France). *Nutr. Rep. Int.* 15(4):421-427; 1977.

The absorption of radiolabeled sodium taurocholate (NaTC) in the ileum of male Fisher rats given a diet containing 10% lactose for 1 month was studied *in situ* by perfusion of an ileal loop. The intestinal pool of bile salts in rats receiving a diet with 10% lactose added before autoclaving was increased from a control value of 22.7 ± 1.2 μmol/100 g to 33.2 ± 4.1 μmol/100 g body weight ($p=0.05$). However, fecal excretion of bile salts in these lactose-fed rats (13.7 ± 0.9 μmol/100 g) was not significantly increased over the control value of 12.9 ± 0.9 μmol/100 g. When the NaTC concentration of the perfusate was increased from 5 to 25 mM, the absorption rate of NaTC in the ileum of rats receiving a diet with 10% lactose added before the diet was autoclaved increased from about 7.5 to 15+ nM/min/cm and the ileal absorption rate of NaTC in rats receiving the same diet but with 10% lactose added to the drinking water (not autoclaved) increased from about 6 to 11 nM/min/cm; control rats showed no significant change in NaTC ileal absorption rate (about 5 nM/min/cm) when the perfusate NaTC concentration was increased 5-25 mM. At a perfusate NaTC concentration of 15 mM, rats receiving lactose in their drinking water had a higher ileal NaTC absorption rate (about 11 nM/min/cm) than rats receiving a diet with lactose added before autoclaving (absorption rate, about 8 nM/min/cm). These results suggest that dietary lactose increases the intestinal pool of bile acids by increasing bile acid absorption rate and that this effect of lactose is not subordinated to a modification of bile acid synthesis.

6006 THE EFFECTS OF ENDOTOXEMIA AND FLUID EXPANSION ON GASTRIC HEMODYNAMICS AND MUCOSAL PERMEABILITY IN THE BABOON.

(Eng.) Zinner, M. J.; Gurll, N. J.; Reynolds, D. G. (Johns Hopkins

Hosp., Johns Hopkins Univ., Baltimore, MD). *J. Surg. Res.* 22(6):605-610; 1977.

The effects of the administration of sublethal i.v. endotoxin on gastric hemodynamics and mucosal ionic permeability were studied in eight adult baboons. An internally drained Heidenhain pouch was constructed in each animal 2 weeks prior to testing. Ionic fluxes were determined by instillation and recovery of an acid test solution (ATS) containing 80 mM HCl and 80 mM NaCl. Four hours of endotoxemia resulted in significant decreases in cardiac output and mucosal blood flow to about one-half of control values. There was a small but insignificant increase in hydrogen back diffusion from -58 ± 26 to -131 ± 59 μEq/30 min/100 cm^2 and no significant change in sodium flux from +183 ± 44 μEq/30 min/100 cm^2 with shock. Endotoxic shock resulted in a significant decrease in the transmucosal electrical potential difference from 40 ± 3 to 29 ± 4 mV with a significant increase in potassium flux from 6 ± 2 to 11 ± 3 μEq/30 min/100 cm^2, both indicating mucosal damage. All pouches developed acute superficial erosions. Fluid resuscitation corrected blood flow and cardiac output without significantly changing ionic fluxes or potential difference. In the baboon, endotoxemia and its attendent ischemia in the presence of acid may result in clinically significant stress ulcers without significant increases in gastric mucosal ionic permeability.

6007 INTERACTION OF BROMOSULFOPHTHALEIN WITH MITOCHONDRIAL MEMBRANES: EFFECT ON ION MOVEMENTS. (Eng.) Schwenk, M.; Burr, R.; Baur, H.; Pfaff, E. (Inst. Toxicology, Univ. Tubingen, D-7400 Tubingen, W. Germany). *Biochem. Pharmacol.* 26(9):825-832; 1977.

The interaction of BSP with mitochondrial membranes was investigated in terms of the effect of BSP on ion movements. An increase in negative surface charge density, resulting from the binding of the anionic dye BSP to mitochondrial membranes, affected the movement of a variety of ions, depending on the dye concentration. Acidification on respiration of mitochondrial suspensions was increased by very small concentrations of BSP (3 nmol/mg protein), reflecting an increased transmembranal pH gradient. The effect was mainly due to inhibition of phosphate translocation. Mitochondrial swelling experiments showed that transport of inorganic phosphate across the mitochondrial membrane was inhibited in both directions. Concentrations of BSP greater than 100 nmol/mg protein resulted in a membrane destabilization, which was reflected by a release of calcium ions and a subsequent increase in membrane permeability for succinate and inorganic phosphate. All of the effects of BSP were freely reversible by the addition of albumin, to which the dye is bound with high affinity. When the effect of BSP on phosphate transport and uncoupled respiration of mitochondria was compared with that of similar compounds (bromthymolblue, bromophenolblue, bromophenolred, phenolred, bengal rose, fluorescein, 1-anilino-naphthalene-8-sulfonic acid, sodium dodecylsulfate, taurocholate, and tetrabromophenolphthalein), BSP had by far the strongest inhibitory effect on both mitochondrial functions.

6008 DIPEPTIDE TRANSPORT IN EXPERIMENTAL DIABETES [Abstract]. (Eng.) Schedl, H. P.; Wenger, J.; Adibi, S. A. (No affiliation given) *Gastroenterology* 72(5, Part 2): 1127; 1977.

6009 EFFECTS OF SUGARS AND AMINO ACIDS ON SODIUM MOVEMENT ACROSS SMALL INTESTINE. (Eng.) Desjeux, J. F.; Tannenbaum, C.; Tai, Y. H.; Curran, P. F. (Dept. Physiology, Yale Univ., New Haven, CT). *Am. J. Dis. Child.* 131(3):331-340; 1977.

6010 FRUCTOSE ABSORPTION AND THE EFFECTS OF OTHER MONOSACCHARIDES ON ITS ABSORPTION IN THE RAT JEJUNUM IN VIVO [Abstract]. (Eng.) Milla, P. J.; Oyesiku, J. E. J.; Muller, D. P. R.; Harries, J. T. (Inst. Child Health, Great Ormond St., London, England). *Gut* 18(5):A425; 1977.

6011 KINETIC PARAMETERS OF GLUCOSE TRANSPORT IN JEJUNAL AND ILEAL BRUSH-BORDER VESICLES [Abstract]. (Eng.) Tannenbaum, C.; Tannenbaum, V.; Kessler, M. (Laboratorium fur Biochemie der ETH, CH-8006 Zurich, Switzerland). *Experientia* 33(6):801; 1977.

6012 DUAL ACTION OF CHOLERA TOXIN ON ELECTROLYTE AND NON-ELECTROLYTE TRANSPORT IN THE MUCOSA OF CANINE JEJUNUM AND ILEUM [Abstract]. (Eng.) Robinson, J. W. L.; Mirkovitch, E. V.; Sepulveda, F. V.; Menge, H.; Dowling, H. (Centre Hospitalier Universitaire Vaudois, CH-1011 Lausanne, Switzerland). *Gut* 18(5):A424-A425; 1977.

6013 ION TRANSPORT ACROSS HUMAN COLONIC MUCOSA IN VITRO [Abstract]. (Eng.) Turnberg, L. A.; Hawker, P. C.; Riley, A. K. (Hope Hosp., Salford M6 8HD, U.K.). *Gastroenterology* 72(5, Part 2):1142; 1977.

6014 INTESTINAL CALCIUM (Ca) TRANSPORT IN GROWTH RETARDED INFANT RATS [Abstract]. (Eng.) Younoszai, M. K.; Ranshaw, J. (Coll. Medicine, Univ. Iowa, Iowa City, IA). *Gastroenterology* 72(5, Part 2):1168; 1977.

6015 CATECHOLAMINES ALTER COLONIC ION TRANSPORT [Abstract]. (Eng.) Racusen, L.; Binder, H. J. (Yale Univ., New Haven, CT). *Gastroenterology* 72(5, Part 2):1115; 1977.

6016 EFFECTS OF VITAMIN D DEPLETION AND REPLETION ON CECAL AND COLONIC CALCIUM (Ca) TRANSPORT: IN VIVO STUDIES IN THE RAT [Abstract]. (Eng.) Petith, M. M.; Schedl, H. P. (Univ. Iowa

Coll. Medicine, Iowa City, IA). *Gastroenterology* 72(5, Part 2):1113; 1977.

6017 RELATIONSHIP BETWEEN H^+ AND K^+ TRANSPORT BY BULLFROG GASTRIC MUCOSA IN VITRO [Abstract]. (Eng.) Ray, T. K.; Tague, L. L. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1164; 1977.

6018 IRON BINDING SUBSTANCES IN THE INTESTINAL MUCOSA OF NEONATAL PIGLETS. (Eng.) Furugouri, K. (Dept. Animal Physiology, Natl. Inst. Animal Industry, 959 Aoba-cho Chiba-shi, Chiba 280, Japan). *J. Nutr.* 107(3):487-494; 1977.

6019 COLONIC OXALATE ABSORPTION: REGIONAL VARIATIONS IN OXALATE UPTAKE MODULATED BY pH AND RICINOLEIC ACID [Abstract]. (Eng.) Stauffer, J. Q.; Schwartz, S. E.; Burgess, L. W. (Upstate Medical Center, Syracuse, NY). *Gastroenterology* 72(5, Part 2):1136; 1977.

6020 COLONIC OXALATE TRANSPORT: A PASSIVE PROCESS [Abstract]. (Eng.) Schwartz, S. E.; Stauffer, J. Q.; Cheney, M.; Burgess, L. W. (SUNY, Upstate Medical Center, Syracuse, NY). *Gastroenterology* 72(5, Part 2):1165; 1977.

6021 ABSORPTION AND PHOSPHORYLATION OF PYRIDOXINE·HCL BY RAT JEJUNUM IN VIVO [Abstract]. (Eng.) Middleton, H. M., III (Veterans Admin. Hosp., Augusta, GA). *Gastroenterology* 72 (5, Part 2):1102; 1977.

6022 ABSORPTION OF 3-METHYLCHOLANTHRENE-SODIUM TAUROCHOLATE MICELLES BY THE GASTRIC MUCOSA [Abstract]. (Eng.) Horowitz, I.; Werther, J. L. (Mount Sinai Sch. Medicine, City Univ. of New York, New York, NY). *Gastroenterology* 72(5, Part 2):1160; 1977.

6023 LYSOSOMAL MECHANISMS IN INTESTINAL TRANSPORT OF SULFATED MACROMOLECULES IN THE NEONATAL RAT AND GUINEA PIG [Abstract]. (Eng.) Estel, G.; Mankes, R.; Barbolt, T.; Abraham, R. (Albany Medical Coll., Albany, NY). *Toxicol. Appl. Pharmacol.* 41(1):188-189; 1977.

6024 EVIDENCE FOR THE ACTIVE TRANSPORT OF L-TRIIODOTHYRONINE INTO ISOLATED RAT LIVER CELLS [Abstract]. (Eng.) Eckel, J.; Rao, G. S.; Rao, M. L.; Breuer, H. (Institut fur Klinische Biochemie der Universitat Bonn, Venusberg, D-5300 Bonn 1, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(3):229; 1977.

6025 EFFECT OF COFFEE ON JEJUNAL WATER ABSORPTION. [Abstract]. (Eng.) Wagner, S. M.; Mekhjian, H. S.; Caldwell, J. H.; Thomas, F. B. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Gastroenterology* 72(5, Part 2):1145; 1977.

See also, 6136, 6162, 6609.

MOTILITY

6026 THE EFFECT OF CHOLECYSTOKININ ON HUMAN TAENIA COLI. (Eng.) Egberts, E. H.; Johnson, A. G. (Charing Cross Hosp., Fulham Palace Rd., London W68RF, England). *Digestion* 15(3):217-222; 1977.

The effects of cholecystokinin (CCK), CCK-octapeptide, and glucagon on human colonic muscle were investigated. Superfusion of 12 human taenia coli strips with CCK, CCK-octapeptide, and glucagon at doses of 25-1,000 milli Ivy Dog U/ml evoked muscular contractions. Dose-dependent response to acetylcholine (ACH, 0.15-1.0 μg/ml) was not altered by an underlying contraction induced by CCK, CCK-octapeptide, or glucagon. Although atropine (0.1 μg/ml) abolished ACH effects, hormonal responses were unaffected. The muscle's sensitivity was highest to CCK and lowest to CCK-octapeptide, and the sigmoid colon was more sensitive than other parts of the bowel to both. The addition of glucagon had no effect on CCK-induced responses. The results suggest that CCK and CCK-octapeptide act directly on the taenia coli. Biologically active impurities in the whole CCK preparations explain their apparent increased activity.

6027 THE EFFECT OF CERULEIN ON GASTRIC EMPTYING. (Eng.) Miwa, I.; Tani, R.; Harasawa, S.; Suzuki, S.; Miwa, M. (Tokai Univ. Sch. Medicine, Tokyo, Japan). *Clin. Endocrinol.* 24(4):315-317; 1976.

MOTILITY

6028 NEURAL CONTROL OF ESOPHAGEAL PERISTALSIS: A CONCEPTUAL ANALYSIS. (Eng.) Diamant, N. E.; El-Sharkawy, T. Y. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario M5T 2S8, Canada). *Gastroenterology* 72(3):546-556; 1977.

6029 CHOOSING A CATHETER SYSTEM FOR MEASURING INTRA-OESOPHAGEAL PRESSURE. (Eng.) Maxted, K. J.; Shaw, A.; Macdonald, T. H. (Dept. Clinical Physics & Bio-Engineering, 11 W. Graham St., Glasgow G4 9LF, Scotland). *Med. Biol. Eng. Comput.* 15(4):398-401; 1977.

6030 THE EFFECT OF SMALL BOWEL RESECTION AND SUBSEQUENT PRECISE ANTRECTOMY ON LOWER ESOPHAGEAL FUNCTION IN RHESUS MONKEYS. (Eng.) Hall, A. W.; Moossa, A. R.; Pelligrini, C.; Clark, J.; Skinner, D. B. (Univ. Chicago, Pritzker Sch. Medicine, 950 E. 59th St., Chicago, IL 60637). *Am. J. Surg.* 133(5):544-547; 1977.

6031 INDOMETHACIN AND CANINE LOWER ESOPHAGEAL SPHINCTER PRESSURE. (Eng.) Mokka, R. E. M.; Punto, L.; Kairaluoma, M. I.; Larmi, T. K. I. (Dept. Surgery, Univ. Oulu, SF-90220 Oulu 22, Finland). *Am. J. Gastroenterol.* 67(4):366-369; 1977.

See also, 5990, 5993, 6093, 6136, 6224, 6259, 6290, 6324, 6552.

SECRETION AND METABOLISM

6032 EXTRACTION, GEL FILTRATION PATTERN, AND RECEPTOR BINDING OF PORCINE GASTROINTESTINAL GLUCAGON-LIKE IMMUNOREACTIVITY. (Eng.) Holst, J. J. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400 Copenhagen NV, Denmark). *Diabetologia* 13(2):159-169; 1977.

6033 STRUCTURE-ACTIVITY RELATIONSHIPS OF GASTROINTESTINAL HORMONES: MOTILIN, GIP, AND [27-TYR]CCK-PZ. (Eng.) Yajima, H.; Kai, Y.; Ogawa, H.; Kubota, M.; Mori, Y.; Koyama, K. (Faculty Pharmaceutical Sciences, Kyoto Univ., Kyoto, Japan). *Gastroenterology* 72(4, Part 2):793-796; 1977.

6034 THE EFFECT OF OUABAIN AND OF Ca^{2+} DEPRIVATION ON ISOPROTERENOL- AND DBcAMP-STIMULATED PROTEIN SECRETION FROM THE SUPERFUSED RAT PAROTID GLAND. (Eng.) Afari, G.; Tenenhouse, A.; Klein, J. (Faculty Medicine, McGill Univ., McIntyre Medical Sciences Building, 3655 Drummond St., Montreal, Quebec H3G 1Y6, Canada). *Can. J. Physiol. Pharmacol.* 55(3):419-426; 1977.

6035 METABOLIC AND ENDOCRINE INFLUENCES ON THE SALIVARY GLANDS. (Eng.) Gill, G. (Martin Luther King, Jr., General Hosp., Los Angeles, CA). *Otolaryngol. Clin. North Am.* 10(2):363-369; 1977.

6036 XIII. SUMMARY. (Eng.) Mitschke, H. *In: Pathomorphic Studies of the Endocrine Cells in the Gastrointestinal Mucosa: Physiology, Cytochemistry, and Ultrastructure. Progress in Pathology.* (Stuttgart: Gustav Fischer Verlag): vol 104, pp. 159-161; 1977.

See also, 6063, 6064, 6378, 6610.

SECRETION AND METABOLISM

Stomach

6037 A CHRONIC GASTROSTOMY AND TEST SYSTEM FOR EVALUATION OF GASTRIC SECRETIONS IN RHESUS MONKEYS. (Eng.) Houghton, P. W.; Jones, D. C. L. (Stanford Res. Inst., Menlo Park, CA 94025). *Gastroenterology* 73(2):252-254; 1977.

A test system was developed for the evaluation of gastric secretion in the rhesus monkey on a chronic basis that does not require the usual restraining techniques. The system is characterized by ease of animal maintenance and handling, reliability in introducing test substances into the stomach, and long-term postsurgical stability. The system comprises a surgical preparation whereby the gastrostomy tube is inserted permanently in the stomach, is passed s.c. up the back, and is exteriorized at the top of the skull, and a training procedure that conditions the monkeys so as to facilitate easy handling during the administration of test substances and the collection of gastric controls. Values for pH, volume, total acid, and acid concentration appear reasonably consistent under base-line (no test substance) conditions as well as after the intragastric administration of water or the s.c. injection of Histalog. Thus, this test system is characterized by painlessness, ease of maintenance and handling of the primates, long-term utility, and reasonable consistency of gastric secretory parameters.

6038 SERUM GASTRIN LEVELS AND GASTRIC ACID SECRETION IN INFANTS. (Ger.) Becker, M.; Fritsch, W. P.; Hausamen, T. U.; Rutthauwe, H. W. (Universitats-Kinderklinik, Adenauerallee 119, 5300 Bonn, W. Germany). *Dtsch. Med. Wochenschr.* 101(49):1800-1805; 1976.

Gastric acid secretion was measured in 20 neonates (divided into 4 groups with average ages of 8, 72, 199, and 391 days), and it was correlated with age, weight, and body surface. Secretion was measured before and after stimulation with pentagastrin (6 μg/kg, s.c.). Measurements of gastrin concentration in the serum were also made for 154 healthy adults (control group) and 10 pregnant women. Parietal cell immaturity was noted for the first 6 months of life. Measurement of fasting serum gastrin concentration by radioimmunoassay in the 20 neonates indicated an increase in the basal gastrin secretion from 0.103 mmol/hr (8 day old) to 0.322 mmol/hr (391 day old); an increase in the maximal acid secretion from 0.163 mmol/hr (8 day old) to 3.93 mmol/hr (391 day old) was noted, and a maximal gastrin secretion of 0.24 mmol/hr (8 day old) to 5.48 mmol/hr (391 day old) was observed. The average basal pH values were 4.6 (8 days), 4.0, 2.4, and 2.0 (391 days). The average pH values after pentagastrin stimulation were 3.1 (8 day old) and around 1.3-1.7 for the other three groups. The serum gastrin concentration showed an exponential decrease during the 1st yr of life. The serum concentration of the pregnant women was similar to the control group (healthy adults). Following oral feeding with breast milk, an increase in serum gastrin concentration was observed. The significantly higher serum gastrin concentrations noted in infants, as compared to the adults and pregnant women, suggested a *de novo* synthesis in the infant, as well as a negative feedback mechanism between gastric acid secretion and serum gastrin levels.

6039 SECRETORY SURFACE AREA AND PHOSPHATASE ACTIVITY OF FROG GASTRIC MUCOSA. (Eng.) Helander, H. F.; Durbin, R. P. (Dept. Anatomy, Univ. Umea, S-901 87 Umea, Sweden). *Am. J. Physiol.* 232 (1):E48-E52; 1977.

Oxyntic cell ultrastructure and enzyme changes were studied before and after the stimulation of secretion in the frog gastric mucosa. Gastric mucosae were isolated from *Rana temporaria*, after 5-7 hr, and after stimulation with histamine (10^{-4} M) and theophylline (5 mM). Acid secretion increased about fourfold, and this was accompanied by a threefold increase in secretory surface of the oxyntic cells, as determined in electron micrographs with conventional morphometric techniques. At the same time, phosphatase activity of the secretory surface increased from an unstimulated level of 49 ± 11 nmol/cm^2/hr to 90 ± 24 nmol/cm^2/hr. Other experiments showed that the latter was due to an acid phosphatase, with pH optimum near 3. It appears that the increase in surface phosphatase with stimulation can be attributed to a diminished local pH and not to the increase in surface area demonstrated in this study.

6040 GASTRIC SECRETION FROM DENERVATED POUCHES AND SERUM LEVELS AFTER MEALS OF DIFFERENT SIZES AND MEAT CONCENTRATIONS IN DOGS. (Eng.) Carpentier, Y.; Woussen-Colle, M. C.; De Graef, J. (Dept. Surgery, Free Univ. Brussels, Brussels, Belgium). *Gastroenterol. Clin. Biol.* 1(1):29-37; 1977.

An investigation was undertaken to study intact physiological responses by comparing the gastric acid output to gastrin release in dogs after meals differing in volume and protein concentration. Five mongrel dogs (11-15.5 kg) were operated to prepare a denervated Heidenhain pouch from the oxyntic area and a gastric fistula. The studies took place after a 24-hr fast and meals consisted of cooked ground liver diluted with water. Each investigation was duplicated on four dogs. The liver solution was injected through a cannula into the stomach discontinuously over 20-30 min; volumes of 10, 20, or 40 ml/kg (21 g protein/100 ml) were given. Acid response (4.98-22.19 mEq/240 min) was related to the meal volume used, while the serum gastrin peaked in 15 min with 20-ml/kg and 40-ml/kg meals (peak, 168 pg/ml and 190 pg/ml, resp.). Meals with 5.25 and 21 g protein/100 ml of fixed volume (40 ml) increased gastrin to similar extents (180 and 190 pg/ml, resp.). An increased volume (10-40 ml) without alteration in protein content increased acid (4.98-9.05 mEq/240 min) and peak gastrin response (112-180 pg/ml). A 20-ml/kg liver meal produced comparable results whether ingested or injected. Repeated injections produced a relatively constant level of gastrin after 45 min, while the amount of acid increased steadily. The poor correlation between the acid output from the pouch and the serum gastrin level indicates that hormonal stimulation other than gastrin is involved in regulating gastric secretion after feeding.

6041 INFLUENCE OF ISOPROTERENOL AND CHOLESTYRAMINE ON ACUTE GASTRIC MUCOSAL ULCEROGENESIS. (Eng.) Ritchie, W. P., Jr.; Shearburn, E. W., III. (Univ. Virginia Sch. Medicine, Charlottesville, VA 22903). *Gastroenterology* 73(1):62-65; 1977.

A recently proposed model in which bile acid-induced H^+ "back diffusion," gastric mucosal ischemia, and intraluminal acid were implicated in the pathogenesis of gastric stress ulceration was tested by selectively mitigating either the ischemic or the back diffusion components of the model. Vascularized wedges of proximal canine gastric wall mounted in Lucite chambers were studied. With the mucosa directly visualized, control group A (6 dogs) was subjected sequentially to topical acid test solution alone (ATS), ATS plus hemorrhagic shock (S), and ATS plus S plus topical 5 mM Na taurocholate (TC). Study group B (6 dogs) was subjected to ATS, ATS plus S plus isoproterenol (1.5 μg/kg/min infused into the splenic artery), and ATS plus S plus TC plus isoproterenol. Study group C (6 dogs) was subjected to ATS, ATS plus S plus cholestyramine (C, 4 g/l), and ATS plus S plus TC plus C. During each period, the net flux of H^+, the electrical potential difference, and the aminopyrine clearance (AC) were determined. Mucosal damage (intramucosal hemorrhage, erosions, and ulcers, graded 0 to 5) was assessed blindly by an independent observer using photographs. Despite H^+ back diffusion comparable to ATS plus S plus TC, intraarterial isoproterenol significantly protected against lesion formation by increasing AC. Despite a reduction in AC comparable to ATS plus S plus TC, topical C significantly protected against lesion formation by preventing excessive back diffusion of H^+.

6042 ASPIRIN ESTERASE OF GASTRIC MUCOSAL ORIGIN. (Eng.) Builder, J.; Landecker, K.; Whitecross, D.; Piper, D. W. (Royal North Shore Hosp., St. Leonards, N.S.W. 2065, Australia). *Gastroenterology* 73(1):15-18; 1977.

Aspirin esterase was found in gastric mucosal specimens obtained from surgically resected tissue; its properties and its relation to gastric disease were studied. The enzyme was stable to storage and active at two pH optima (2.5 and 8). Alcohol in the reaction mixture produced a net effect of slowing the rate of aspirin hydrolysis; this was attributable to a marked inhibitory effect on aspirin esterase activity that was not completely counteracted by the increased rate of spontaneous breakdown of aspirin by alcohol. Age, sex, or gastric disease state of the patient from whom the tissue was obtained did not significantly alter the level of enzyme activity measured, nor were different levels obtained from body or antral mucosa. In patients with gastric ulcer, those with a previous history of regular aspirin consumption did not show significantly different levels from those without such a history. It is concluded that aspirin esterase activity of gastric mucosa is not alone a significant factor in any role acetylsalicylic acid may play in the etiology and natural history of chronic peptic ulcer.

6043 ACTIVITY OF A LYOPHILISED WHOLE EXTRACT OF LAMB GASTRIC MUCOSA IN SEVERAL EXPERIMENTAL MODELS OF DIGESTIVE PATHOLOGY IN THE RAT, THE DOG AND THE MONKEY. (Eng.) Labrid, C.; Dureng, G.; Delort, P.; Chopard, M.; Courcy, J. (Dept. Pharmacodynamics, CERM, F 63201 Riom, France). *Arzneim. Forsch.* 27(4):837-845; 1977.

6044 CHANGES IN GASTRIC SECRETION INDUCED BY A LYOPHILISED WHOLE EXTRACT OF LAMB GASTRIC MUCOSA. (Eng.) Labrid, C.; Dureng, G.; Tachon, J. (Dept. Pharmacodynamics, CERM, F 63201 Riom, France). *Arzneim. Forsch.* 27(4):832-837; 1977.

6045 COMPARATIVE EFFECTS OF TOLFENAMIC ACID AND ACETYLSALICYLIC ACID ON HUMAN GASTRIC MUCOSA: A DOUBLE-BLIND CROSSOVER TRIAL EMPLOYING GASTROSCOPY, EXTERN GASTROCAMERA AND MULTIPLE BIOPSIES. (Eng.) Axelsson, C. K.; Christiansen, L. V.; Johansen, A.; Poulsen, P. E. (Copenhagen County Hosp., Ndr. Ringvej, DK-2600 Glostrup, Denmark). *Scand. J. Rheumatol.* 6(1):23-27; 1977.

6046 EFFECTS OF METIAMIDE AND PROPRANOLOL ON GASTRIC SECRETION IN ANESTHETIZED DOGS. (Eng.) Okabe, S.; Hung, C. R.; Takeuchi, K.; Takata, Y.; Takagi, K. (Dept. Chemical Pharmacology, Univ. Tokyo, Bunkyo, Tokyo 113, Japan). *Jpn. J. Pharmacol.* 27(1):17-22; 1977.

6047 THE EFFECT OF THE ALKALINE TIDE ON SERUM-IONIZED CALCIUM CONCENTRATION IN MAN. (Eng.) Hughes, W.; Cohen, S.; Arvan, D.; Seamonds, B. (Univ. Texas Medical Branch, Galveston, TX 77550). *Digestion* 15(3):175-181; 1977.

6048 ANALYSIS OF THE ACTIONS OF CIMETIDINE AND METIAMIDE ON GASTRIC ACID SECRETION IN THE ISOLATED GUINEA PIG GASTRIC MUCOSA. (Eng.) Sjostrand, S. E.; Ryberg, B.; Olbe, L. (Dept. Pharmacology, AB Hassle, Fack, S-431 20 Molndal, Sweden). *Arch. Pharmacol.* 296(2):139-142; 1977.

6049 GASTRIC SECRETORY RESPONSE OF THE ANESTHETIZED DOG AFTER DIRECT CHEMICAL STIMULATION OF THE SUPRAOPTIC REGION. (Eng.) Zawoiski, E. J.; Koplovitz, I. (Jefferson Medical Coll., Thomas Jefferson Univ., Philadelphia, PA 19107). *Exp. Neurol.* 55(1):122-132; 1977.

6050 EFFECTS OF VARIOUS AMINO ACIDS ON INDOMETHACIN-INDUCED GASTRIC ULCERS IN RATS. (Eng.) Urushidani, T.: Okabe, S.; Takeuchi, K.; Takagi, K. (Dept. Chemical Pharmacology, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan). *Jpn. J. Pharmacol.* 27(2):316-319; 1977.

6051 GASTRIC VOLUME AND ACIDITY AT CAESAREAN SECTION. (Eng.) Brock-Utne, J. G.; Barclay, A. J.; Houlton, P. J. C. (Univ. Natal and

King Edward VIII Hosp., Durban, South Africa). *S. Afr. Med. J.* 52(5):182-183; 1977.

6052 GASTRIC SECRETION AND ACTIVITY-STRESS LESIONS IN THE RAT. (Eng.) Pare, W. P. (Veterans Admin. Hosp., Perry Point, MD 21902). *J. Comp. Physiol. Psychol.* 91(4):778-783; 1977.

6053 EFFECT OF INTRA-ARTERIAL INFUSION OF GLUCOSE ON SECRETORY ACTIVITY OF ISOLATED CANINE STOMACH. (Eng.) Kowalewski, K.; Kolodej, A. (Surgical Medical Res. Inst., Univ. Alberta, Edmonton, Alberta T6G 2N8, Canada). *Pharmacology* 15(4): 324-330; 1977.

6054 BILE ACIDS, THE "BARRIER," AND REFLUX-RELATED CLINICAL DISORDERS OF THE GASTRIC MUCOSA. (Eng.) Ritchie, W. P., Jr. (Univ. Virginia Medical Center, Charlottesville, VA 22901). *Surgery* 82(2):192-200; 1977.

6055 EFFECTS OF INTRAVENOUS GLUCOSE AND AMINO-ACIDS ON GASTRIC SECRETION. (Eng.) Zeitune, J. M. R.; Fonseca, P. C.; Fabiani, V. L. R.; Filho, J. A. (Health Sciences Center, Londrina State Univ., Londrina, Parana, Brazil). *Gastroenterol. Latinoam.* 7(1):33-37; 1977.

6056 REFLECTIONS ON HISTAMINE, GASTRIC SECRETION AND THE H_2 RECEPTOR. (Eng.) Code, C. F. (Rm. 217, Building 115, Veterans Admin. Center, Los Angeles, CA 90073). *N. Engl. J. Med.* 296(25): 1459-1462; 1977.

6057 EFFECTS OF INTRAVENOUS INFUSION WITH SEVERAL NUTRIENTS ON GASTROINTESTINAL SECRETION. (Eng.) Muto, T.; Iwafuchi, M.; Nitta, H.; Shimizu, T.; Matsubara, Y.; Tajika, S. (Univ. Niigata, Sch. Medicine, Niigata, Japan). *Chir. Gastroenterol.* 10(4):371-372; 1976.

6058 COMPARATIVE ANTISECRETORY ACTIVITY OF SEVERAL DRUGS IN THE GASTRIC FISTULA SQUIRREL MONKEY AND RAT. (Eng.) Ridley, P. T.; Margeta, V. A.; Schlosser, J. H.; Groves, W. G. (Dept. Biological Res., Smith Kline and French Lab., Philadelphia, PA 19101). *Res. Commun. Chem. Pathol. Pharmacol.* 17(3):365-373; 1977.

See also, 6030, 6036, 6146, 6176, 6259, 6261, 6264, 6271, 6274, 6278, 6283, 6285, 6286, 6593.

SECRETION AND METABOLISM

Pancreas

6059 EFFECTS OF AN ATP ANALOGUE (α,β-METHYLENE-ADENOSINE-5'-TRIPHOSPHATE) ON CYCLIC AMP AND CYCLIC GMP LEVELS, ^{45}Ca EFFLUX, AND PROTEIN SECRETION FROM RAT PANCREAS. (Eng.) Heisler, S. (Departement de Physiologie et pharmacologie, Centre Hospitalier Universitaire, Universite de Sherbrooke, Quebec, Canada). *Can. J. Physiol. Pharmacol.* 54(5): 692-697; 1976.

The effect of α,β-methylene-adenosine-5'-triphosphate (Ap[CH$_2$]pp), an ATP analog and competitive inhibitor of adenylate cyclase, upon ^{45}Ca efflux, nucleotide levels, and protein secretion from rat pancreas was studied *in vitro* to establish the relationship between its two functions. Incubation of rat pancreatic fragments with 2.5 and 5.0 mM Ap(CH$_2$)pp for 3 and 5 min did not affect basal cyclic AMP (cAMP) levels. Carbachol (0.01 mM)-stimulated ^{45}Ca efflux, and basal ^{45}Ca efflux were also not affected by 1.0, 2.5, or 5.0 mM Ap(CH$_2$)pp after a 20-min incubation. Ap(CH$_2$)pp (1.0, 2.5, and 5.0 mM) did not significantly affect the synthesis of cyclic 3',5'-guanosine monophosphate (cGMP) in response to carbachol (0.01 mM), pancreozymin (PZ, 1.0 Crick U/ml), or calcium ionophore (A-23187, 2 μg/ml) stimulation. However, a 1-hr incubation with 5 mM Ap(CH$_2$)pp increased ^{3}H-zymogen protein secretion from 3.93 ± 0.19% to 5.89 ± 0.26% of the total trichloroacetic acid-insoluble protein in the medium, reduced carbachol (0.01 mM)-stimulated zymogen secretion from 10.09 ± 0.43% to 7.70 ± 0.20%, and increased dibutyryl cAMP (1.0 mM)-stimulated zymogen secretion from 6.93 ± 0.17% to 9.04 ± 0.72%. Although dibutyryl cAMP potentiated carbachol-stimulated protein secretion, Ap(CH$_2$)pp (5 mM) reduced the dibutyryl cAMP + carbachol response from 35.61 ± 1.90% to 18.37 ± 0.85%. Ap(CH$_2$)pp (5 mM) also inhibited the zymogen secretion stimulated by PZ (1.0 Crick U/ml) and A-23187 (5 μg/ml). It is concluded that Ap(CH$_2$)pp acts at a specific step in the secretory response since it inhibited the action of all the secretagogues except dibutyryl cAMP. Since Ca^{2+} efflux, cGMP synthesis, and protein secretion precede the effect of Ap(CH$_2$)pp, Ap(CH$_2$)pp may affect Ca^{2+} homeostasis at a point following the initial stimulus producing secretion.

6060 INHIBITION OF SECRETIN RELEASE AND PANCREATIC BICARBONATE SECRETION BY SOMATOSTATIN INFUSION IN MAN. (Eng.) Hanssen, L. E.; Hanssen, K. F.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(4):391-394; 1977.

Studies were carried out in five healthy subjects to determine the effect of somatostatin on the release of endogenous secretin after duodenal acidification and whether the exocrine secretion of fluid and bicarbonate from the pancreas is affected. The subjects were investigated on two different days with or without a constant i.v. infusion of somatostatin (500 μg/hr). A fluoroscopically placed Lagerlof tube was used for the collection of gastric and duodenal juice. After 30-min basal period, 40 ml of 100 mM HCl was infused into the mid-duodenum over 5 min through a thin catheter attached to the tube. Plasma immunoreactive secretin was measured by radioimmunoassay employing ^{125}I-labeled synthetic secretin, antibody against synthetic secretin, and standards prepared from pure natural porcine secretin. The mean secretin level without somatostatin infusion was 4.6 ± 0.7 pM basally and rose to a peak of 21.8 ± 6.2 pM after duodenal acidification ($p<0.05$). With somatostatin infusion, the level was 4.4 ± 0.4 pM basally and rose to a peak of 6.7 ± 1.7 pM (not significant) after duodenal acidification. Pancreatic bicarbonate output increased from 8.0 ± 2.5 μmol/min to 283 ± 44 μmol/min without somatostatin infusion ($p<0.05$) and from 6.7 ± 2.1 μmol/min to 70 ± 13 μmol/min with somatostatin ($p<0.05$). This study shows that somatostatin inhibits the release of secretin and the pancreatic bicarbonate secretion after duodenal acidification in man.

6061 HORMONE STIMULATED PANCREATICO-BILIARY SECRETIONS--DO THEY PREVENT INTESTINAL MUCOSAL ATROPHY DURING INTRAVENOUS FEEDING [Abstract]. (Eng.) Hughes, C. A.; Sabin, E.; Dowling, R. H. (Guy's Hosp. Medical Sch., London SE1 9RT, England). *Arch. Dis. Child.* 52(5):428; 1977.

6062 RADIOIMMUNOASSAY OF SECRETIN IN HUMAN PLASMA. (Eng.) Hanssen, L. E.; Torjesen, P. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(4):481-488; 1977.

6063 THE ROLE OF γ-GLOBULIN IN COMPOSITION OF MACROAMYLASE. (Eng.) Kaczmarek, M. J.; Rosenmund, H. (Kantonsspital, 8006 Zurich, Switzerland). *Clin. Chim. Acta* 79(1):183-187; 1977.

6064 THE ACTION OF HUMAN PANCREATIC AND SALIVARY ISOAMYLASES ON STARCH AND GLYCOGEN. (Eng.) Kaczmarek, M. J.; Rosenmund, H. (Kantonsspital, Ramistrasse 100, Zurich, Switzerland). *Clin. Chim. Acta* 79(1):69-73; 1977.

6065 EFFECTS OF ALBUMIN AND OTHER PROTEINS DURING ASSAY OF AMYLASE ACTIVITY. (Eng.) Hao, K.; Takeuchi, T.; Sato, S.; Sugimura, T. (Natl. Cancer Center Res. Inst., Tsukiji, Chuo-ku, Tokyo 104, Japan). *Clin. Chim. Acta* 79(1):75-80; 1977.

6066 PANCREATIC AND BILIARY EXCRETION OF CADMIUM IN THE RAT. (Eng.) Nordberg, G. F.; Robert, K. H.; Pannone, M. K. (Dept. Environmental Hygiene, Karolinska Inst., S-104 01 Stockholm, Sweden). *Acta Pharmacol. Toxicol.* 41(1):84-88; 1977.

6067 THE PANCREAS AND IMMUNOGLOBULINS. I. IMMUNOGLOBULIN LEVELS IN PANCREATIC SECRETION OF PATIENTS WITH NORMAL FUNCTION: PRELIMINARY STUDIES. (Eng.) Soto, J. M.; Bramis, J.; Aufses, A. H., Jr.; Dreiling, D. A. (Mount Sinai Sch. Medicine, City Univ. New York, 100th St. and Fifth Ave., New York, NY 10029). *Am. J. Gastroenterol.* 67(4):345-347; 1977.

See also, 5991, 5998, 6358, 6378, 6381, 6385, 6463.

SECRETION AND METABOLISM

Hepatobiliary Tract

6068 AFFINITY CHROMATOGRAPHY SYSTEMS FOR ARTIFICIAL LIVER SUPPORT. (Eng.) Hughes, R. D.; Dunlop, E. H.; Davis, M.; Silk, D. B. A.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5, England). *Biomater. Med. Devices Artif. Organs* 5(2):205-221; 1977.

Two albumin-conjugated agarose materials were tested *in vitro* to determine whether they could be used in artificial liver support systems to enhance the removal of toxic protein-bound substances in cases of fulminant hepatic failure. The agarose gels tested were Bio Gel A-5M (bead size, 74-149 μm) and cyanogen bromide-activated Sepharose 6MB (bead size, 200-300 μm). The amount of albumin bound to the Bio Gel agarose beads was 46 mg/g wet agarose, compared with 71 mg/g for the Sepharose gel. The mean fractional water content of the Bio Gel albumin agarose in three experiments was 0.949 ± 0.002 versus 0.857 ± 0.070 for Sepharose albumin agarose. The mean values for the amounts of bilirubin and chenodeoxycholic acid bound to Bio Gel were 262 ± 6 and 136 ± 3 μmol/kg wet agarose, resp., compared with values of 499 ± 27 and 407 ± 9 μmol/kg, resp., for Sepharose. In terms of column hemodynamics, large pressure drops (greater than 300 mm Hg) were observed during flow experiments with Bio Gel where blood or saline was pumped over columns of albumin-agarose. Falls in pressure across the column were less with the Sepharose albumin agarose; however, even with this gel, pressures of more than 100 mm Hg were measured at flow rates of more than 20 ml/min. Although the above tests suggest that there might be advantages in using the Sepharose rather than Bio Gel albumin agarose in future hemoperfusion systems, further modifications, especially relating to improved flow properties, are needed before the former agarose material can be successfully scaled up for human use.

6069 THE AMINO ACID COMPOSITION OF RAT BILE. (Eng.) Folsch, U. R.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee DD2 1UB, Scotland). *Experientia* 33(8):1055-1056; 1977.

The amino acid composition of bile was studied in male Wistar rats and compared with amino acid levels in the serum. The bile of fasted rats contained significantly greater amounts of aspartic acid (0.770 mM) and glutamic acid (1.356 mM) than did the serum (0 and 0.147 mM, resp., $p<0.002$); the bile of fed rats also contained significantly greater amounts of these amino acids (>2.500 and 2.049 mM, resp.) than did the serum (0.261 and 0.197 mM, resp.; $p<0.002$). In contrast, the serum contained more lysine (0.237 in fasted, 0.381 mM in fed) and ornithine (0.134 in fasted, 0.261 mM in fed) than did the bile (lysine, 0.089 in fasted and 0.103 mM in fed; ornithine, 0.066 in fasted and 0.067 in fed, $p<0.001$). While bile contained appreciable amounts of cystine and methionine, cystine was absent from the serum, and only traces of methionine were detected ($p<0.001$). There were significantly greater amounts of glycine in bile compared with serum ($p<0.001$). The results indicate that bile contains significantly greater amounts of acidic and sulfur-containing amino acids and glycine than does serum, while serum contains more basic amino acids than does bile; the results indicate that the secretion of amino acids into bile may involve specific transport processes.

6070 BINDING PROPERTIES IN VITRO OF ANTACIDS FOR CONJUGATED BILE ACIDS. (Eng.) Clain, J. E.; Malagelada, J. R.; Chadwick, V. S.; Hofmann, A. F. (Groote Schuur Hosp., 7925 Cape Town, South Africa). *Gastroenterology* 73(3):556-559; 1977.

The binding properties of various commercial antacids for pure conjugated bile acids in an aqueous solution or the bile acids present in human gallbladder bile were characterized *in vitro*. Aluminum hydroxide was a potent binding agent, similar in affinity and capacity to cholestyramine. With aluminum hydroxide, dihydroxy bile acid conjugates were bound more strongly than trihydroxy bile acid conjugates, and glycine conjugates were bound more strongly than taurine conjugates; pH had no effect *per se* on binding. Magnesium hydroxide and aluminum phosphate bound bile acids much more weakly. The finding that aluminum hydroxide is superior to other antacids in binding bile acids, together with its antacid effect, suggests that it may be useful in the therapy of reflux gastritis or gastric ulcer.

6071 LONG TERM BILE COLLECTION IN THE RAT. (Eng.) Enderlin, F. E.; Honohan, T. (The Upjohn Co., Kalamazoo, MI 49001). *Lab. Anim. Sci.* 27(4):490-493; 1977.

A method for continuous bile collection from the rat over extended periods is described. Bile is collected continuously, using an externalized cannula brought through an intrascapular incision. The cannula is protected by a 30-cm, 16-gauge stainless steel tube attached to the skin through the incision. The rat is housed in a 10.2 x 10.2 x 12.7 cm cage at a level higher than the collection vial to aid in drainage of bile. A hole in the vial cap permits the cannula to turn freely as the rat moves about the cage. This method allows bile to be collected conveniently over long periods of time with minimal restraint of the animal.

6072 BILIARY COPPER EXCRETION IN MAN AND THE RAT. (Eng.) Frommer, D. J. (St. Vincent's Hosp., Sydney N.S.W. 2010, Australia). *Digestion* 15(5):390-396; 1977.

The form in which copper is bound in bile was studied in bile from patients with Wilson's disease (hepatolenticular degeneration), control subjects (normal individuals and patients with nonhepatic disease or primary biliary cirrhosis), and Sprague-Dawley rats. Bile was labeled with ^{64}Cu. Sephadex column chromatography using gels G-200 to G-10 showed a major ^{64}Cu and protein peak of between 4,000 and 5,000 daltons and a minor peak of about 8,000 daltons. A high-molecular weight peak (above 800,000 daltons), which was present when the eluting solution consisted of water or saline, was shown to be an artifact that could be abolished by the addition of bile salt (glycocholate) to the eluting solution. Bile from control subjects, Wilson's disease patients, and rats behaved in the same manner, binding Cu to low-molecular weight proteins. No evidence was found to suggest that the diminished biliary Cu excretion found in Wilson's disease can be attributed to abnormalities in the form in which Cu is present in the bile. Therefore, the inability of the liver to excrete Cu into bile in Wilson's disease must be due to an abnormality of the handling of Cu within the hepatocyte.

6073 AGE-RELATED VARIATIONS IN HEPATIC REGENERATION AND ERYTHROPOIETIN PRODUCTION IN THE RAT.

(Eng.) Naughton, B. A.; Piliero, J. A.; Kruger, R. E.; Birnbach, D. J.; Roy, M.; Piliero, S. J.; Gordon, A. S. (A. S. Gordon, Lab. Experimental Hematology, Dept. Biology, New York Univ., New York, NY). *Am. J. Anat.* 149(3):431-438; 1977.

Hepatic regenerative capacity and erythropoietin (EP) production were studied in adolescent and adult Long-Evans male rats undergoing single or repeated partial hepatectomies. The EP levels in posthepatectomized (30-72 hr), anephric, hypoxic, adolescent rats exceeded sham operated, anephric, hypoxic controls by 198%, with a peak in the EP levels occurring 72 hr posthepatectomy when most of the original liver mass had been restored. In adult rats, EP levels were significantly higher (91%) at 50-120 hr after hepatectomy in rats subsequently subjected to nephrectomy and exposed to hypoxia than in similarly treated sham-hepatectomized, anephric, hypoxic controls. The EP response to hypoxia was significantly greater in adolescent than in adult anephric rats with normal or regenerating livers. An 80-90% hepatectomy evoked an EP response that was 38% higher than in 30- to 40%-hepatectomized rats examined 72 hr after hepatectomy, subsequent nephrectomy, and exposure to hypoxia. At 72 hr after the third of three successive hepatectomies, EP levels (mean, 0.257 ± 0.013 IU) in rats weighing 300-360 g were lower than in singly hepatectomized, anephric, hypoxic rats (mean, 0.346 ± 0.008 IU) of similar age, but were significantly higher than those observed in sham-operated controls (mean, 0.215 ± 0.019 IU) and in rats subjected to four successive hepatectomies (mean, 0.198 ± 0.036 IU). Overall, the regenerative and hematopoietic potential of the liver decreased with animal age, and EP production was related to the return of liver mass to normal levels following hepatectomy in both adolescent and adult anephric, hypoxic rats.

6074 EFFECTS OF BILIARY DIVERSION ON INTESTINAL MICROFLORA IN THE RAT.

(Eng.) Burke, V.; Stone, D. E.; Beaman, J.; Gracey, M. (Princess Margaret Children's Medical Res. Foundation, Perth, Western Australia). *J. Med. Microbiol.* 10(2):241-244; 1977.

Since certain bile acids inhibit the *in vitro* growth of intestinal anaerobic bacteria, changes in intestinal flora in the rat were examined *in vivo* after diversion of bile to the urinary bladder. Five days after operation there was an increase in numbers of *Proteus* sp. in the stomach, mid-jejunum, and cecum and of coliform bacilli in the stomach and mid-jejunum, in comparison with controls. Lactobacilli were increased in the stomach. There was no change in numbers of anaerobic organisms. Similar changes in bacterial flora followed 5 days of pair feeding in control rats. These results do not suggest a specific antibacterial effect of bile salts in the rat *in vivo*. The changes found are probably related to semistarvation, because the food intake of the rats after operation was about half that of control rats having an unrestricted diet.

6075 CHANGES AFTER MAJOR RESECTION OF EXPERIMENTAL CIRRHOTIC LIVER.

(Eng.) Kohno, A.; Mizumoto, R.; Honjo, I. (Murakami Memorial Hosp., Gifu Coll. Dentistry, 6, 1-Chome, Wakamiya-cho, Gifu City, Japan, 500). *Am. J. Surg.* 134(2):248-252; 1977.

Changes after major resection of experimentally induced cirrhotic livers in dogs were investigated. Liver cirrhosis was induced either hemodynamically (constriction of the hepatic vein) or pharmacologically (dimethylnitrosamine administration), and approximately 45% of the liver was resected. The results were similar in the two experiments. Dogs with experimental liver cirrhosis did not tolerate 45% resection of the liver, with resectability being limited to 40% or less of the liver. Dogs with advanced cirrhosis died of hemorrhage and hepatic insufficiency immediately after hemihepatectomy. When the liver showed moderate cirrhosis, dogs tolerated hemihepatectomy and survived during the early postoperative period; however, they died of hepatic insufficiency within 40 days after resection, with progression of cirrhotic changes in the remnant liver. When the liver had mild fibrosis, the animals tolerated hemihepatectomy well and survived for periods ranging from 51 to 168 days before they were sacrificed. Levels of SGOT and SGPT increased immediately (more than sixfold) after hemihepatectomy and decreased rapidly to the preoperative level within 2 weeks. However, SGPT levels remained higher than SGOT levels throughout the postoperative period in all dogs. Serum albumin decreased progressively in dogs dying early, but decreased only slightly and transiently in long-term survivors after liver resection. These results indicate that death after major resection of a cirrhotic liver was caused not only by too extensive a resection, but also by the rapid progression of cirrhotic changes in the remnant liver during the postoperative course.

6076 EXPERIMENTAL CRYOPROBE PRODUCTION OF INTRAHEPATIC PORTOCAVAL SHUNT.

(Eng.) Reich, M.; Olumide, F.; Jorgensen, E.; Eiseman, B. (Univ. Colorado Sch. Medicine, West 8th Ave. and Cherokee St., Denver, CO 80204). *J. Surg. Res.* 23 (1):14-18; 1977.

The technical feasibility of using a cryoprobe to produce an intrahepatic portacaval shunt was investigated in 25 anesthetized adult pigs. The technique involved the passage of a small caliber (5 mm) cryoprobe via an incision in the portal vein to a major branch of the left hepatic vein. Directed toward a finger on the middle hepatic vein, a 9-mm diameter tunnel through 3 cm of liver tissue to the hepatic venous outflow tract was created with the cryoprobe, which was activated to a tip temperature of -90 F. The entire procedure from insertion to removal of the probe was accomplished in 2-10 min. Patent shunts were observed in 6 of 11 animals sacrificed between 5 and 56 days postoperatively; these animals, which were unheparinized, had normal portal pressures. No arteriovenous shunts were observed along the cold probe tract; apparently the cryoprobe coagulated the arterioles along the shunt. The above technique is designed ultimately to provide a relatively atraumatic method for creating an emergency portacaval shunt in patients with bleeding esophageal varices.

6077 A POSSIBLE PROTECTIVE ROLE FOR SULPHYDRYL COMPOUNDS IN ACUTE ALCOHOLIC LIVER INJURY. (Eng.) Macdonald, C. M.; Dow, J.; Moore, M. R. (Hazleton Lab. Europe Ltd., Glasgow, G.21, Scotland). *Biochem. Pharmacol.* 26(16):1529-1531; 1977.

The role of various sulfhydryl compounds in protective mechanisms against acute ethanol toxicity was investigated in the mouse. The i.p. administration of ethanol (0-6 g/kg as 20% weight/volume solutions in saline) produced a linear dose response reduction in hepatic reduced glutathione (GSH) levels. The time scale of this effect suggests that GSH depletion occurs as a consequence of hepatic damage rather than contributing towards it. β-Mercaptoethylamine-HCl, cysteine, and methionine significantly increased the survival rate of mice given a lethal dose of ethanol.

6078 STUDIES ON THE METABOLIC EFFECTS OF LONG-TERM ADMINISTRATION OF ETHANOL AND 4-METHYLPYRAZOLE IN THE RAT. VITAMIN A DEPLETION IN THE LIVER. (Eng.) Blomstrand, R.; Lof, A.; Ostling, H. (Huddinge Univ. Hosp., Huddinge, Sweden). *Nutr. Metab.* 21(Suppl. 1):148-151; 1977.

The effects of ethanol and 4-methylpyrazole on liver lipid accumulation and vitamin A concentration were studied in male Sprague-Dawley rats. The rats received 1.3 mM 4-methylpyrazole, 1.7 M ethanol, or a combination of 4-methylpyrazole and ethanol in the drinking water for 12 weeks; controls received pure water. In the rats receiving ethanol alone, the serum ethanol concentrations at 6, 8, 9, 10, and 12 weeks were 1.3, 3.3, 7.0, 8.4, and 10.4 mM, resp. In the rats receiving ethanol and 4-methylpyrazole, the respective ethanol concentrations were 13.8, 16.7, 15.8, 19.0, and 19.6 mM. The 4-methylpyrazole concentrations during weeks 6, 8, 9, 11, and 12 in the rats treated with 4-methylpyrazole alone were 0, 0, 0, 6, and 3 μM, resp., while the 4-methylpyrazole concentrations in the rats treated with ethanol and 4-methylpyrazole were 31, 8, 13, 27, and 37 μM, resp. These results indicate that 4-methylpyrazole partially inhibits the oxidation of ethanol and that ethanol interacts with 4-methylpyrazole metabolism. There was a significant accumulation of liver triglycerides both in the ethanol and in the ethanol and 4-methylpyrazole group. The partial inhibition of ethanol oxidation by 4-methylpyrazole cannot prevent liver triglyceride accumulation in chronic experiments, which indicates that ethanol *per se* might have an effect on the liver cell metabolism. The rats receiving ethanol or ethanol and 4-methylpyrazole had a hepatic vitamin A concentration less than half that of the controls.

6079 EFFECT OF ETHANOL ON URIC ACID PRODUCTION OF HUMAN LIVER. (Eng.) Grunst, J.; Dietze, G.; Wicklmayr, M. (Medizinische Klinik II, Klinikum Grosshadern, Marchioninistrasse 15, D-8 Munchen 70, W. Germany). *Nutr. Metab.* 21(Suppl. 1): 138-141; 1977.

Hepatic uric acid production was studied in six healthy subjects during the infusion of ethanol (15 g in 5 min; 0.2 g/min, 1 hr) following a 15-hr fast. During the infusion, the uric acid concentrations in the liver vein increased and reached a peak after 30 min. The uric acid level in the arterial blood did not change. Before the infusion, the measured blood flow was 80 ml/100 g liver/min; after infusion, it increased to a meal level of 93 ml/100 g/min and returned to the initial value after 1 hr. The uric acid production, calculated from arteriovenous concentration differences and liver blood flow, increased from 3.3 nmol/g liver/min in the control period to 25.7 nmol/g liver/min at the end of ethanol infusion. During the whole infusion period, the calculated uric acid output of the liver was approximately 300 mg. This study suggests that ethanol may induce the *de novo* synthesis of purine nucleotides or that there is a decrease in ATP content in the liver cell.

6080 HEPATIC DRUG ACETYLATION AND OXIDATION: EFFECTS OF AGING IN MAN. (Eng.) Farah, F.; Taylor, W.; Rawlins, M. D.; James, O. (Dept. Pharmacological Sciences, Univ. Newcastle upon Tyne, Newcastle NE1 7RU, England). *Br. Med. J.* 2(6080): 155-156; 1977.

The half-lives of acetanilide and isoniazid ("model" substrates for oxidation and acetylation, resp.) were determined in groups of young (aged 20-35 yr) and elderly (aged >65 yr) people. Isoniazid half-lives were distributed similarly in both populations, whereas acetanilide half-lives were significantly longer in the elderly (2.07 hr versus 1.45 hr). The results suggest that liver function does not deteriorate uniformly with age and that heterozygotes for acetylation do not possess survival advantages during their middle-age years.

6081 PRODUCTION OF α-FETOPROTEIN BY CULTURED RAT ASCITES HEPATOMA CELLS DETERMINED IN VIVO AS α-FETOPROTEIN-NEGATIVE. (Eng.) Isaka, H.; Koura, M.; Koura, S.; Yoshii, H.; Hattanmaru, M.; Tsukada, Y.; *et al.* (Kagoshima Univ. Sch. Medicine, 1208-1 Usuki-cho, Kagoshima 890, Japan). *Gann* 68(3):363-367; 1977.

Three rat ascites hepatoma cell lines, AH-41B, AH-34, and AH-64B, which had been determined *in vivo* as α-fetoprotein-negative, were cultured *in vitro* in media containing cyclic AMP (0.5-2.0 mM), cyclic dibutyryl-AMP (0.1-1.0 mM), or theophylline (0.1-

1.0 mM). The concentration of α-fetoprotein in the culture media was measured by ^{125}I-radioimmunoassay. In comparison with untreated control culture media, the α-fetoprotein concentrations of the AH-41B cells in cultures containing cyclic AMP, cyclic dibutyryl-AMP, and theophylline were increased; the levels in the respective cultures were $1.0\text{-}1.3 \times 10^{-5}$, $1.1\text{-}1.3 \times 10^{-5}$, and $0.7\text{-}1.0 \times 10^{-5}$ ng/cell, in comparison with 0.7×10^{-5} ng/cell in the control cultures. The effects of cyclic AMP, cyclic dibutyryl-AMP, and theophylline were not seen in the other two cell lines.

6082 FATTY LIVER INDUCED IN ZUCKER "FATTY" (ff) RATS BY A SEMISYNTHETIC DIET RICH IN SUCROSE. (Eng.) Novikoff, P. M. (Albert Einstein Coll. Medicine, Yeshiva Univ., Bronx, NY 10461). *Proc. Natl. Acad. Sci. USA* 74(7):3038-3042; 1977.

The use of a sucrose-enriched semisynthetic diet for the production of fatty liver in 2- to 4-month-old homozygous mutant Zucker fatty (*ff*) rats is described. The rats were fed for 1 or 3 weeks on the experimental diet, which consisted of 60% sucrose, 20% vitamin-free casein, 4% corn oil, 1% vitamin mixture, 4% salt mixture, and 10% cellulose. The *ff* rats fed the experimental diet developed a marked fatty liver after 1 week of feeding, whereas lean littermates fed the experimental diet did not. The increased liver size in *ff* rats on the experimental diet was due to the enlargement of individual hepatocytes, as they accumulated large lipid spheres throughout the cytoplasm. On standard rat chow, 7-month-old *ff* rats showed no such lipid accumulation; these animals showed only a mild increase in the number of small sinusoidal lipid droplets, compared with the younger *ff* rats.

6083 ACCUMULATION OF NASCENT LIPOPROTEINS IN RAT HEPATIC GOLGI DURING INDUCTION OF FATTY LIVER BY OROTIC ACID. (Eng.) Sabesin, S. M.; Frase, S.; Ragland, J. B. (Center for the Health Sciences, Univ. Tennessee, 951 Court Ave., Room 335M, Memphis, TN 38163). *Lab. Invest.* 37(2):127-135; 1977.

The ultrastructure of fatty liver induced by 1% orotic acid (OA) in the diet was studied in an attempt to correlate the resulting hepatic secretory defect in very low density lipoproteins (VLDL) with specific alterations in the organization of hepatocyte subcellular organelles. Inasmuch as the final assembly of VLDL occurs in the Golgi apparatus and lipoprotein secretion is mediated by the release of VLDL from Golgi-derived secretory vesicles, studies were carried out to determine whether OA prevents the nascent VLDL from entering the Golgi. Groups of female rats were sacrificed at 6 and 12 hr after OA feeding and at daily intervals thereafter until 8 days. There was a rapid depression of plasma triglycerides after OA feeding and a progressive increase in hepatic triglyceride content. Ultrastructural studies demonstrated an accumulation of VLDL-size droplets in hepatic Golgi as early as 24 hr after OA feeding. By 72 hr, a remarkable alteration in the organization of the hepatocyte smooth and rough endoplasmic reticulum (ER) was apparent, resulting in distention and vesiculation of ER cisternae due to an accumulation of lipid droplets. Small lipid droplets within the ER coalesced to form large osmiophilic droplets that eventually formed membrane-bound vesicles or liposomes. Although the accumulation of lipid within the vesiculated elements of the ER was progressive, VLDL-size droplets were always visualized within elements of the Golgi apparatus. Studies performed from 72 hr to 8 days after OA feeding revealed a progressive accumulation of fat within distended and vesiculated channels of the ER; however, VLDL-like particles were readily visualized within the Golgi. In Golgi fractions that were purified from rat liver homogenates on discontinuous sucrose density gradients and negatively stained for electron microscopy, VLDL-like droplets accumulated with Golgi elements even after 8 days of OA feeding. These observations indicate that the development of fatty liver in rats fed OA is associated with an accumulation of nascent VLDL in hepatocyte Golgi. Since OA produces a selective defect in VLDL secretion it appears that the biochemical effect of OA occurs at the level of the Golgi apparatus and may be related to an impairment of the final steps in VLDL biosynthesis.

6084 EFFECTS OF LITHOGENIC DIETS ON MOUSE GALLBLADDER EPITHELIUM: A HISTOCHEMICAL, CYTOCHEMICAL, AND MORPHOMETRIC STUDY. (Eng.) Wahlin, T. (Dept. Histology, Univ. Umea, S-901 87 Umea, Sweden). *Virchows Arch.* [*Cell Pathol.*] 22(4):273-286; 1976.

To study the process of gallstone formation, particularly the structural and histochemical alterations in the gallbladder epithelium, lithogenic diets were fed to 90 adult C57BL black mice of both sexes. Groups of 30 mice each were fed diets of either 1% cholesterol plus 0.5% cholic acid (diet NCC), a glucose-rich fat-free composition (diet 284), or normal chow (control diet). Ten mice from each group were sacrificed 2, 4, and 8 weeks after beginning these diets and their gallbladders were examined by light and electron microscopy. Diet 284 produced no obvious alterations in gallbladder morphology as compared to controls, nor was size or bile content increased, and no gallstones were found. After 2 weeks of the NCC diet, however, gallbladders were noticeably distended and hyperplasia of the mucosa produced a thickening of the gallbladder walls. An increase in glycoproteins was demonstrated histochemically (PAS and Alcian blue at pH 2.5) in cells near the bottom of the crypts and in the mucosal folds; there were ultrastructural changes in the principal cells of this region, including numerous supranuclear Golgi complexes with many vesicles and distended saccules and other evidence of organelle degeneration. An increased number of secretory granules appeared in the apical regions of the principal cells. Gland cells that were not present in control epithelia appeared after 4 weeks. Cholesterol crystals began to appear by 4 weeks in the gallbladder bile and small cholesterol stones were found after 8 weeks. By 4 to 8 weeks, the muscularis had also thickened. The epithelial volume density increased from the normal 34% to 41.5% ($p < 0.05$) after 2 weeks, and to 44% after 8 weeks ($p < 0.001$). The number of clear cells or degenerate primary cells also increased. Increased exocytotic discharge of secretory products indicated a greater synthesis and release of glycoproteins into the bile. It is suggested that glycoproteins may be involved in trapping cholesterol crystals.

6085 EFFECT OF PHYSICAL EXERCISE ON ERYTHROCYTE LIPIDS, BILIARY CHOLESTEROL AND BILE LITHOGENICITY IN RATS.

(Eng.) Simko, V.; Kelley, R. (Univ. Cincinnati Medical Center, Cincinnati, OH 45267). *Eur. J. Clin. Invest.* 7(4):319-320; 1977.

The effects of physical exercise on liver and biliary cholesterol, on cholesterol solubility, and on RBC lipids were studied in male Wistar rats. Rats were exercised (E) by daily 1 hr swimming for 24 days. Sedentary controls (S) were caged individually. Bile analysis at the end of the experiment (24 hr after the last exercise) showed a decrease in bile cholesterol (0.78 ± 0.07 versus 1.27 ± 0.17 μmol/ml, $p<0.02$) and phospholipids (4.95 ± 0.42 versus 7.08 ± 0.53 μmol/ml, $p<0.01$) in the exercising animals, but no significant change in the bile acids. These changes in the exercising rats resulted in a decreased cholesterol saturation of bile (44.4 ± 3.4% versus 57.2 ± 7.4%, not significant), and in an improvement in the bile acid + phospholipid/cholesterol ratio (51.4 ± 4.9 versus 35.0 ± 5.9). Exercise did not affect the bile flow or bile acid flux rate. Exercise decreased RBC phospholipids ($p<0.01$). The effect of exercise on bile was associated with a trend to lower cholesterol in the RBC and in the adipose tissue and probably does not represent a shift of cholesterol from the liver to the peripheral tissues. Physical exercise may be a preventing factor in cholesterol gallstone formation.

6086 MECHANISM OF RAT LIVER MICROSOMAL MONO-OXYGENASE INHIBITION UNDER CHOLESTASIS DEVELOPMENT.

(Rus.) Zakharova, N. E.; Pospelova, L. N.; Gromova, O. A.; Tsyrlov, I. B.; Lyakhovich, V. V. (Inst. Clinical and Experimental Medicine, Novosibirsk, USSR). *Vopr. Med. Khim.* (2):181-185; 1977.

The changes of liver mono-oxygenase activity were studied in male Wistar rats subjected to ligation of the biliary duct. On days 4, 7, and 10 after surgery, rats were sacrificed, and the liver microsome fraction was isolated by ultracentrifugation. On day 4 after ligation, there was almost a twofold decrease in cytochrome P-450 content, a significant decrease of NADPH-cytochrome P-450 reductase activity, and a nonsignificant alteration of enzymatic peroxide lipid oxidation (PLO). Further accumulation of the bile acids in the liver of the cholestatic rats resulted in decreased enzymatic PLO on day 7, and decreased nonenzymatic PLO on day 10. The results of *in vitro* incubation of microsome fraction with sodium deoxycholate confirm the hypothesis that observed changes in xenobiotic metabolism in the cholestatic rats are due not to the cholic acid accumulation, but rather to the accumulation of the intermediate products of cholesterine oxidation.

6087 SIMULTANEOUS PROTECTIVE EFFECT OF A NEW CHELATING AGENT AND ZINC, ON THE CARBON TETRACHLORIDE INDUCED HEPATIC INJURY IN SQUIRRELS.

(Eng.) Rana, S. V. S. (Dept. Zoology, D. A. V. Coll., Muzaffarnagar-251001, India). *Res. Exp. Med. (Berl.)* 170(3):217-227; 1977.

Zinc and a chelating agent (para-amino salicylic acid oxine azo dye complex) were studied to evaluate their efficacy in overcoming liver damage caused by carbon tetrachloride administration to squirrels. Six groups of six squirrels each were used. Carbon tetrachloride (0.1 ml/100 g, i.p.) was given to groups 2, 3, and 4 on alternate days for 30 days. Zinc acetate (5.0 mg/100 g, by gavage) was administered to groups 3, 4, and 6 each day for the last 15 days of the study. The chelating agent (0.2 ml of a 0.2% solution/100 g, i.p.) was injected into groups 4 and 5 on days alternate to the CCl_4 injections during the last 15 days of the study. The histological changes caused by CCl_4 include the vacuolization of centrilobular parenchymal cells, the appearance of binucleated cells followed by the formation of balloon cells with clear cytoplasm and retracted nuclei; and general necrosis follows. Zinc given with CCl_4 maintained some cellular structure, but zinc and chelator, after 20 days of treatment, caused the appearance of rapidly regenerating areas with a diminished necrosis and, after 30 days of treatment, no differences were seen between the latter group and the controls. Squirrels receiving zinc and chelator showed histologic loss of much more accumulated fat and the presence of normal rather than elevated quantities of collagen when compared to carbon tetrachloride treated animals. The total activity of bound β-glucuronidase, the proportion of free β-glucuronidase, and the activity of glucose-6-phosphate dehydrogenase were altered by carbon tetrachloride treatment; these alterations were largely alleviated by zinc treatment and virtually normalized by the combined therapy of zinc and chelator. The chelator assisted in removing excess zinc, as noted when group 3 was compared to group 4 (97.8 ± 7.40 and 89.7 ± 7.06 μg zinc/g dry weight liver, resp.). The author suggests that the chelating agent should be considered for clinical utilization even though the agent's mechanism of action remains largely unknown.

6088 PREVENTION BY CHLORPROMAZINE OF ISCHEMIC LIVER CELL DEATH.

(Eng.) Chien, K. R.; Abrams, J.; Pfau, R. G.; Farber, J. L. (Temple Univ. Sch. Medicine, 3400 N. Broad St., Philadelphia, PA 19140). *Am. J. Pathol.* 88(3):539-554; 1977.

The protective action of chlorpromazine against ischemic liver cell death was studied. Ischemic liver tissue was produced by clamping the portal venous and hepatic arterial blood supply to the left lateral and median lobes of rat liver. If, after 2-3 hr of ischemia, reflow to the liver was established by removing the clamp, two-thirds or more of the liver cells were histologically dead 24 hr later. Pretreatment with chlorpromazine (20 mg/kg) 30 min before inducing ischemia for up to 3 hr prevented this ischemic cell death. If the animals were kept alive for an additional 24 hr with no further treatment, the extent of liver cell necrosis at 48 hr was still markedly less than that seen in the untreated ischemic controls. Administration of chlorpromazine, after induction of ischemia and immediately prior to the onset of reflow, reduced but did not completely prevent ischemic cell death as determined at 24 hr. This protective action of chlorpromazine was confirmed by the ability of the treated animals to regenerate cellular ATP levels after 3 hr of ischemia. In addition, chlorpromazine significantly reduced the increases in total liver cell and mitochondrial calcium ion contents that accompanied the return of blood flow to irreversibly injured liver cells. The protective effect of chlorpromazine was not attributed to any effect either on the rate or extent to which the liver cells became ischemic or on the perfusion patterns following release of the obstruction. It is concluded that the action of chlorpromazine must be on some component(s) of the reaction of the cells to the ischemia itself.

6089 THE EFFECT OF GAMMA-HEXACHLORCYCLOHEXANE ON RAT LIVER LYSOSOMES.

(Eng.) Carevic, O. (Pharmaceutical and Chemical Works, 41000 Zagrab, I. L. Ribara 89, Yugoslavia). *Biochem. Pharmacol.* 26(15):1377-1381; 1977.

A study was undertaken to investigate whether hepatic cell necrosis and increased activity of serum acid phosphatase observed previously in gamma-hexachlorcyclohexane-intoxicated rats are causally related to the alterations of liver lysosomal membranes. Experimental and control groups of 25 male and female Wistar rats each received an i.p. injection of gamma-HCH (40 mg/kg, LD_{50}); five rats were sacrificed at 1, 4, 8, 12, and 24 hr post injection, and their liver lysosomal hydrolase activities were measured. Gamma-HCH induced a significant release of three lysosomal enzymes--acid phosphatase, β-glucosidase, and cathepsin D--in rat livers at only 1 hr after administration of the agent. From 1 hr up to 24 hr of the observation period, release of selected lysosomal hydrolases consistently increased. Morphological changes, including hepatic necrosis and fatty infiltration, were established later at 24 hr after gamma-HCH treatment. The *in vitro* studies on the latency of two lysosomal enzymes--acid phosphatase and β-glucosidase--in the rat liver lysosome-rich suspension treated with gamma-HCH, showed that concentrations of $\geq 10^{-5}$ M significantly decreased the latency of both enzymes. However, acid phosphatase and β-glucosidase exhibited differential responses *in vitro* to the effect of gamma-HCH, which might be due to the differential affinities of these enzymes for the lysosomal matrix. Concentrations of gamma-HCH of $>10^{-5}$ M did not significantly alter the activities of acid phosphatase, β-glucosidase, and cathepsin D *in vitro*. No significant changes were observed in the total activities of enzymes studied after *in vivo* and *in vitro* administered gamma-HCH. The results suggest that gamma-HCH exerts its effect on rat liver lysosomes by modifying the lysosomal membrane's structural properties.

6090 HEPATIC LESIONS AND HEMOLYSIS FOLLOWING ADMINISTRATION OF 3α, 7α, 12α-TRIHYDROXY-5β-CHOLESTAN-26-OYL TAURINE TO RATS.

(Eng.) Hanson, R. F.; Williams, G. C.; Hachey, D.; Sharp, H. L. (Box 23 Mayo, Univ. Minnesota Hosp., Minneapolis, MN 55455). *J. Lab. Clin. Med.* 90(3):536-548; 1977.

The effects of taurine conjugated 3α, 7α, 12α-trihydroxy-5β-cholestan-26-oyl (tauro-THCA) on hemolysis, bile flow, and hepatic morphology were evaluated in bile fistula rats to determine if increased amounts of conjugated THCA causes liver disease and hemolysis in patients with a metabolic block in the conversion of THCA to cholic acid. All rats infused with tauro-THCA at rates of 0.25, 0.50, or 0.75 μmol/min developed hemolysis with hemoglobinuria. A direct toxic effect of tauro-THCA on washed human RBC membranes was demonstrated at a concentration of 8×10^{-4} M. Liver biopsy sections from rats infused for a 2-hr period with tauro-THCA were examined by electron microscopy and showed dilation of the rough endoplasmic reticulum and distortion of mitochondrial membranes. Cholestasis was not induced, since tauro-THCA actually caused a greater choleretic response for a given rate of bile salt excretion than did taurocholate. This study supports the contention that the clinical liver disease seen in patients with a metabolic block in the conversion of THCA into cholic acid may be caused by tauro-THCA.

6091 STIMULATION OF HEPATOCELLULAR PROLIFERATION BY A SERUM FACTOR FROM THIOACETAMIDE-TREATED RATS.

(Eng.) Morley, C. G. D.; Boyer, J. L. (Dept. Medicine, Univ. Chicago, 950 East 9th St., Chicago, IL 60637). *Biochim. Biophys. Acta* 477 (2):165-176; 1977.

Humoral DNA synthesis-stimulating factors in the sera of thioacetamide-treated male Sprague Dawley rats were investigated by studying the responses to these sera in male CF_1 mice. Thioacetamide (25, 50, 100, and 200 mg/kg) was given to groups of five rats each and blood was collected at 6, 18, and 72 hr. Donor rats showed liver centrilobular and periportal necrosis following administration of 50 mg/kg thioacetamide; hepatic DNA synthesis began to rise by 24 hr and was maximal at 36 hr. Administration of ^3H-thymidine (1 μCi/g body weight, i.p.) showed peak liver DNA synthesis stimulation in CF_1 mice following injection of sera obtained from rats 48 hr after 50 mg/kg thioacetamide administration. Aliquots of 0.02, 0.05, 0.075, 0.10, and 0.20 ml serum were tested in a dose versus response experiment on mice; 0.1 ml (6 mg protein) serum gave the maximal response, which consisted of a 10-fold increase in mitosis, a 6-fold increase in the percentage of labeled nuclei, and a 2-fold increase in DNA synthesis. Dialysis or boiling and dialysis did not affect DNA synthesis stimulation, but these treatments halved the effects on mitosis and thymidine-labeled nuclei. The results suggest that humoral growth factors might play a role in hepatic repair after chemical insult.

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See also, 5992, 5997, 5999, 6054, 6057, 6061, 6066, 6147, 6293, 6357, 6395, 6397, 6411, 6428, 6521, 6523, 6541, 6542, 6543, 6556.

SECRETION AND METABOLISM

Intestine

6128 STIMULATION BY IMMUNE COMPLEXES OF MUCUS RELEASE FROM GOBLET CELLS OF THE RAT SMALL INTESTINE. (Eng.) Walker, W. A.; Wu, M.; Bloch, K. J. (Massachusetts General Hosp., Boston, MA 02114). *Science* 197(4301):370-372; 1977.

The ability of immune complexes to stimulate mucus release was studied in female Sprague-Dawley rats. Immune complexes (bovine serum albumin with rat antibodies to bovine serum albumin) formed in twofold antibody excess were injected into the duodenum of normal rats. In comparison to controls injected with antigen only, there was a marked increase in the percentage of disrupted goblet cells (an index of mucus release) in segments from the intestine of rats exposed for 3 hr to immune complexes *in vivo* ($p<0.001$). Similarly, there was a significant increase in ^{35}S-labeled mucus recovered by filtration of intestinal wash, rinse, and mucosal homogenate fluids from rats exposed to immune complexes compared to those from rats exposed to bovine serum albumin or purified rat antiserum to bovine serum albumin alone. These findings suggest that certain immune complexes can stimulate mucus release from intact rat small intestine; enhanced mucus release may have a role in clearing the surface of these complexes.

6129 ELECTRON MICROSCOPIC DETECTION OF CALCIUM BINDING TO THE DUODENAL ABSORPTIVE CELL PLASMA MEMBRANES. (Eng.) Jande, S. S. (Dept. Anatomy, Univ. Ottawa, Ottawa, Ontario, Canada K1N 9A9). *Anat. Embryol.* 150(2):155-162; 1977.

Calcium binding was studied ultrastructurally in chick duodenal loops. This material was fixed at 2 days before hatching, 2 days after hatching, and 4 weeks after hatching with the chicks on a normal diet, 4 weeks after hatching with the chicks on a vitamin D-deficient diet, 5 weeks after hatching with the chicks on a vitamin D-deficient diet supplemented with p.o.-administered vitamin D_3 (500 IU) for the last week, and 4 weeks after hatching with the chicks on a vitamin D-deficient diet supplemented with *Cestrum diurnum* leaves for the last week. Electron dense structures (EDS) were observed on the plasma membranes of duodenal absorptive cells of some chicks. EDS were seen only when calcium was added to formal glutaraldehyde fixative in cacodylate buffer and the material was postosmicated in phosphate buffer. Microvillar, lateral, and basal plasma membranes showed the EDS, and these were seen always in the inner dark layer of the three-layered unit membrane. No EDS were seen in the embryonic material, but some were present in material from chicks 2 days after hatching. There were more EDS in material from 6-week-old normal and vitamin D-replete animals. The absorptive cells from chicks fed *Cestrum* powder (known to mimic the effects of 1,25-dihydroxycholecalciferol) showed the highest number of EDS. The distinct correlation of EDS frequency with amounts of calcium binding protein known to be present in chick duodenum suggests that the site of calcium binding protein is the EDS.

6130 LACTASE LEVELS IN THE INTESTINES OF THE YOUNG OF PROTEIN-DEFICIENT RATS. (Eng.) Mahboob, S.; Zeman, F. J. (Dept. Nutrition, Univ. California, Davis, CA 95616). *Nutr. Rep. Int.* 15(4):451-457; 1977.

The effect of prenatal protein deficiency (PPD) on elevated lactase activity in neonatal rat intestine was investigated together with the effect of age on lactase activity decline and whether proximal, medial, and distal segments of the intestine differ in lactase activity. Pregnant Sprague-Dawley rats were fed diets either of 24% casein (controls) or of 4% casein with an additional 20% glucose (experimental, protein-deficient) during gestation. Suckled newborn pups and 17-, 19-, and 21-day-old pups of these mothers were examined. Mean body (6.40-3.54 g) and intestinal (166.11-77.52 mg) weights were significantly lower both in suckled neonates ($p< 0.001$) and in all postnatal pups ($p< 0.001$) compared to controls. The intestinal/body weight ratio also showed significant reduction (from 25.89 to 21.72 mg/g) in PPD newborns when compared to controls, but was not significantly different in older postnatal pups. Lactase activity significantly increased ($p< 0.001$) in proximal and distal but not medial segments compared to controls. No significant differences between control and PPD pups of matching ages were observed with respect to lactase activity in various segments in 17-, 19-, and 21-day-old rats, except for 19-day PPD distal segments. Newborn PPD pups showed no difference in lactase activity among various segments when compared to controls. Lactase activity fell with age in all segments. It is concluded that PPD affects the entire intestine and that the elevated lactase levels at birth might be due to retardation of intestinal maturation caused by depressed thyroid function in these animals.

6131 BIOSYNTHESIS OF GLYCOPROTEINS IN THE INTESTINAL MUCOSA. I. SOLUBLE STATE OF FIVE GLYCOSYL-TRANSFERASES. (Eng.) Martin, A.; Louisot, P. (Univ. Lyon, Lyon-Sud Medical Sch., 69600 Oullins, France). *Int. J. Biochem.* 7(9/10): 501-505; 1976.

The activities of five glycosyl transferases in mitochondrial, microsomal, or cytosol fractions of rat small intestinal mucosa were evaluated using endogenous and exogenous acceptors to determine their distribution, solubility, and stabilities. Acellular incorporation of radioactive nucleoside-diphospho-sugars into glycoproteins was measured, and the identity of the transferred sugar was determined by hydrolysis and chromatography. Assays with endogenous acceptors indicated that sialyl and galactosyl transferase activities were primarily located in the microsomal fraction (70% and 80% activity, resp.), while fucosyl transferase activity predominated in the mitochondrial (59%) and microsomal (30%) fractions. Mannosyl and *N*-acetyl galactosamine transferase activities were found in the mitochondrial (28% and 45%, resp.) and cytosol (63% and 45%, resp.) fractions, while *N*-acetyl glucosamine transferase activity was primarily located in the cytosol (80%). However, use of the appropriate exogenous acceptor showed high levels of sialyl, galactosyl, fucosyl, and mannosyl transferase activities in the cytosol (62%, 71%, 71%, and 74%, resp.). Each of the incorporated sugars was found in the form in which it had been added to the medium except mannose, of which 95% had been converted to fucose. The transferases were relatively stable to purification and in storage. Contaminants of membrane origin in each fraction indicated that the transferases are solubilized membrane enzymes. The solubility and stability of cytosolic glycosyl transferases improve the prospects for their purification and study.

6132 REGIONAL RELEASE OF GLUCAGON-LIKE IMMUNOREACTIVITY FROM THE INTESTINE OF THE CAT. (Eng.) Frame, C. M. (B-5, Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509). *Horm. Metab. Res.* 9(2):117-120; 1977.

6133 THE EXPRESSION OF ENZYME ACTIVITY OF BIOPSY TISSUE FROM THE SMALL INTESTINE. (Eng.) Scott, B. B.; Fairman, M. J.; Toothill, C.; Losowsky, M. S. (St. James' Hosp., Leeds LS9 7TF, England). *Digestion* 15(3):182-187; 1977.

6134 FUNCTIONAL AND STRUCTURAL CHARACTERISTICS OF THE JEJUNUM AND ILEUM IN THE DOG AND THE RAT. (Eng.) Robinson, J. W. L.; Menge, H.; Sepulveda, F. V.; Mirkovitch, V. (Centre Hospitalier Universitaire Vaudois, CH-1011 Lausanne, Switzerland). *Digestion* 15(3):188-199; 1977.

6135 THE ORIGIN OF THE ELEVATED PERITONEAL FLUID ALKALINE PHOSPHATASE ACTIVITY IN SMALL INTESTINAL INJURY. (Eng.) Moss, C. M.; Baron, N.; Bernstein, L.; Delany, H. M. (Montefiore Hosp. and Medical Center, Bronx, NY 10467). *J. Surg. Res.* 23(3):172-176; 1977.

6136 COLON PHYSIOLOGY: A REVIEW. (Eng.) Carey, W. D. (Cleveland Clinic Foundation, Cleveland, OH). *Cleve. Clin. Q.* 44(2):73-81; 1977.

6137 HUMAN FETAL INTESTINAL ALKALINE PHOSPHATASE. (Eng.) Miki, K.; Suzuki, H.; Iino, S.; Oda, T.; Hirano, K.; Sugiura, M. (First Dept. Internal Medicine, Univ. Tokyo, Hongo 7-3-1, Bunkyo-Ku, Tokyo, Japan). *Clin. Chim. Acta* 79(1): 21-30; 1977.

6138 MEASUREMENT OF ENZYME ACTIVITY AND SUBSTRATES IN INTESTINAL MUCOSA: EVALUATION OF A SYSTEM FOR QUALITY CONTROL IN CLINICAL AND EXPERIMENTAL GASTROENTEROLOGY. (Eng.) Ecknauer, R.; Rommel, K.; Schnosenberg, I.; Breitsameter, J. (Department fur Klinische Chemie der Universitat, Steinhovelstrasse 9, 7900 Ulm/Donau, W. Germany). *Acta Hepatogastroenterol.* 24(3):182-192; 1977.

6139 EFFECT OF DIET ON CECAL pH AND FEEDING BEHAVIOR OF HORSES. (Eng.) Willard, J. G.; Willard, J. C.; Wolfram, S. A.; Baker, J. P. (Dept. Animal Sciences, Univ. Kentucky, Lexington, KY 40506). *J. Anim. Sci.* 45(1):87-93; 1977.

6140 INORGANIC IONS IN THE INTESTINAL AND CAECAL CONTENTS OF GERM-FREE AND CONVENTIONAL CHICKENS. (Eng.) Rolls, B. A. (Natl. Inst. Res. in Dairying, Shinfield, Reading RG2 9AT, England). *Lab. Anim.* 11(2):99-104; 1977.

6141 LINGUAL LIPASE AND FAT DISGESTION [sic] IN THE NEWBORN. (Eng.) Hamosh, M. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research.* (Columbus: Ross Lab.): pp. 91-99; 1977.

See also, 6000, 6005, 6006, 6019, 6021, 6025, 6030, 6032, 6036, 6074, 6142, 6144, 6354, 6396.

GENERAL

6142 MICROCIRCULATION OF THE RAT SMALL INTESTINE AS STUDIED BY THE INJECTION REPLICA SCANNING ELECTRON MICROSCOPE METHOD. (Eng.) Ohashi, Y.; Kita, S.; Murakami, T. (Okayama Univ. Sch. Medicine, Okayama, 700 Japan). *Arch. Histol. Jpn.* 39 (4):271-282; 1976.

Mucosal blood supply in the rat intestine was studied by the injection replica scanning electron microscope method. The vessels of the vascular plexus originate at the tip of the villus and converge near the base of the villus. This demonstrates the existence of the previously described "fountain pattern" of the villus microcirculation. The capillary plexus in the crypt is derived at the base of the crypt and converges near the base of the crypt. The capillary plexuses in the villus and the crypt communicate with each other. The basal segments of the villus, where the arterial termination is lacking, is thought to be supplied by the cryptal capillaries via this communication.

6143 COMPARISON OF PORTAL FLOW DISTRIBUTION AFTER PORTACAVAL AND MESOCAVAL SHUNTS. (Eng.) Harmon, J. W.; Zinner, M. J.; Reynolds, D. G. (Walter Reed Army Inst. Res., Walter Reed Army Medical Center, Washington, DC 20012). *J. Surg. Res.* 22(4):343-347; 1977.

Gamma-labeled radioactive microspheres were injected into the superior mesenteric vein, the inferior mesenteric vein, and the splenic vein of normal dogs to compare the distribution of portal blood flow after the construction of either side-to-side portacaval (SSP) or interposition mesocaval (IM) shunts. To clarify the difference between these two shunts further, a group of dogs in which interposition portacaval (IP) shunts were constructed was also studied. Depending on the microsphere injection site, control experiments (no shunt) demonstrated that between 99.8 ± 0.1 and 99.9 ± 0.1% of the injected microspheres lodged in the liver. The SSP shunt functioned as a total systemic shunt, with the percentage of microspheres lodged in the liver ranging from only 0.03 ± 0.02 to 1.4 ± 1.2%, depending on the injection site; the remaining microspheres lodged in the lung. In contrast, the IM shunt resulted in definite preservation of portal hepatic blood flow, with the highest proportion of blood flow to the liver coming via the splenic vein (70.2 ± 12.7%) and the least via the superior mesenteric vein (31.2 ± 19.5%). The percentage flow in the inferior mesenteric (62.0 ± 20.4%) and splenic veins was significantly greater ($p<0.05$) after the IM shunt than after the SSP shunt. Preservation of some hepatic blood flow was also observed with the IP shunt; the superior mesenteric (22.6 ± 7.3%) and inferior mesenteric (25.2 ± 1.0%) venous flow distributions after the IP shunt were both significantly different ($p<0.05$) from the distribution after the SSP shunt. There was no significant difference between the IM and IP shunts. Based on these findings, the use of a SSP shunt to preserve portal hepatic blood flow in cirrhotic patients is completely unjustified. Whether the IM shunt would preserve hepatic blood flow in cirrhotics with elevated portal pressure cannot be determined from these studies.

6144 IMMUNOPROPHYLAXIS AND THERAPY OF GRAFTED RAT COLONIC CARCINOMA. (Eng.) Martin, M. S.; Martin, F.; Justrabo, E.; Michel, M. F.; Lagneau, A. (Laboratoire d'Immunologie, Faculte de Medecine, Dijon, France). *Gut* 18(3):232-235; 1977.

Two independent lines of chemically-induced colonic carcinoma, serially graftable in syngeneic rats, were used to investigate the effects of immunoprophylaxis and immunotherapy. BD-IX strain rats were challenged s.c. with 2×10^6 DHD or DHB carcinoma cells. Only one of four protocols resulted in a partial inhibition of tumor growth: in this experiment, *Mycobacterium bovis*, strain BCG, was used as an immunostimulating agent. Six of eight rats challenged on the same day as the administration of 9.5 mg of BCG were tumor-free at the end of the experiment (56 days after challenge), which was a significantly lower tumor frequency ($p<0.007$) than that of the untreated challenged controls (0/8 tumor-free animals). The mean tumor weight was significantly lower in the two tumor-bearing rats in the BCG-treated group ($p<0.01$) than that in the controls. The mean tumor weight was also significantly lower ($p<0.05$) in rats treated with BCG 15 days after challenge. Significant enhancement of tumor growth was observed in two protocols in which tumor cells, or tumor cells plus BCG, were used for immunostimulatory therapy; the tumors were approximately seven times larger in treated animals than in controls. The tumor incidence in rats that received mitomycin- and neuraminidase-treated DHD cells for immunostimulatory therapy (5/8) was the same as that in controls, and the mean tumor weights in the two groups was not significantly different. The data emphasize the potential hazards of tumor enhancement in the immunotherapy of human colorectal cancer.

6145 STUDIES ON IMMUNE RESPONSES TO LARVAL CESTODES IN MICE: IMMUNOGLOBULINS ASSOCIATED WITH THE LARVAE OF Mesocestoides corti.

(Eng.) Mitchell, G. F.; Marchalonis, J. J.; Smith, P. M.; Nicholas, W. L.; Warner, N. L. (Walter and Eliza Hall Inst., Royal Melbourne Hosp., P.O., Victoria 3050, Australia). *Aust. J. Exp. Biol. Med. Sci.* 55(2):187-211; 1977.

Mesocestoides corti was investigated in terms of the immunological aspects of the host-parasite relationship. Hypothymic BALB/c.nu/nu ("nude") mice (short-term infected, 21 days) were more susceptible (number of liver larvae at day 21, mean 956) than their intact BALB/c.nu/+ littermates (short-term infected; number of liver larvae at day 21, mean 73) to infection with *M. corti*, and antigens of this parasite induced T cell-dependent immune responses in intact mice. Defective anti-dinitrophenol (DNP) antibody responses were induced by DNP-*M. corti* larvae and DNP-human gamma globulin (HGG) in infected intact mice. However, on transfer to uninfected irradiated recipients, lymphoid cells from infected intact mice responded well to DNP-*M. corti* larvae. Surface immunoglobulin content of peritoneal *M. corti* larvae from long-term infected mice (injected with larvae 2-6 months previously), determined by the ability of a 50 μl washed pellet of larvae to absorb anti-Ig antibodies was IgG$_1$, 0.81 ± 0.11 μg; IgM, 0.35 ± 0.10 μg; IgG$_{2a}$, 0.03 ± 0.01 μg; IgG$_{2b}$, 0.07 ± 0.02 μg; IgG$_3$, 0.11 ± 0.03 μg; and IgA, <0.05 μg. IgM (0.09 ± 0.04 μg) predominated in BALB/c.nu/nu-derived larvae. Chronically infected intact mice contained large amounts of IgG$_1$ immunoglobulins in their serum. Very few proteins were available for labeling on peritoneal larvae by the lactoperoxidase-catalyzed radioiodination technique. IgG$_1$ molecules (concentration in original sample, 11.0 μg/ml; after absorption with treated larvae, 2.2-3.8 μg/ml) associated with *M. corti* larvae for long-term infected mice were reported to include antiparasite antibodies. However, no clear cut evidence is available to show whether the *M. corti*-associated immunoglobulins (and in particular IgG$_1$, which is reported to be relatively inert with respect to direct pathogenic effects) serves the function of masking parasite antigens and protecting the established parasites from more aggressive T cell-dependent immunological effector mechanisms.

6146 THE EFFECT OF LASER PHOTOCOAGULATION ON THE GASTRIC MUCOSA AND BLEEDING GASTRIC LESIONS.

(Eng.) Bank, S.; Miles, A. E.; Botha, J. B. C. (Groote Schuur Hosp., Capetown, S. Africa). *S. Afr. Med. J.* 52(9):347-350; 1977.

An argon ion laser beam was tested experimentally for its histological effect on and penetration of the gastric mucosa of rat and man and for its ability to induce hemostasis in traumatically produced gastric lesions and transected small blood vessels. Lesions were made in the gastric mucosa of 40 Long-Evans anesthetized rats producing two ulcers in each; one for photocoagulation and one to serve as a control. Localized laser photocoagulation lasting from 2 sec to 5 min at 1 W produced a coagulative necrosis of the gastric mucosa and half of the muscularis propria. Transmural necrosis required prolonged exposure of 10-15 min for rat stomach and 20-30 min for human stomach. Laser phototherapy markedly reduced the bleeding time in experimental ulcers and small blood vessels by 50-100%, provided the superficial blood could be adequately dispersed from the direct beam of the laser.

6147 EXCRETION OF BILIRUBIN.

(Jpn.) Abe, H.; Shirachi, T. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Jpn. J. Clin. Pathol.* (2492):102-110; 1976.

6148 A FUNCTION TEST OF THE PANCREAS WITH ^{131}I-5-IODOMETHYL-5-METHYL-2,4-OXAZOLIDINAEDIONE.

(Jpn.) Oshiumi, Y.; Morita, K.; Kamoi, I.; Nakayama, C.; Koga, I.; *et al.* (Kyushu Univ. Sch. Medicine, 3-1-1 Higashi Ku, Fukuoka, Japan). *Radioisotopes* 26(7):469-471; 1977.

6149 Ascaris suum: HATCHING OF EMBRYONATED EGGS IN SWINE.

(Eng.) Rhodes, M. B.; McCullough, R. A.; Mebus, C. A.; Klucas, C. A.; Ferguson, D. L.; Twiehaus, M. J. (Inst. Agriculture and Natural Resources, Univ. Nebraska-Lincoln, Lincoln, NB 68583). *Exp. Parasitol.* 42(2):356-362; 1977.

6150 IMMUNOSUPPRESSION MEDIATED BY ADULT WORMS IN CHRONIC SCHISTOSOMIASIS MANSONI.

(Eng.) Mota-Santos, T. A.; Tavares, C. A. P.; Gazzinelli, G.; Pellegrino, J. (Inst. Biological Sciences, Federal Univ. Minas Gerais, P.O. Box 2486, 30.000 Belo Horizonte, Minas Gerais, Brazil). *Am. J. Trop. Med. Hyg.* 26(4):727-731; 1977.

See also, 6033, 6052, 6074, 6128, 6385, 6593.

DIAGNOSTIC PROCEDURES

6151 COMPARISON OF ULTRASOUND PANCREATIC SCANNING AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAMS: A RETROSPECTIVE STUDY. (Eng.) Feinberg, S. B.; Schreiber, D. R.; Goodale, R. (Box 292-Mayo, Univ. Minnesota Hosp., Minneapolis, MN 55455). *J. Clin. Ultrasound* 5(2):96-100; 1977.

The results of ultrasound pancreatic scanning and of endoscopic retrograde cholangiopancreatography (ERCP) were compared in 32 patients who underwent both procedures for the diagnosis of pancreatic diseases. Thirty-one ultrasound studies were satisfactory, and ERCP cannulation was possible in 26 cases. Among the 11 patients with pancreatitis, the correct diagnosis was suggested by the results of ultrasound in 10, and by ERCP in 7. Pancreatic pseudocyst was correctly diagnosed by ultrasound in all of four patients and in three of the four by ERCP. Among the 10 patients with pancreatic or periampullary carcinoma, the correct diagnosis was made by ultrasound in 9 and by ERCP in 5. The overall success for ultrasound pancreatic scanning was 93.8%, and the overall success for ERCP cannulations was 62.5%. Ultrasonography provides a safe screening procedure with a high overall accuracy rate in the diagnosis of pancreatic diseases. ERCP provides a complementary approach for evaluating small lesions and aids in defining surgical lesions.

6152 DETECTION OF GALLBLADDER DISEASE IN PATIENTS WITH NORMAL ORAL CHOLECYSTOGRAMS: RESULTS USING A SIMPLIFIED BILIARY DRAINAGE TECHNIQUE. (Eng.) Foss, D. C.; Laing, R. R. (Univ. Kansas Medical Center, Kansas City, KS 66102). *Am. J. Dig. Dis.* 22(8):685-689; 1977.

The value of biliary drainage in the diagnosis of gallbladder disease was studied in 70 patients with histories suggestive of gallbladder disease but with normal oral cholecystograms. Of the 29 patients with abnormal drainage studies, 26 had cholecystectomy; all specimens showed cholecystitis, and cholelithiasis was seen in 46%. Five of the 41 patients with normal drainages underwent cholecystectomy, but no abnormality was noted in any surgical specimen. Significant differences were seen when the mean WBC count, frequency of leukocytosis, and the presence of back pain were compared between the normal and abnormal drainage groups. Biliary drainage is a useful supplemental test when a false-negative oral cholecystogram is suspected.

6153 THE BLOOD SERUM IMMUNOGLOBULINS BINDING LACTATE DEHYDROGENASE. (Rus.) Voronin, V. A. (Pavlov's Inst., Physiology Acad. Sciences USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(2): 341-342; 1977.

6154 GASTROINTESTINAL ENDOSCOPY IN SURGICAL PATIENTS. (Ger.) Waldmann, D.; Fiedler, L.; Lindenmaier, H. (Chirurgische Universitatsklinik, Hugstetterstr. 55, D-7800 Freiburg/Br., W. Germany). *Zentralbl. Chir.* 102(14):844-850; 1977.

6155 CURRENT POSSIBILITIES OF FIBERENDOSCOPY OF THE DIGESTIVE TRACT. (Ita.) Spinelli, P. (Istituto Nazionale per lo Studio e la Cura dei Tumori, Milan, Italy). *Terapia* 61(439):83-85; 1976.

6156 RESULTS OF FIBROENDOSCOPY UTILIZATION IN CLINICAL SURGERY OF THE ALIMENTARY TRACT. (Pol.) Karcz, D.; Popiela, T. (Z I Kliniki Chirurgii Ogolnej i Samodzielnego Oddzialu Chirurgii Gastroenterolgicnej AM ul. Pradnicka 37, 31-202 Krakow, Poland). *Prezgl. Lek.* 33(7):655-662; 1976.

6157 COMPLICATIONS IN 12,683 ENDOSCOPIC BIOPTIC GASTROENTEROLOGICAL EXAMINATIONS: RETROSPECTIVE SURVEY OF 10 YEARS. (Ger.) Halter, F. (Gastroenterologischen Abteilung der Medizinischen Fakultat, Inselspital, Ch-3010 Bern, Switzerland). *Z. Gastroenterol.* 14(7):712-713; 1976.

6158 COMPLICATIONS AND SIDE-EFFECTS OF FIBER-ENDOSCOPIC EXAMINATIONS OF THE UPPER SEGMENT OF THE GASTROINTESTINAL TRACT. (Ger.) Gassmann, R.; Baumgartner, R.; Hefti, M. L.; Leuthold, E.; Stocker, H. (FMH fur Gastroenterologie, Plattenstr. 44, 8032 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):713-715; 1976.

6159 EXAMINATIONS OF UPPER GASTROINTESTINAL BLEEDING--VALUE OF EMERGENCY ENDOSCOPY. (Ger.) Waldmann, D.; Hartung, H.; Roth, H. J. (Chirurgische Universitatsklinik, Hugstetterstr. 55, D-7800 Freiburg i. Br., W. Germany). *Zentralbl. Chir.* 102(5):262-269; 1977.

6160 IMMUNOLOGICAL DIAGNOSIS OF GASTROENTEROLOGICAL DISEASES. (Ger.) Morenz, J. (Medizinische Akademie Magdeburg, Leipziger Str. 44, DDR-301 Magdeburg, E. Germany). *Dtsch. Z. Verdau. Sotffwechselkr.* 36(3/4):107-111; 1976.

6161 ENDOSCOPY OF PATIENTS WITH PARAESOPHAGEAL HERNIAS. (Ger.) Rohner, H. G.; Miederer, S. E.; Wobser, E.; Louven, B. (Medizinische Klinik der Universitat, Venusberg, E. Germany). *Leber Magen Darm* 6(3):180-184; 1976.

6162 ^{14}C-TRIOCTANOIN ABSORPTION TEST. (Jpn.) Kinugasa, K.; Bamba, T.; Kashima, K.; Nakajo, S.; Hosoda, S. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Jpn. J. Gastroenterol.* 73(1):13-21; 1976.

6163 d(+)-XYLOSE TEST IN THE DIAGNOSIS OF CELIAC DISEASE IN CHILDREN. (Rus.) Alimova, M. M.; Ryzhkova, L. A. (Inst. Pediatrics, USSR Acad. Medical Sciences, USSR). *Lab. Delo* (8):487-490; 1976.

6164 COMBINATION OF GASTRODUODENOSCOPY AND SMALL INTESTINAL SUCTION BIOPSY. (Ger.) Weidenhiller, S.; Kremer, H. (Med. Poliklinik, Universitat Munchen, Pettenkoferstrasse 8 a, D-8000 Munich 2, W. Germany). *Z. Gastroenterol.* 14(8): 749-751; 1976.

6165 EVACUATION OF THE COLON BEFORE RADIOGRAPY. A CONTROLLED, COMPARATIVE STUDY OF BISACODYL ERCO, TOILAX COMP. AND PERILAX. (Dan.) Pedersen, E. B.; Brunner, S. (Rontgenafdelingen, Kobenhavns amts sygehus i Gentofte, DK-2900 Hellerup, Denmark). *Ugeskr. Laeger* 138(42):2562-2564; 1976.

6166 PANCOLONOSCOPY. (Ita.) Pizzetti, P. (Istituto Nazionale per lo Studio e la Cura dei Tumori, Milan, Italy). *Terapia* 61(439): 86-89; 1976.

6167 SERUM ANTIRETICULIN ANTIBODIES: THEIR FREQUENCY AND SIGNIFICANCE IN ACUTE, SUBACUTE AND CHRONIC DIARRHEA IN CHILDREN [Abstract]. (Fre.) Mougenot, J. F.; Goeverts, J.; Simonneau, M.; Polonovski, C. (Hopital Trousseau, Paris, France). *Gastroenterol. Clin. Biol.* 1(3):309-310; 1977.

6168 BIOCHEMISTRY OF HUMAN STOOLS. (Ger.) Seige, K.; Muller, G. (II. Medizinischen Klinik, Martin-Luther-Universitat, Leninallee 2, DDR-402 Halle, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):237-238; 1976.

6169 THE VALUE OF ROUTINE X-RAY INVESTIGATION OF THE STOMACH AND DUODENUM IN PATIENTS WITH BILIARY TRACT DISEASE. (Dan.) Sparso, B. H. (Palthomterrasserne 12 F, DK-3520 Farum, Denmark). *Ugeskr. Laeger* 139(2):76-77; 1977.

6170 DOUBLE CONTRAST EXAMINATION OF THE STOMACH: SUGGESTIONS FOR A ROUTINE METHOD. (Ger.) Tschaikowski, K. L. (Facharzt fur Innere Medizin/Gastroenterologie, Lichhof 10, 5000 Cologne 1, W. Germany). *Roentgenblaetter* 29(8):399-404; 1976.

6171 DOUBLE CONTRAST EXAMINATION OF THE STOMACH: DEFINITION, TECHNIQUE, INDICATIONS. (Ger.) Frik, W.; Fernholz, H. J.; Spieth, W. (Abteilung Radiologie, Medizinische Fakultat, Goethestrasse 27/29, D-5100 Aachen, W. Germany). *Z. Gastroenterol.* 14(4):487-497; 1976.

6172 COMBINED TECHNIQUE OF RADIOLOGICAL EXAMINATION OF THE STOMACH; DIRECT AND IMPROVED INDIRECT X-RAY EXPOSURE. (Ger.) Fuchs, H. F. (Medizinischen Klinik mit Poliklinik, Universitat Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Leber Magen Darm* 6(3):146-153; 1976.

6173 SIMPLE INTRAVITAL STAINING AS A DIAGNOSTIC MEANS FOR CONTROL GASTROSCOPY IN PATIENTS WITH PERNICIOUS ANEMIA. (Ger.) Kobler, E.; Sulser, H.; Deyhle, P. (Departement fur Innere Medizin, Universitat Zurich, Ramistrasse 100, Ch-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):709-711; 1976.

6174 GASTROCAMERA EXAMINATION VERSUS GASTROSCOPY. (Ger.) Heinkel, K. (Med. Klinik, Krankenhaus Bad Cannstatt, Priessnitzweg 24, 7000 Stuttgart 50, W. Germany). *Z. Gastroenterol.* 14(4): 498-507; 1976.

6175 CYTOLOGICAL DIAGNOSIS OF GASTRIC CHANGES. (Ita.) Durante, E. (Istituto di Patologia Speciale Chirurgica dell'Universita, Ferrara, Italy). *Minerva Med.* 67(7):425-428; 1976.

6176 GASTRIC ACID SECRETION IN HEALTHY CHILDREN. (Por.) Costa, F.; Tedesco Marchese, L.; Villari, F. S.; Zeitune, J. M. R.; de Moraes Novaes, H. (Departamento de Medicina e Chirurgica, Centro de Ciencias da Saude, Universidade Estadual de Londrina, Londrina, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 32(2):86-89; 1977.

6177 STUDIES ON THE SERUM GASTRIN RESPONSE TO A TEST MEAL. (Jpn.) Murai, S.; Nukaga, A.; Toyama, S.; Watanabe, Y.; Adachi, J.; Nagata, K.; *et al.* (Jikei Univ. Sch. Medicine, Japan). *Jpn. J. Gastroenterol.* 73(1):84-93; 1976.

6178 NEW METHOD FOR THE FUNCTIONAL EXAMINATION OF THE PANCREAS: para-AMINOBENZOIC ACID TEST [Abstract]. (Fre.) Ribet, A.; Tournut, R.; Vaysse, N.; Hallac, S.; Septi, F. (Groupe de Recherche de Biologie et Pathologie Digestive, INSERM U-151, CHU de Rangueil, Toulouse, France). *Gastroenterol. Clin. Biol.* 1(4):404; 1977.

6179 "VENTRAL PANCREAS." CHARACTERISTIC DIFFERENTIAL DIAGNOSIS BY ENDOSCOPIC CHOLEDOCHOPANCREATOGRAPHY. (Fre.) Ljunggren, B.; Rey, J. F.; Faure, X.; Delmont, J. (Hopital de Cimiez, 4, avenue Reine-Victoria, F 06100 Nice, France). *Nouv. Presse Med.* 5(36):2391; 1976.

6180 OUR EXPERIENCE WITH PANCREATIC ECHOTOMOGRAPHY. (Fre.) Dardenne, A. N.; Marchall, G. (Cliniques Universitaires Saint-Pierre, Brusselsestraat 69, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):465-473; 1976.

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6187 TRANSPARIETAL CHOLANGIOGRAPHY (MODIFICATION OF OKUDA'S TECHNIQUE) [Abstract]. (Fre.) Michel, H.; Raynaud, A.; Pomier-Layrargues, G.; Pueyo, J.; Dubois, A.; Bruel, J. M. (Hopital Saint-Eloi, 34059 Montpellier, France). *Gastroenterol. Clin. Biol.* 1(4):399-400; 1977.

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6189 CLINICAL AND CHEMICAL ASPECTS OF CONTRAST MEDIUM RESIDUES IN THE INTESTINE WITH ORAL CHOLECYSTOGRAPHY WITH TRIJOBIL AND FALIGNOST. (Ger.) Quasdorf, M.; Becker, Chr.; Quasdorf, G.; Becker, H. W. (Radiologischen Klinik der Martin-Luther-Universitat Halle-Wittenberg, 402 Halle, E. Germany). *Radiol. Diagn. (Berl.)* 18(1):19-28; 1977.

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6192 WHOLE BODY COMPUTED TOMOGRAPHY OF LIVER AND PANCREAS. INITIAL RESULTS. (Fre.) Lamarque, J. L.; Bruel, J. M.; Dondelinger, R.; Senac, J. P.; Rabischong, P.; Bonnel, F.; *et al.* (Hopital St-Eloi, 4, av. Bertin-Sans, F 34059 Montpellier Cedex, France). *Nouv. Presse Med.* 6(16):1363-1367; 1977.

6193 GRAY-SCALE ULTRASONOGRAPHY OF THE LIVER AND GALLBLADDER. (Ger.) Triller, J. (Institut fur Diagnostiche Radiologie der Universitat Inselsipital, CH-3010 Bern, Switzerland). *Radiologe* 16(8):328-336; 1976.

6194 COLOR CONTACT THERMOGRAPHY IN DIAGNOSIS OF ACUTE APPENDICITIS, ACUTE ADNEXITIS AND EXTRAUTERINE PREGNANCY. (Rus.) Nikitinskaya, N. I.; Rosentul, E. B.; Yakimov, Yu. V. (Dept. Obstetrics and Gynecology, Arkhamgelsk Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):50-52; 1977.

6195 CURRENT DIAGNOSTIC METHODS FOR LESIONS OF THE PANCREAS. (Rus.) Bondar, Z. A.; Tuzhilin, S. A. (First Moscow Medical Inst., USSR). *Klin. Khir. (Mosk.)* 55(6):26-31; 1977.

6196 THE COMPARISON OF HEPATIC SCINTIGRAM WITH SCANNING FOR LIVER CANCER. (Jpn.) Oishi, H.; Shibatsuji, H.; Hamada, S.; Miura, T.; Hosogi, Y.; Inoue, K.; *et al.* (Nara Univ. Sch. Medicine, Nara, Japan). *Jpn. J. Clin. Radiol.* 21(2):177-182; 1976.

6197 COLONOSCOPY. (Rus.) Voskresensky, P. K. (N. I. Pirogov Second Medical Inst., Moscow, USSR). *Vestn. Khir.* 118(5):142-147; 1977.

See also, 6029, 6133, 6135, 6198, 6199, 6200, 6201, 6218, 6223, 6224, 6227, 6234, 6253, 6257, 6260, 6289, 6291, 6292, 6294, 6307, 6315, 6323, 6325, 6326, 6328, 6330, 6337, 6339, 6340, 6345, 6346, 6355, 6358, 6359, 6361, 6362, 6363, 6367, 6370, 6381, 6382, 6383, 6386, 6391, 6393, 6394, 6410, 6465, 6517, 6545, 6546, 6547, 6548, 6549, 6550, 6563, 6571, 6574, 6575, 6577, 6578, 6579, 6581, 6590, 6591, 6611, 6630, 6631, 6635, 6640, 6642, 6645, 6658, 6660, 6664.

GASTROINTESTINAL DISEASES

ESOPHAGUS

6198 A PROSPECTIVE, RANDOMISED STUDY OF ENDOSCOPY AND RADIOLOGY IN ACUTE UPPER-GASTROINTESTINAL-TRACT BLEEDING. (Eng.) Dronfield, M. W.; Ferguson, R.; McIllmurray, M. B.; Atkinson, M.; Langman, M. J. S. (City Hosp., Nottingham NG5 1PB, England). *Lancet* 1(8023):1167-1169; 1977.

The value of emergency endoscopy was compared with that of radiology in a prospective, randomized investigation of 318 patients hospitalized with acute upper gastrointestinal bleeding. Although the diagnostic yield was higher in the endoscopy group (108/162) than the radiology group (88/160), there was no difference between the two groups in management or survival, and the accuracy of the findings, as judged independently at operation and/or autopsy, was also similar in the two groups. These findings cast doubt on the need to provide emergency endoscopic facilities for the investigation of patients with acute upper gastrointestinal bleeding where radiological services are already adequate.

6199 RADIOLOGIC TREATMENT OF ESOPHAGEAL FOOD IMPACTION USING INTRAVENOUS GLUCAGON. (Eng.) Ferrucci, J. T., Jr.; Long, J. A., Jr. (Massachusetts General Hosp., Boston, MA 02114). *Radiology* 125(1):25-28; 1977.

The cases of three patients in whom esophageal food impaction was successfully treated using i.v. glucagon are presented. These patients were among six given 1.0 mg of glucagon; food impaction persisted in the remaining three. The patients who were successfully treated had impaction for 1-3 days before presentation. In all cases, barium swallow 15 min after glucagon administration revealed that the food bolus had passed with complete clearing of the esophageal lumen. Since proteolytic enzyme digestion of bolus impaction carries a clear risk of fatal esophageal perforation, early therapeutic administration of glucagon during the initial esophagography affords a safe and effective acute-care radiologic adjunct.

6200 PROGNOSTIC SIGNIFICANCE OF PORTAL PRESSURE IN PATIENTS WITH BLEEDING ESOPHAGEAL VARICES. (Eng.) Adamsons, R. J.; Butt, K.; Dennis, C. R.; Kinkhabwala, M.; Moskowitz, H.; Gordon, D.; *et al.* (Downstate Medical Center, Brooklyn, NY). *Surg. Gynecol. Obstet.* 145(3):353-356; 1977.

Portal pressure was determined in 76 patients during the acute bleeding episode of hemorrhagic varices, and the degree of portal hypertension was related to the cessation or noncessation of hemorrhage with nonoperative management. Portal pressure was determined by hepatic vein wedge catheter in 40 patients, by splenic puncture in 19, intraoperatively in 11, and by percutaneous transhepatic portal vein cannulation in 6. Hemorrhage was arrested nonsurgically in 38 patients and had to be treated surgically in the remainder; the age range of the two groups was similar, 45.3 yr and 45.0 yr, resp. To compare the outcome of hemorrhage with the degree of portal hypertension, all patients were divided into subgroups, with increments in portal pressure of 3 cm of saline solution in each subgroup. No patient with portal pressure less than 17 cm of saline solution had documented bleeding from esophageal varices. While the cessation of hemorrhage in patients with a portal pressure of 27-33 cm was 100% with conservative treatment, there was a decreasing percentage of cessation of hemorrhage in each subgroup with increasing portal pressure: 65, 46.7, 38.5, 25.0, 16.7, and 0%, resp., for each 3 cm rise in pressure. The last group, in which 0% of the patients could be treated conservatively, consisted of five patients with pressures of 49-54 cm saline. These data were statistically significant ($p<0.001$). The results indicate that there is a direct relation between the severity of hemorrhage and the degree of portal hypertension. Portal pressure should be determined as soon as feasible when bleeding varices are suspected, and other causes of hemorrhage should be carefully excluded. The data are of great prognostic significance and might be helpful in planning the course of therapy in these patients.

6201 SUPERIOR VENA CAVAL OBSTRUCTION COMPLICATING FIBREOPTIC GASTROSCOPY. (Eng.) Dawson, J. (King Edward Memorial Hosp., London W13, England). *Br. Med. J.* 2(6083):368; 1977.

6202 PRIMITIVE RETICULUM CELL SARCOMA OF THE ESOPHAGUS. (REPORT ON TWO CASES TREATED SURGICALLY). (Eng.) Pruna, D. C.; Gutierrez, A. G.; Brooks, R. G. (Hospital "General Calixto Garcia," Havana, Cuba). *Chir. Gastroenterol.* 10(4):461-463; 1976.

6203 CONGENITAL OESOPHAGOBRONCHIAL FISTULA IN THE ADULT. (Eng.) Salepcioglu, A.; Cebeci, H.; Saner, H.; Akcal, T. (Cerrahpasa Medical Faculty, Istanbul, Turkey). *Br. J. Surg.* 64(8):581-582; 1977.

6204 ESOPHAGEAL PERFORATION: AN UNUSUAL PRESENTATION WITH A BENIGN CLINICAL COURSE. (Eng.) DeLuca, R. F.; Tedesco, F. J.; Ballan, K.; Wortzel, E.; Rogers, A. I. (Univ. Miami Sch. Medicine, Miami, FL). *Am. J. Gastroenterol.* 67(4):362-365; 1977.

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Paulo, Sao Paulo, Brazil). *Chir. Gastroenterol.* 11(1):7-14; 1977.

6206 IATROGENIC ESOPHAGITIS. (Eng.) Meyer, C.; Calderoli, H.; Jamart, J.; Hollender, L. F. (Centre Hospitalo-Universitaire, Strasbourg, France). *Chir. Gastroenterol.* 11(1):29-35; 1977.

6207 HIATAL HERNIA: WHAT TO GUARD AGAINST MOST IN POSTOP PATIENTS. (Eng.) Sweet, K. (No affiliation given). *Nursing* 7(8):36-43; 1977.

6208 GASTROESOPHAGEAL REFLUX AND ASCORBIC ACID INSUFFICIENCY. (Eng.) Hiebert, C. A. (321 Brackett St., Portland, ME 04102). *Ann. Thorac. Surg.* 24(2):108-112; 1977.

6209 COLON AS A SUBSTITUTE FOR THE ESOPHAGUS. (Eng.) Amirkhan, A. D.; Malek, H.; Ebadi, A. (No affiliation given). *Abdom. Surg.* 19(7/8): 159-160; 1977.

6210 AUTOMATIC ONLINE NUMERICAL ANALYSIS OF PROLONGED RECORDING OF GASTRO-OESOPHAGEAL ACID REFLUX. (Eng.) Madsen, T.; Boesby, S. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Med. Biol. Eng. Comput.* 15(4):402-406; 1977.

6211 PERFORATION OF THE PHARYNX IN THE NEWBORN. A NEAR LOOK-ALIKE FOR ESOPHAGEAL ATRESIA. (Eng.) Heller, R. M.; Kirchner, S. G.; O'Neill, J. A. (Vanderbilt Univ. Hosp., Nashville, TN 37232). *Am. J. Roentgenol.* 129(2):335-337; 1977.

6212 CLINICAL FINDINGS, EARLY ENDOSCOPY, AND MULTIVARIATE ANALYSIS IN PATIENTS BLEEDING FROM THE UPPER GASTROINTESTINAL TRACT. (Eng.) Morgan, A. G.; McAdam, W. A. F.; Walmsley, G. L.; Jessop, A.; Horrocks, J. C.; De Dombal, F. T. (Airedale District General Hosp., Steeton, Keighley, Yorkshire BD20 6TD, England). *Br. Med. J.* 2(6081): 237-240; 1977.

6213 A SEARCH FOR VOLATILE NITROSAMINES IN EAST AFRICAN SPIRIT. (Eng.) Gough, T. A. (Lab. Government Chemist, London, England). *Gut* 18(4):301-302; 1977.

6214 SURGICAL TREATMENT OF PEPTIC OESOPHAGEAL STRICTURE WITH NISSEN FUNDOPLICATION AND INTRAOPERATIVE DILATATION. (Eng.) Mokka, R. E. M.; Kairaluoma, M. I.; Larmi, T. K. I. (Dept. Surgery, Univ. Oulu, SF-90220 Oulu 22, Finland). *Ann. Chir. Gynaecol.* 66:72-75; 1977.

6215 RESPIRATORY FUNCTION AFTER REPAIR OF CONGENITAL DIAPHRAGMATIC HERNIA. (Eng.) Landau, L. I.; Phelan, P. D.; Gillam, G. L.; Coombs, E.; Noblett, H. R. (Royal Children's Hosp., Flemington Rd., Parkville, Victoria 3052, Australia). *Arch. Dis. Child.* 52(4):282-286; 1977.

6216 CARCINOMA OF THE OESOPHAGUS AND CARDIA. (Eng.) Kairaluoma, M. I.; Karkola, P.; Jokinen, K.; Larmi, T. K. I. (Dept. Surgery, Univ. Oulu, SF-90220 Oulu 22, Finland). *Ann. Chir. Gynaecol.* 66:8-13; 1977.

6217 THE PATHO-PHYSIOLOGY OF GASTRO-OESOPHAGEAL REFLUX. (Eng.) Atkinson, M. *In: Topics in Gastroenterology.* Edited by S. C. Trulove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):67-83; 1976.

6218 ENDOSCOPIC ASPECTS. (Eng.) Gibbs, D. D. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):85-91; 1976.

6219 PATHOLOGICAL ASPECTS. (Eng.) Thompson, H. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):93-108; 1976.

6220 COMPLICATIONS IN HIATAL HERNIA. (Rus.) Smakov, G. M.; Melentiev, M. G. (No affiliation given). *Klin. Med.* 55(4):24-28; 1977.

6221 EXPERIENCE WITH TREATMENT FOR ACHALASIA (CARDIOSPASM) BY CARDIODILATATION. (Rus.) Grebenev, A. L.; Geppe, A. A. (I. M. Sechenov First Medical Inst., Moscow, USSR). *Klin. Khir. (Mosk.)* 55(6):38-46; 1977.

6222 LOWER PHARYNX CANCER OF THE ESOPHAGEAL WEB. (Jpn.) Okimura, T.; Rikimaru, S.; Hamada, S.; Kakishita, M.; Omichi, T. (Kanazawa Univ. Sch. Medicine, Kanazawa, Japan). *Jpn. J. Clin. Radiol.* 20(7):597-599; 1975.

6223 MODERN ASPECTS OF DIAGNOSIS AND TREATMENT OF SOME ESOPHAGEAL LESIONS AND THEIR COMPLICATIONS. (Rus.) Lutsevich, E. V.; Belov, I. N.; Struchkov, Yu. V.; Karelina, E. A. (I. M. Sechenov First Medical Inst., Moscow, USSR). *Grudn. Khir.* (3):119-124; 1977.

See also, 6158, 6161, 6246, 6257, 6260, 6290, 6533, 6544, 6596.

6224 GASTRIC EMPTYING IN DIABETIC AUTONOMIC NEUROPATHY.

(Eng.) Campbell, I. W.; Heading, R. C.; Tothill, P.; Buist, T. A. S.; Ewing, D. J.; Clarke, B. F. (Royal Infirmary, Edinburgh, Scotland). *Gut* 18(6):462-467; 1977.

Gastric emptying was studied in six diabetic patients with and six without objective evidence of autonomic neuropathy, using a double isotope scintiscanning technique, which differentiated between solid and liquid emptying. Gastric stasis was observed in three of the patients with autonomic neuropathy, although this was detected by conventional radiology (barium examination) in only one of these three patients. The half-time values for liquid marker emptying in the three patients with gastric stasis were 106, 103, and 205 min, compared with a nondiabetic control value of 39 ± 12 min. The other three patients with autonomic neuropathy exhibited normal gastric emptying half-time values (range, 26-52 min) as did the six diabetics without autonomic neuropathy (range, 20-52 min). Neither patients with stasis nor those without stasis exhibited abnormally rapid early gastric emptying. Whereas nondiabetic control subjects exhibited clear differences in emptying patterns of liquid and solid markers (solids emptying more slowly than the liquid), the patterns of solid and liquid marker emptying in diabetics were much more alike, and there was no statistically significant difference between them. Both i.v. and p.o. metoclopramide (10 mg) produced symptomatic improvement in two patients with gastric stasis and restored their gastric emptying to normal.

6225 GASTRIC COMPLICATIONS AFTER RADIOTHERAPY FOR HODGKIN'S DISEASE AND OTHER LYMPHOMAS.

(Eng.) Kellum, J. M., Jr.; Jaffe, B. M.; Calhoun, T. R.; Ballinger, W. F., II. (Tufts Univ. Sch. Medicine, 171 Harrison Ave., Boston, MA 02111). *Am. J. Surg.* 134(3):314-317; 1977.

The cases of six patients (17-63 yr; average, 39 yr) who developed gastric complications after radiotherapy for lymphomas are reported. Three patients received radiation therapy for Hodgkin's disease, two for primary gastric lymphomas, and one for generalized lymphosarcoma. The complications occurred from 2 months to 11.5 yr (median, 3 months) after irradiation, and all patients received a cumulative dose of at least 4,500 rads. The first patient received a cumulative irradiation dose of 17,500 rads, of which more than 6,000 rads was directed to the upper abdomen. She developed a gastrocolic fistula 12 months later, which was successfully treated by subtotal gastrectomy, gastrojejunostomy, and resection of the involved portion of transverse colon. The second patient received a total dose of 4,550 rads to the epigastrium. Esophagogastrectomy, vagotomy, pyloroplasty, and splenectomy were carried out 2 months after the last dose for the removal of what was found to be a radiation pseudotumor. The third patient developed a large perforating gastric ulcer 3 months following a total dose of 8,000 rads. Two months following a total dose of over 4,500 rads, the fourth patient developed gastric ulceration. The fifth patient developed radiation gastritis 2 months following 4,000 rads total nodal radiation, and the sixth patient developed a pyloric stricture 138 months following a total dose of 5,700 rads. Gastric resection with gastrojejunostomy was the surgical treatment in the last four cases. In most cases, the symptoms of radiation injury mimicked those of recurrent neoplastic disease.

6226 MUCOSAL CHANGES IN THE GASTRIC STUMP 20-25 YEARS AFTER PARTIAL GASTRECTOMY.

(Eng.) Schrumpf, E.; Stadaas, J.; Myren, J.; Serck-Hanssen, A.; Aune, S.; Osnes, M. (Ulleval Hosp., Oslo, Norway). *Lancet* 2(8036):467-469; 1977.

The value of routine endoscopy combined with multiple biopsies in patients with gastric resection was evaluated in 108 patients who underwent Billroth type-II gastrectomy 20-25 yr previously. In no case were the endoscopic appearances of the mucosae interpreted as malignant, although in two patients the clinical history suggested malignant disease. The histological examination revealed infiltrating carcinoma in four patients, three of whom had intramucosal carcinoma only. Three further patients had severe dysplasia (carcinoma *in situ*). Only one patient had a near-normal mucosa close to the anastomosis; in the remainder the gastric remnant showed various degrees of dysplasia, metaplasia, or chronic atrophic gastritis. In the patients with carcinoma only, 28 of the 226 biopsy specimens revealed the malignant lesion. Patients who have had partial gastrectomy for benign lesions are at high risk of gastric stump carcinoma. If endoscopy with multiple biopsy is carried out 20 yr after resection, stump carcinoma may be detected when the prognosis after operation is probably good.

6227 BARIUM MEAL APPEARANCE SIMULATING SUPERFICIAL ULCERATION.

(Eng.) Gould, S. R.; Frank, P.; Davison, L.; Bogomoletz, W. V.; Barnardo, D. E. (St. Mark's Hosp., City Rd., London EC1V 2PS, England). *Clin. Radiol.* 28(4):449-452; 1977.

The cases of five patients in whom a single contrast barium meal examination demonstrated diffuse gastric spiculation simulating superficial ulceration are summarized. The examination was carried out because of duodenal ulceration in two cases, gastroesophageal reflux in one case, and ileocolic Crohn's disease in one; gastroscopy prior to barium examination was normal in these four patients. The fifth patient had endoscopically and histologically confirmed gastritis. The results indicate that a barium meal spiculation pattern simulating widespread superficial mucosal ulceration may coexist with gastroscopically and histologically normal mucosa. This radiological appearance may be due to filling of the grooves between the areae gastricae and may thus represent a normal anatomical variant.

6228 EFFECT OF PREDNISONE ON VITAMIN E SERUM LEVEL IN PATIENTS WITH GASTRITIS WITH SECRETORY INSUFFICIENCY. (Rus.) Khubutiya, R. D. (Ryazan Medical Inst., USSR). *Vrach. Delo* (3):25-27; 1977.

6229 CHARACTERISTICS OF CYTOGRAMS IN ADENOMATOUS POLYPS OF THE STOMACH. (Rus.) Chistyakova, O. V. (Lab. Clinical Cytology, Cancer Res. Center, Moscow, USSR). *Lab. Delo* (4):205-208; 1977.

6230 EARLY COMPLICATIONS AFTER RESECTION OF THE STOMACH FOR PENETRATING GASTRODUODENAL ULCERS. (Rus.) Magomedov, A. Z.; Magomedov, Sh. M.; Dibirov, A. D. (Dagestan Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):114-117; 1977.

6231 TETANY IN PYLORIC STENOSIS (Rus.) Usmanov, N. U.; Abduzhabbarov, A. (Tadzhik Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):117-119; 1977.

6232 ALGESIC SKIN-REFLEX MANIFESTATIONS IN GASTRIC AND DUODENAL ULCER. (Rus.) Babitsky, E. L. (Polyclinic, Kiev Subway System, USSR). *Vrach. Delo* (3):20-22; 1977.

6233 STOMACH INJURIES IN ACUTE INTOXICATIONS WITH CORROSIVES. (Rus.) Rasukas, V. A.; Yurryavichus, B. P.; Misevichus, I. R.; Noreika, L. L. (Medical Faculty, Vilnius Univ., USSR). *Vrach. Delo* (5):25-28; 1977.

6234 ANALYSIS OF DIAGNOSTIC ERRORS IN OUTPATIENTS WITH STOMACH CANCER. (Rus.) Vartanyan, M. G. (Saratov Medical Inst., USSR). *Klin. Khir.* (5):73-74; 1977.

6235 CASE OF EOSINOPHILIC INFILTRATES OF THE STOMACH AND LUNGS. (Rus.) Maslennikova, A. A.; Bargutina, T. G. (Aktyubinsk Medical Inst., USSR). *Klin. Med. (Mosk.)* 55(8):129-130; 1977.

6236 A CASE OF ISOLATED LYMPHOGRANULOMATOSIS OF THE STOMACH. (Rus.) Davydov, A. A. (Mikhailovsk Interdistrict Cancer Dispensary, Volgograd Oblast, USSR). *Vestn. Rentgenol. Radiol.* (4):90-91; 1977.

6237 A CASE OF PHYTOBEZOAR OF THE STOMACH. (Rus.) Bogatyuk, O. R. (Dzerzhynsky Polyclinic, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (4):91-93; 1977.

6238 CASE OF LEIMYOMA OF THE STOMACH. (Rus.) Firsov, E. S. (Kursk Medical Inst., USSR). *Vestn. Rentgenol. Radiol.* (4):89-90; 1977.

6239 MENETRIER'S DISEASE: PROTEIN-LOSING GASTROPATHY AND ANTIPLASMIN THERAPY. (Jpn.) Ikezaki, M.; Imanishi, H.; Nishigaki, I.; Kohli, Y.; Kondo, M.; Hosokawa, J.; *et al.* (Kyoto Prefectural Univ. Sch. Medicine, Kyoto, Japan). *Jpn. J. Gastroenterol.* 73(6):692-696; 1976.

6240 SYPHILIS AND SQUAMOUS CELL CARCINOMA OF THE STOMACH: A CASE REPORT. (Eng.) Rochester, D.; Brosnan, J. J.; Straus, F. H., II. (Univ. Chicago Hosp. and Clinic, 950 E. 59th St., Chicago, IL 60637). *Gastroenterol. Radiol.* 1(4):335-337; 1977.

6241 SUPERFICIAL CYSTIC GASTRITIS WITH ALOPECIA: A FORME FRUSTE OF THE CRONKHITE-CANADA SYNDROME. (Eng.) Lipper, S.; Kahn, L. B. (Univ. Cape Town Medical Sch., Observatory, Cape Town, South Africa). *Arch. Pathol. Lab. Med.* 101(8):432-436; 1977.

6242 INFANTILE PYLORIC STENOSIS: SURGICAL MATERIAL OF 100 PATIENTS. (Eng.) Seppanen, E. J.; Heikkinen, E. S.; Kaltiala, E. K.; Larmi, T. K. I. (Oulu Univ. Central Hosp., SF-90220 Oulu 22, Finland). *Z. Kinderchir. Grenzgeb.* 21(2):141-147; 1977.

6243 WHERE IS YOUR VAGOTOMY INCOMPLETE? OBSERVATIONS ON OPERATIVE TECHNIQUE. (Eng.) Johnson, A. G.; Baxter, H. K. (Charing Cross Hosp., London, W6 8RF, England). *Br. J. Surg.* 64(8):583-586; 1977.

6244 KAPOSI'S SARCOMA OF THE STOMACH. (Eng.) Balthazar, E. J.; Richman, A. (New York Medical Coll.-Metropolitan Hosp. Center, 1901 First Ave., New York, NY 10029). *Am. J. Gastroenterol.* 67(4):375-379; 1977.

6245 CRITIQUE AND SUMMARY ON THE CLINIC OF SPV + PYLOROPLASTY (1964-1974). (Eng.) Holle, F. (No affiliation given). *Chir. Gastroenterol.* 11(1):69-75; 1977.

6246 Y-U PYLOROPLASTY. (Eng.) Szauer, J. S.; Vivas, C. A.; Baylis, S. M. (Pontiac General Hosp., Seminole at West Huron, Pontiac, MI 48053). *Am. J. Surg.* 134(2):270-271; 1977.

6247 ANTROPYLORIC HYPERTROPHY, ULCER MULTIPLICITY, AGE AND SEX OF PATIENTS RELATED TO ULCER SIZE IN GASTRIC ULCER. (Eng.) Liebermann-Meffert, D.; Allgower, M.; Tondelli, P. (Kantonsspital, Basle, Switerland). *Chir. Gastroenterol.* 11(1):45-49; 1977.

6248 SURGICAL TREATMENT AND ADJUVANT CHEMOTHERAPY OF GASTRIC CANCER ON THE BASIS OF PATHO-

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6249 LOCAL INJECTION OF ANTITUMOR AGENTS IN THE GASTRIC WALL FOR TREATMENT OF NODAL METASTASES OF GASTRIC CARCINOMA. (Eng.) Kikuchi, K.; Aneha, Y.; Kanno, H.; Kunii, Y.; Hirata, K. (Sendai Natl. Hosp., Sendai, Japan). *Tohoku J. Exp. Med.* 122(2):121-127; 1977.

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6252 THE EVALUATION OF R-2 OPERATION OF EARLY GASTRIC CARCINOMA. (Eng.) Terada, M. (Tokyo Women's Medical Coll., Tokyo, Japan). *Chir. Gastroenterol.* 10(4):399-400; 1976.

6253 PHLEGMONOUS GASTRITIS DIAGNOSED BY ENDOSCOPIC SNARE BIOPSY. (Eng.) Bron, B. A.; Deyhle, P.; Pelloni, S.; Krejs, G. J.; Siebenmann, R. E.; Blum, A. L. (Triemli Hosp., 8063 Zurich, Switzerland). *Am. J. Dig. Dis.* 22(8):729-733; 1977.

6254 THE EFFECT OF VITAMIN D_2 TREATMENT ON BONE MINERAL AFTER PARTIAL GASTRECTOMY. (Eng.) Alhava, E. M.; Aukee, S.; Juuti, M.; Karjalainen, P.; Kettunen, K. (Univ. Central Hosp. of Kuopio, Kuopio, Finland). *Scand. J. Gastroenterol.* 12(4):497-499; 1977.

6255 DUMPING FOLLOWING PARTIAL GASTRECTOMY. (Eng.) Svennevig, J. L.; Vetvik, K.; Bernstein, O.; Sigstad, H. (Aust-Agder Central Hosp., Arendal, Norway). *Ann. Chir. Gynaecol.* 66:4-7; 1977.

6256 MALIGNANT GASTRIC NEUROENDOCRINOMAS: ULTRASTRUCTURAL AND BIOCHEMICAL CHARACTERIZATION OF THEIR SECRETORY ACTIVITY. (Eng.) Chejfec, G.; Gould, V. E. (Univ. Illinois Coll. Medicine, Chicago, IL). *Hum. Pathol.* 8(4):433-440; 1977.

6257 X-RAY NEGATIVE DYSPEPSIA. (Eng.) Salter, R. H. (Cumberland Infirmary, Carlisle, England). *Br. Med. J.* 2(6081):235-236; 1977.

6258 ULCERATION AND NECROSIS OF THE GASTRIC WALL AFTER HIGHLY SELECTIVE VAGOTOMY. (Eng.) Kalsbeek, H. L. (Diakonessen-inrichting Bronovo, The Hague, Netherlands). *Arch. Chir. Neerl.* 29(2):101-108; 1977.

6259 GASTRIC PHYSIOLOGY. (Eng.) Cooperman, A. M. (Cleveland Clinic, Cleveland, OH). *Cleveland Clin. Q.* 44(2):65-71; 1977.

6260 X-RAY EXAMINATION OF ENDOSCOPY? A BLIND PROSPECTIVE STUDY INCLUDING BARIUM MEAL, DOUBLE CONTRAST EXAMINATION, AND ENDOSCOPY OF ESOPHAGUS, STOMACH, AND DUODENUM. (Eng.) Hedemand, N.; Kruse, A.; Madsen, E. H.; Mathiasen, M. S. (Aarhus Kommunehospital, Aarhus, Denmark). *Gastroenterol. Radiol.* 1(4):331-334; 1977.

See also, 6041, 6043, 6045, 6050, 6054, 6146, 6158, 6164, 6169, 6170, 6171, 6172, 6173, 6174, 6175, 6177, 6198, 6208, 6210, 6212, 6216, 6217, 6262, 6263, 6271, 6272, 6274, 6275, 6277, 6278, 6279, 6280, 6281, 6282, 6283, 6285, 6286, 6366, 6544, 6585, 6590, 6591, 6595, 6596, 6602, 6657.

STOMACH

Peptic Ulcers

6261 ANTRAL GASTRIN AND ACID SECRETION IN DUODENAL ULCER PATIENTS. (Eng.) Perreault, C.; Coutsoftides, T.; Himal, H. S. (Dept. Experimental Surgery, McGill Univ., Montreal, Quebec, Canada). *Am. J. Surg.* 134(2):244-247; 1977.

The acid and gastrin responses to meat extract were studied in 12 normal subjects and in 51 duodenal ulcer patients before and after vagotomy-antrectomy or vagotomy and drainage. Two groups of ulcer patients were identified: antral responders (19 patients), in whom meat extract instillation led to at least a 50% increase in acid output, and antral nonresponders (32 patients), in whom meat extract instillation caused no significant response. The basal acid output was significantly greater in antral nonresponders than in antral responders (6.9 ± 0.8 versus 3.3 ± 1.1 mEq/l, $p<0.001$). Food-stimulated gastrin output was significantly greater in antral responders than in nonresponders (163.3 ± 6.6 versus 89.9 ± 9.7 pg/ml, $p<0.001$). Food-stimulated and peak acid outputs significantly decreased after vagotomy and drainage and after vagotomy-antrectomy in both responders and nonresponders. Basal acid output significantly decreased in the responders after vagotomy-antrectomy, but not after vagotomy and drainage. Basal and food-stimulated gastrin outputs decreased in the nonresponders after vagotomy-antrectomy. Basal and food-stimulated gastrin outputs increased after vagotomy and drainage in both responders and nonresponders, and food-stimulated gastrin output decreased after vagotomy-antrectomy in the responders. Differentiation of duodenal ulcer patients into antral responders and nonresponders allows for the selection of patients for specific surgery and may decrease the incidence of stomal ulceration and other complications, such as the dumping syndrome, after gastric surgery.

6262 LIGHT AND ELECTRON MICROSCOPICAL STUDIES OF PARIETAL CELLS BEFORE AND ONE YEAR AFTER PROXIMAL GASTRIC VAGOTOMY IN DUODENAL ULCER PATIENTS. (Eng.) Aase, S.; Roland, M. (Anatomical Inst., Univ. Oslo, Karl Johansgt. 47, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(4):417-420; 1977.

Parietal cell morphology was studied before and 1 yr after proximal gastric vagotomy (PGV) in four duodenal ulcer patients. The average basal gastric acid secretion of the patients was reduced from 9.2 mmol/hr before to 0.9 mmol/hr 1 yr after PGV (90% reduction). The reduction in acid secretion was not accompanied by changes in the morphology of the parietal cells. Light microscopy indicated that the average cell size was about the same before and 1 yr after PGV. Electron microscopy showed only negligible changes in the parietal cell ultrastructure.

6263 THE FUNCTIONAL STATE OF THE GASTROINTESTINAL TRACT AFTER ULCER SURGERY. A TEN-YEAR PROSPECTIVE FOLLOW-UP STUDY. (Eng.) Paakkonen, M.; Aukee, S.; Jussila, J. (Univ. Central Hosp., Kuopio, 70210 Kuopio 21, Finland). *Scand. J. Gastroenterol.* 12(5):599-603; 1977.

Absorption tests were carried out in 26 patients before and 1, 6, and 10 yr following surgery for peptic ulcer. The operations included antrectomy with gastroduodenostomy in 10, antrectomy with selective vagotomy and gastroduodenostomy in 9, and other operations in 7. None had recurrence of the ulcer or disturbing abdominal complaints during the follow-up period. Ten years after operation there was an increase in the mean value of the Schilling test, and all patients had a normal serum vitamin B_{12} level. The mean d-xylose excretion was decreased (1.3-3.1 g) in comparison with that before surgery (4.9-6.6 g), and fecal dry-weight fat content was increased. At the time of the 10th yr follow-up examination, six patients had impaired d-xylose absorption, and seven had impaired fat absorption. However, the increase in the mean body weight and the serum protein and hemoglobin concentration demonstrated that the nutritional status had not worsened.

6264 CHARACTERISTIC FEATURES OF PENTOSE PHOSPHATE PATHWAY OF CARBOHYDRATE METABOLISM IN HUMAN GASTRIC MUCOSA IN PEPTIC ULCER. (Rus.) Ivanov, G. G. (Sverdlovsk Medical Inst., USSR). *Vopr. Med. Khim.* 23(4):499-503; 1977.

6265 USE OF HYPERBARIC OXYGENATION IN TREATMENT OF PATIENTS WITH PEPTIC ULCER. (Rus.) Komarov, F. I.; Efuni, S. N.; Go-batenko, V. P.; Filimonov, R. M.; Pogromov, A. I.; Egorov, A. P.; Novikova, L. L. (First Therapeutic Faculty, I. M. Sechenov First Medical Inst., Moscow, USSR). *Klin. Med.* 55(4):29-32; 1977.

6266 ATROPINE TEST AND PROBLEM OF FUNCTIONAL CLASSIFICATION OF DUODENAL ULCER. (Rus.) Orlikov, G. A. (Republican Center Gastroenterology and Diet Therapy, Riga, USSR). *Klin. Med.* 55(4): 43-47; 1977.

6267 PANCREATICO-DUODENAL RESECTION IN PENETRATING MALIGNANT DUODENAL ULCER. (Rus.) Chernyavsky, A. A.; Kasumian, S. A. (Gorky Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):127-128; 1977.

6268 LIVER AND BILIARY PASSAGES IN CHILDREN AND TEENAGERS WITH PEPTIC ULCER. (Rus.) Netakhata, Zh. N. (A. M. Gorky Medical Inst., Donetsk, USSR). *Pediatriia* (3):62-64; 1977.

6269 MODERN PATHOGENETIC TREATMENT OF PEPTIC ULCER. (Rus.) Burchinsky, G. I. (Kiev Medical Inst., USSR). *Klin. Med. (Mosk.)* 55(6): 16-20; 1977.

6270 EFFECT OF PHENYCOBERAN ON THE ACID NEUTRALIZING FUNCTION OF THE STOMACH IN PATIENTS WITH PEPTIC ULCER. (Rus.) Shevchenko, L. T. (Vinnitsa Medical Inst., USSR). *Klin. Med. (Mosk.)* 55(8):79-80; 1977.

6271 PARIETAL CELL VAGOTOMY: SURGICAL TECHNIQUE, GASTRIC ACID SECRETION, AND RECURRENCE. (Eng.) Jaffe, B. M. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Surgery* 82(2):284-286; 1977.

6272 HIGHLY SELECTIVE VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER IN A TEACHING HOSPITAL: A ONE-TO-THREE YEAR FOLLOW-UP RELATING RESULTS TO THE NUMBER OF OPERATING SURGEONS, THEIR SURGICAL EXPER-

IENCE, AND TRAINING CONDITIONS. (Eng.) Solhaug, J. H.; Bjerkeset, T.; Halvorsen, J. F. (Haukeland Hosp., Univ. Bergen, Bergen, Norway). *Surgery* 82(2):248-253; 1977.

6273 PERFORATED DUODENAL ULCER DISEASE: THE CASE FOR A DEFINITIVE OPERATION. (Eng.) Kirkpatrick, J. R. (Sch. Medicine, Wayne State Univ., Detroit, MI). *Chir. Gastroenterol.* 10(4):385-388; 1976.

6274 THE RELATIONSHIP BETWEEN ANTRAL FUNCTION AND COMPLETENESS OF VAGOTOMY. (Eng.) Himal, H. S.; Coutsoftides, T.; Perreault, C. (Royal Victoria Hosp., Montreal, Canada). *Surg. Gynecol. Obstet.* 145(2):219-222; 1977.

6275 A PROSPECTIVE STUDY ON HIGHLY SELECTIVE VAGOTOMY IN 100 PATIENTS WITH NON-OBSTRUCTING DUODENAL ULCER. (Eng.) Geurts, W. J. C.; Wittebol, P. (Univ. Hosp. Utrecht, Utrecht, Netherlands). *Chir. Gastroenterol.* 11(1):63-67; 1977.

6276 PERFORATED DUODENAL ULCER IN BLACK PATIENTS. (Eng.) Brozin, I. H.; Prajapat, D. K.; Blumsohn, D. (Tembisa Hosp., Olifantsfontein, Tvl, South Africa). *S. Afr. Med. J.* 52(5):186-188; 1977.

6277 THE PROBLEMS OF RECURRENT GASTRO-JEJUNAL ULCER. (Eng.) Sandsmark, M. (Sentralsykehuset for Ostfold i Fredrikstad, Kirurgisk avdeling, P.B. 1031, 1601 Fredrikstad, Norway). *Ann. Chir. Gynaecol.* 60:1-3; 1977.

6278 POSTOPERATIVE GASTRIN RESPONSE. (Eng.) Saik, R. P.; Wiesenfeld, N.; Peskin, G. W. (Veterans Admin. Hosp., San Diego, CA). *Chir. Gastroenterol.* 10(4):381-384; 1976.

6279 PSEUDOTUMOR ACUTE GASTRIC ULCER IN A CHILD. (Eng.) Daryabeigi, J.; Kane, P. E.; Johnson, L. M. (Bahrami Hosp., Teheran Univ., Teheran, Iran). *JAMA* 238 (6):512-513; 1977.

6280 THE RESULTS OF HIGHLY SELECTIVE VAGOTOMY IN OUR EXPERIENCE (787 CASES). (Eng.) Grassi, G.; Orecchia, C.; Cantarelli, I.; Grassi, G. B., Jr. (Ospedale San Giovanni, Rome, Italy). *Chir. Gastroenterol.* 11(1):51-58; 1977.

6281 FIVE YEARS AFTER PARIETAL CELL VAGOTOMY. (Eng.) Jensen, H. E.; Amdrup, E. (Kommunehospitalet Surgical Dept. 1, Copenhagen, Denmark). *Chir. Gastroenterol.* 11(1):59-62; 1977.

6282 FAILURE OF VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER: EXPLICABLE BY INTRAMURAL NERVE FIBRES OR REGENERATION? (Eng.) Loup, P.; Ghavami, B.; Mirkovitch, W.; Mosimann, R.; Van Der Loos, H. (Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland). *Chir. Gastroenterol.* 11(1):81-84; 1977.

6283 RATIONAL BASIS FOR THE APPLICATION OF CIMETIDINE IN THE THERAPY OF HUMAN GASTRIC HYPERSECRETION [Letter to Editor]. (Eng.) Simon, B.; Kather, H. (Medizinische Universitatsklinik Heidelberg, Bergheimerstrasse 58, 69 Heidelberg, W. Germany). *Br. J. Clin. Pharmacol.* 4(4):487-488; 1977.

6284 SERUM HAPTOGLOBIN PHENOTYPES AND DUODENAL ULCER. (Eng.) Tsoukantas, A.; Archimandritis, A.; Theodoropoulos, G.; Katsavochristos, K.; Melissinos, K. (Medical Sch., Univ. Athens, Athens, Greece). *Acta Genet. Med. Gemellol.* 26(1):95-96; 1977.

6285 GASTRIN RESPONSE TO TEST MEAL AND HYPOGLYCEMIA UP TO ONE YEAR AFTER PROXIMAL SELECTIVE VAGOTOMY. (Eng.) Londong, W.; Feifel, G.; Wagner, S.; Bosl, F.; Zumtobel, V. (II. Medizinische Klinik, Univ. Munich, Ziemssenstr. 1, D-8000 Munich 2, W. Germany). *Chir. Gastroenterol.* 11(1):85-89; 1977.

6286 GASTRIC MUCUS AND CARBENOXOLONE. (Eng.) Parke, D. V. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):329-343; 1976.

See also, 6042, 6212, 6230, 6232, 6243, 6246, 6247
6259, 6602.

6287 PRIMARY ADENOCARCINOMA OF THE SMALL INTESTINE. (Eng.) Morgan, D. F.; Busuttil, R. W. (Univ. California Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Am. J. Surg.* 134(3):331-333; 1977.

The clinical features, pathology, and treatment of small bowel adenocarcinoma were studied in 18 cases. The median survival from the time of diagnosis was 10.5 months, with 55% of the patients dead of their disease within 24 months. There were no 5-yr survivors. Symptoms of obstruction were present in 72% of the patients, while pain, the most common symptom, occurred in 78%. Other common symptoms were weight loss (66%), gross or occult blood loss (33%), palpable mass (22%), and jaundice (11%). The origin of the tumor was fairly equally distributed among the duodenum (7 patients), jejunum (6), and ileum (5). The presumptive diagnosis of small bowel carcinoma was made preoperatively in 13 cases, based on radiographic data. Surgical resection was the treatment of choice, and this usually involved wide local excision and removal of the involved regional lymph nodes without sacrifice of large portions of the small intestine. Surgical mortality was 11%; one patient died 1 month after a pancreaticoduodenectomy, and a second patient died after biopsy and bypass of unresectable carcinoma in the second part of the duodenum. Awareness of the constellation of symptoms, which are typically insidious and vague early in the course of the disease, should alert the physician to the possibility of small bowel cancer.

6288 NODULAR LYMPHOID HYPERPLASIA OF THE BOWEL IN PRIMARY HYPOGAMMAGLOBULINAEMIA: STUDY OF IN VIVO AND IN VITRO LYMPHOCYTE FUNCTION. (Eng.) Webster, A. D. B.; Kenwright, S.; Ballard, J.; Shiner, M.; Slavin, G.; Levi, A. J.; *et al.* (Northwick Park Hosp. and Clinical Res. Center, Harrow, England). *Gut* 18(5):364-372; 1977.

In vitro and *in vivo* lymphocyte function was studied in six patients with primary hypogammaglobulinemia and nodular lymphoid hyperplasia (NLH) of the bowel. Lymphocyte transformation, numbers of circulating T and B lymphocytes, and delayed hypersensitivity skin tests did not significantly differ when compared with hypogammaglobulinemic patients without NLH. However, patients with NLH had higher jejunal juice IgM concentrations (4-18 IU/ml versus 0-4.5 IU/ml) and a tendency to higher serum IgM concentrations (0-60 IU/ml versus 0-38 IU/ml) than those without NLH. The morphological features of NLH were similar to the germinal center of lymph nodes but more closely resembled the follicle zone of Peyer's patches. These findings suggest that NLH represents a local immune response to antigens originating in the gut lumen.

6289 SECONDARY NEOPLASMS OF THE SMALL BOWEL. (Eng.) Smith, S. J.; Carlson, H. C.; Gisvold, J. J. (Mayo Clinic, Rochester, MN 55901). *Radiology* 125(1):29-33; 1977.

Patterns of proved secondary neoplastic involvement of the small bowel were studied in 33 patients to determine criteria for distinguishing secondary from primary lesions. Secondary neoplasms were distributed throughout the small bowel: 6 in the descending duodenum, 3 in the third portion of the duodenum (all involving the retroperitoneum), 2 in the fourth portion of the duodenum (including the ligament of Treitz), 14 in the jejunum, and 18 in the ileum (including 5 in the terminal ileum). Multiplicity of lesions and the radiologic finding of transverse stretch, i.e., a stretching and fixation of mucosal folds transverse to the longitudinal axis of the bowel lumen, were found to be highly indicative of secondary neoplastic disease. Out of 15 patients exhibiting transverse stretch, with or without intramural involvement, 14 had surgical proof of mesenteric or peritoneal implants. Nodules with deep central ulceration occurred from hematogenous metastasis and were often of a sarcomatous nature. A lesion of the descending duodenum strongly suggested a primary neoplasm in the right colon or right kidney, although local extension from carcinoma of the pancreas could not be ruled out. An example of multiplicity of lesions in the small bowel secondary to involvement from carcinoma of the appendix was shown to include several areas of luminal narrowing, with dilatation of the small bowel proximally, intramural extension as thickened mucosal folds, and, in the right lower quadrant, a large ulcerating tumor mass resulting from direct invasion from the primary site. The most probable route of tumor dissemination to the small bowel in these 33 patients was direct local extension in 17 patients, peritoneal seeding in 13, hematogenous emboli in 6, and noncontiguous extension via fascial or lymphatic pathways in 4. Seven of these patients had evidence of both direct extension and peritoneal seeding.

6290 GASTROINTESTINAL MYOELECTRICAL ACTIVITY IN IDIOPATHIC INTESTINAL PSEUDO-OBSTRUCTION. (Eng.) Sullivan, M. A.; Snape, W. J., Jr.; Matarazzo, S. A.; Petrokubi, R. J.; Jeffries, G.; Cohen, S. (Dept. Medicine, Univ. Pennsylvania, Philadelphia, PA 19104). *N. Engl. J. Med.* 297(5):233-238; 1977.

The myoelectrical and motor function of the esophagus, small intestine, colon, and anal sphincter was evaluated in four patients with chronic idiopathic intestinal pseudo-obstruction. All patients had aperistalsis of the esophagus, with incomplete relaxation of the lower esophageal sphincter after swallowing or balloon distention. Duodenal slow-wave frequency was normal at 11.4 ± 0.3 cycles/min. The patients did not have a normal increase in duodenal spike or motor activity after intestinal distention, but duodenal activity increased after stimulation with i.v. secretin (0.5 U/kg). Colonic slow-wave activities were present at two frequencies, 6.2 ± 0.3 and 3.3 ± 0.1 cycles/min. Neostigmine administration increased both colonic spike and motor activity normally. These studies suggest that in this disorder, physiologic neural responses to swallowing or intestinal distention are impaired, but the intestinal smooth muscle slow-wave activity and the spike and motor responses to exogenous neurohormonal stimulation are intact.

6291 DUODENAL VARICES IN EXTRAHEPATIC PORTAL OBSTRUCTION. (Eng.) Itzchak, Y.; Glickman, M. G. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Radiology* 124(3):619-624; 1977.

Duodenal varices were angiographically demonstrated in 18 patients with extrahepatic portal or splenic vein obstruction. In 11 patients, barium examination of the upper gastrointestinal tract revealed prominent filling defects in the duodenal bulb and the duodenal sweep. Duodenal deformities in these patients were strikingly similar. In 10 of these patients, the deformity was located on the posterior wall of the duodenal bulb and along the greater curvature side of the second portion of the duodenum. Only 1 of the 11 patients showing duodenal deformities had a deformity of the lesser curvature surface of the duodenal bulb or the descending duodenum. The deformities consisted in all cases of sharply margined indentations within the lumen and along the contour of the duodenum and were very similar to the deformities produced in the esophagus by esophageal varices. Demonstration of these deformities should raise the suspicion of extrahepatic portal or splenic vein obstruction, which may be verified by angiography.

6292 FLUID FILLED SMALL BOWEL LOOPS IN GALLSTONE ILEUS: CLINICAL AND EXPERIMENTAL OBSERVATIONS. (Eng.) Bryk, D.; Silverman, M. J.; Venugopal, M. K.; Rind, J.; Levowitz, B. (Jewish Hosp. and Medical Center Brooklyn, 555 Prospect Place, Brooklyn, NY 11238). *Invest. Radiol.* 12(4):357-363; 1977.

A bowel fluid gas index (BFGI) utilizing the proportion of fluid-filled versus gas-filled bowel loops visualized on plain roentgenograms was developed to express the degree of fluid-filled distention in small intestinal obstruction. The BFGI was set up so that in index 1, less than 25% of the visualized loops are fluid filled; in index 2, 25-50% of the loops are fluid filled; in index 3, 50-75% of the loops are fluid filled; and in index 4, more than 75% of the loops are fluid filled. Each of two radiologists made 100 observations on dogs with experimentally produced distal small bowel obstruction, and their average results were 2.34 and 2.38, resp. These results were significant for the means ($p<0.001$) and also for the variances ($p<0.01$). A comparison of BFGI for 55 patients with gallstone ileus and 65 patients with simple adhesive small bowel obstruction gave average BFGI values of 2.9 and 1.9, resp. ($p<0.005$). There was a 33% incidence of index 4 fluid-filled obstruction in cases of gallstone ileus versus only 8% for cases of adhesive obstruction. The BFGI of dogs with experimentally produced distal small bowel obstruction and a cholecystoduodenal fistula operation was 2.8. This was similar to the average BFGI in cases of gallstone ileus and was significantly ($p<0.025$) lower than the BFGI of 1.9 observed in dogs without a fistula and in clinical cases of simple adhesive obstruction.

6293 HEPATIC STRUCTURE AND FUNCTION AFTER MODIFIED JEJUNOILEAL BYPASS SURGERY FOR OBESITY. (Eng.) Maxwell, J. D.; Sanderson, I.; Butler, W. H.; Gazet, J. C.; Pilkington, T. R. E. (St. George's Hosp. Medical Sch., London SW17 0RE, England). *Br. Med. J.* 2(6089):726-729; 1977.

The long-term effects of a modified form of jejunoileal bypass (in which a greater continuous length of ileum is retained) on liver function were examined in 120 patients. Substantial weight loss (119.0 ± 23.3-82.3 ± 18.8 kg) occurred during the first 9 months after surgery, accompanied by a significant rise in serum concentrations of bilirubin, alanine transferase, and alkaline phosphatase, and a significant reduction in albumin concentrations. Biochemical changes were unrelated to weight loss or halothane anaesthesia. After weight stabilization, liver function reverted to normal, and 4 yr after bypass, BSP retention and hepatic histology did not differ from those in obese controls. There were two postoperative deaths. Three other patients died during the period of rapid weight loss with severe hepatic steatosis. While transient mild impairment of liver function is common after modified jejunoileal bypass, clinically significant hepatic dysfunction is a rare and unexplained early complication.

6294 ROENTGENOLOGICAL DIAGNOSIS OF CANCER OF BAUHIN'S VALVE. (Rus.) Novikova, I. K.; Pyltsov, I. M.; Krasnova, I. S. (No affiliation given). *Vestn. Rentgenol. Radiol.* (2):92-94; 1977.

6295 USE OF LAPAROSCOPIC JEJUNOSTOMY IN EARLY OBSTRUCTION OF GASTROENTEROSTOMY. (Rus.) Prudkov, I. D.; Kopylov, F. N.; Savchenko, N. F. (Sverdlovsk Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):25-26; 1977.

6296 IMMUNOGLOBULINS AND LYSOZYMES IN PATIENTS WITH CHRONIC LESIONS OF THE INTESTINE. (Rus.) Zhukovskaya, N. A.; Temkina, T. Ya. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Klin. Khir. (Mosk.)* 55(6):83-86; 1977.

6297 ACUTE MESENTERIC ENTERITIS IN COMBINATION WITH EARLY SMALL INTESTINAL INTUSSUSCEPTION. (Rus.) Kondratiev, N. P. (Tyumen Medical Inst., USSR). *Klin. Khir.* (6):79; 1977.

6298 ILEUS DUE TO CHYLOUS CYST OF RETROPERITONEAL FAT IN A 3-MONTH-OLD CHILD. (Rus.) Berezhnoy, V. I.; Trutyak, Ya. V. (Chernovtsy Medical Inst., USSR). *Klin. Khir.* (6):79; 1977.

6299 CLINICAL FEATURES AND DIAGNOSIS OF POST-OPERATIVE MECHANICAL ILEUS. (Rus.) Chistyakov, S. S. (Medical Stomatological Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (8):119-122; 1977.

6300 SYMPTOM OF LOCAL PNEUMATIZATION OF THE INTESTINE IN ACUTE SURGICAL DISEASES OF ABDOMINAL ORGANS. (Rus.) Fomin, N. N.; Fomin, A. N. (No affiliation given). *Khirurgiia (Mosk.)* (8): 128; 1977.

6301 NONOCCLUSIVE DISTURBANCES OF CIRCULATION IN INTRAMURAL VESSELS OF THE INTESTINE (LITERATURE REVIEW). (Rus.) Sigal, Z. M. (Kazan State Inst. Advanced Training for Physicians, USSR). *Khirurgiia (Mosk.)* (8):134-137; 1977.

6302 ACUTE COMMISSURAL ILEUS AFTER GYNECOLOGIC OPERATIONS. (Ukr.) Toropov, Yu. D. (Zaporozhye Inst. Advanced Training for Physicians, USSR). *Pediatr. Akush. Ginekol.* (3):54-56; 1977.

6303 IMMUNE DEFICIENCY DISEASES AND DISTURBANCES OF THE ABSORPTION IN SMALL INTESTINE. (Rus.) Livshits, E. G.; Medne, T. A.; Ebels, L. G. (Medical Inst., Riga, USSR). *Pediatriia* (3):77-80; 1977.

6304 SIMPLE ULCERS OF THE SMALL INTESTINE AS ONE CAUSE OF PERITONITIS. (Rus.) Baulin, N. A. (Fifth Municipal Hosp., Penza Oblast, USSR). *Khirurgiia* (4):115-119; 1977.

6305 CHYLOUS CYST OF SMALL INTESTINE MESENTERY. (Rus.) Kharchenko, V. T. (No affiliation given). *Khirurgiia (Mosk.)* (6):128-129; 1977.

6306 SUBCUTANEOUS TRANSVERSE RUPTURE OF THE DUODENUM IN A 3-YEAR-OLD CHILD. (Rus.) Zhukov, V. S.; Kapustin, N. P.; Antonenko, F. F. (Vladivostok Medical Inst., USSR). *Klin. Khir.* (6):80; 1977.

6307 ERRORS IN DIAGNOSIS OF NONEPITHELIAL MALIGNANT TUMORS OF SMALL INTESTINE. (Rus.) Nazarov, V. G.; Dubovik, N. T.; Belov, V. N. (Novokuznetsk Municipal Clinical Oncological Dispensary, USSR). *Vestn. Khir.* 118(5):122-123; 1977.

See also, 6043, 6135, 6149, 6158, 6164, 6212, 6230, 6257, 6260, 6267, 6273, 6277, 6284, 6309, 6312, 6315, 6321, 6364, 6430, 6520, 6585, 6586, 6587, 6588, 6589, 6595, 6596, 6598, 6604, 6607, 6614, 6616, 6630, 6636, 6653, 6658, 6662, 6665, 6668, 6672, 6675.

SMALL INTESTINE

Malabsorption

6308 HEPATIC INJURY IN ADULT COELIAC DISEASE. (Eng.) Hagender, B.; Brandt, L.; Sjolund, K.; Berg, N. O.; Norden, A.; Stenstam, M. (Univ. Hosp., S-221 85 Lund, Sweden). *Lancet* 2(8032):270-272; 1977.

The records of 74 patients with adult celiac disease (ACD) were examined in an attempt to determine the frequency of liver injury in this disease. In 13 cases, histological sections of the liver were available, and in 5 of these there were signs of reactive hepatitis. Histological signs of distinct hepatic injury with cirrhosis and/or chronic active hepatitis were found in seven other patients. In five of these, serum IgA was normal, whereas 16 out of 20 control patients with liver cirrhosis not associated with ACD had raised serum IgA. Serum aspartate aminotransferase and serum alanine aminotransferase were determined in 53 patients; 29 had raised concentrations. In 19 patients, serum aminotransferases were repeatedly determined before and during the dietary regimen, and there was a significant reduction in enzyme concentrations during treatment. The median concentration of serum alkaline phosphatase was also reduced during treatment, but not significantly. The histological evidence of liver injury in 16% and the abnormal liver function tests in 39% of the patients indicate that hepatic injury is common in ACD. Since liver function tests or liver biopsy specimens were available for only about two-thirds of the patients, liver damage in ACD may be more common than indicated by these results. The effect of a gluten-free diet on aminotransferase concentrations indicates that the liver injury may be reversible and suggests that, in some ACD patients, progressive liver damage may be prevented by suitable treatment. Since ACD is not always recognized, the diagnosis should be considered in patients with liver disease of unknown etiology.

6309 ROLE OF BACTERIAL OVERGROWTH IN THE MALABSORPTION SYNDROME OF PRIMARY SMALL INTESTINAL LYMPHOMA IN IRAN. (Eng.) Russell, R. M.; Abadi, P.; Ismail-Beigi, F. (Univ. Maryland, Loch Raven Veterans Admin. Hosp. [151], 3900 Loch Raven Blvd., Baltimore, MD 21218). *Cancer* 39(6):2579-2583; 1977.

Studies were performed on five Iranian patients with primary small intestinal lymphoma to determine the effect of bacterial overgrowth on malabsorption. The effect of oral tetracycline (1.0 g/day) was studied in three patients (1-3). Extensive jejunal resections were carried out at laparotomy in patients 4 and 5. The hemoglobin in three patients (10.0-11.0 g/100 ml) and serum carotenes (15-45 μg/100 ml), serum folate (0.4-8.9 ng/ml), and serum albumin (1.3-3.7 g/100 ml) in all patients were low before the antibiotic treatment. Prothrombin time was abnormal (14.5-19.0 sec) in all subjects, but reverted to normal within 2 days after vitamin K administration. After 1 month of tetracycline therapy, serum carotene (20-70 μg/100 ml), albumin (2.8-3.8 g/100 ml), and cholesterol (121-140 mg/100 ml) rose in all of the treated patients. The results of breath tests for bile salt deconjugation (utilizing glycine-1-^{14}C-cholic acid) were abnormal in all five patients (3.4-11.8 %/mmol $CO_2/10^3$) before the antibiotic treatment. Oral tetracycline had a striking effect towards normalizing the results of breath tests (0.2-2.3 %/mmol $CO_2/10^3$). Schilling tests (with intrinsic factor) improved in two patients (16-40%) and steatorrhea improved in all and there was significant weight gain (3.1-4.6 kg). The antibiotic had no apparent effect on D-xylose or folate absorption tests. It is concluded that bacterial overgrowth in the small intestinal lumen is an important contributory factor to the malabsorption syndrome in primary small intestinal lymphoma.

6310 ALPHA-CHAIN DISEASE AS MALABSORPTION SYNDROME WITH EXUDATIVE ENTEROPATHY.

(Ger.) Roth, S.; Havemann, K.; Kalbfleisch, H.; Menge, H.; Riecken, E. O.; Sodomann, C. P.; Martini, G. A. (Medizinische Universitatsklinik, Mannkopff-str. 1, 3550 Marburg, W. Germany). *Dtsch. Med. Wochenschr.* 101(50):1823-1828; 1976.

The case history of a 30-yr-old man with exudative enteropathy with malabsorption is presented. This case represents the first occurrence of alpha-chain disease, characterized by diffuse proliferations of plasma cells of the IgA system in the area of the small intestine, in West Germany. The patient exhibited three phases of the disease: the first phase showed enteropathy and malabsorption, without improvement following a gluten-free diet; the second phase showed remission with cytostatic therapy using cyclophosphamide and melphalan (combined with steroids); and the third phase showed an increase in the intestinal lymphoma, where melphalan and radiation treatments (2,000 R for entire abdomen and 1,500 R for left para-umbilical region) had only a slight influence on retarding the disease. Diagnosis of small intestinal function indicated a decreased glucose resorption, an increased daily fat excretion, and an increased iron resorption. The upper and middle portions of the small intestine showed hypermotility (under x-ray examination). Histological examination of an extirpated lymph node of the neck revealed a chronic lymphadenitis with sinus catarrh and sinus hystiocytosis. Hematological examination indicated a hypochromic anemia of the peripheral blood and hypoproteinemia. There were granuloma-like proliferations in the liver and lymphoid elements in the marrow. Atrophy of the villi of the small intestine and plasma-cellular infiltrations of the lamina propria (jejunum and ileum) were also evident. Following surgery to remove a conglomerate tumor and enlarged lymph nodes from the mesenterial root, the patient's condition deteriorated, eventually leading to his death.

6311 STEATORRHOEA IN THE ELDERLY. (Eng.)

Price, H. L.; Gazzard, B. G.; Dawson, A. M. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Br. Med. J.* 1(6076):1582-1584; 1977.

To assess the etiology and the clinical and laboratory features of steatorrhea in the elderly, experience with 47 patients who presented with this entity after the age of 50 yr was analyzed. The causes of steatorrhea were celiac disease (16), pancreatic insufficiency (10), pancreatic carcinoma (4), postgastrectomy steatorrhea (8), jejunal diverticula (2), tropical sprue (2), collagen disease (1), diabetes mellitus (1), scleroderma (1), and Whipple's disease (1); the cause of steatorrhea was undetermined in one patient. The most common cause of steatorrhea was celiac disease in patients under 65 yr and pancreatic insufficiency in those over 65. Pancreatic insufficiency was the most common cause of steatorrhea in men (9/30), whereas celiac disease was the most common cause in women (10/17). Half the patients with celiac disease had a hemoglobin concentration of less than 10 g/dl, while patients with pancreatic insufficiency all had values above this level. Serum xylose concentrations after a xylose test meal were decreased in six of nine celiac patients tested, but in none of the four patients with pancreatic insufficiency. The glucose tolerance test result was diabetic in 9 of 12 patients with pancreatic insufficiency but was normal or flat in 8 of 9 patients with celiac disease and 9 of 10 patients with other causes of steatorrhea. Barium examination of the small bowel was mainly useful in showing jejunal diverticula but also showed a malabsorption pattern in 13 of 16 patients with celiac disease and 2 with pancreatic insufficiency. The ESR and serum albumin concentration were not helpful in determining the cause of steatorrhea. A jejunal biopsy and Lundh test, together with a barium follow-through to exclude small bowel diverticula, are helpful in establishing the correct cause of steatorrhea in most elderly patients.

6312 ETIOPATHOGENETIC STUDIES IN A PATIENT WITH WHIPPLE'S DISEASE. (Eng.)

Tytgat, G. N.; Hoogendijk, J. L.; Agenant, D.; Schellekens, P. Th. (Dept. Medicine, Univ. Amsterdam, Amsterdam, Netherlands). *Digestion* 15(4):309-321; 1977.

A case report is presented of a patient having Whipple's disease (hospitalized for marked weakness, dyspnea, fatigue, anorexia, epigastric pain, and intermittent attacks of shortness of breath). Characterization of the invading microorganism and of the immunological disturbances was attempted. Gross distortion of the villus architecture due to massive accumulation of PAS-positive macrophages and large lipid-filled cystic spaces in the lamina propria occurred. Abnormal values were reported for serum calcium (1.93 mmol/l), d-xylose excretion (21 instead of >33 mmol/5 hr), and fecal fat (17 instead of <6 g/day). X-ray examination revealed coarsening of the fold pattern with superimposed nodular indentations. Before treatment, *Haemophilus influenzae* type e, sensitive to tetracycline, was cultured from multiple small intestinal biopsies. This isolated microorganism was structurally similar to one observed in the tissue. All further culture experiments during and after treatment (tetracycline, 2-3 g/day) proved negative except for one biopsy from which a tetracycline-resistant *H. influenzae* type-e mutant was isolated. The immunological disturbances, mainly characterized by cutaneous anergy, in the absence of major humoral or *in vitro* lymphocytic impairment, regressed during treatment together with clinical remission of the disease. The patient recovered and no recurrence of the disease occurred until his death (2.5 yr after recovery) due to massive stroke. It is suggested that the immunological disturbances are of a secondary nature in this disease.

6313 BILATERAL COXARTHROSIS REVEALING WHIPPLE'S DISEASE: CASE REPORT. (Fre.) Le Chevallier, P.; Vallat, J. P.; Luthier, F.; Methan, E.; Janvoie, L.; Medelsi, M. (Centre Hospitalier Regional Bretonneau, F 37033 Tours Cedex, France). *Rev. Rhum. Mal. Osteoartic.* 43(11):663-668; 1976.

6314 VALUE OF THERAPEUTIC TEST IN WHIPPLE'S DISEASE: REPORT OF ONE CASE. (Fre.) Groussin, P.; Metman, E. H.; Morand, Ph.; Bougnoux, Ph. (CHU Bretoneau, 37033 Tours Cedex, France). *Sem. Hop Paris* 52(39):2235; 1976.

6315 RADIOLOGICAL DIAGNOSIS OF WHIPPLE'S DISEASE. REPORT OF 8 CASES. (Fre.) Benozio, M.; Legendre, H.; Rymer, R.; May, J. P. (Groupe Hospitalier Lariboisiere, Paris, France). *Ann. Radiol. (Paris)* 20(5):461-468; 1977.

6316 DIFFUSIBLE BLOOD CALCIUM IN CHILDREN WITH ADVANCED PROTEIN-ENERGY MALNUTRITION. (Spa.) Frenk, S.; Luna-Del Villar, J.; Burgos, G.; Mariscal, J. (Departamento de Investigacion Clinica, Subdireccion General Medica, IMSS. Ave. Cuauhtemoc 330, Mexico 7, D.F.). *Arch. Invest. Med. (Mex.)* 7(2):77-84; 1976.

6317 RESULTS WITH A NEW LACTOSE-FREE MILK IN REALIMENTATION IN ACUTE DIARRHEA AND IN PATIENTS WITH MALABSORPTION. (Ita.) Della Cella, G.; Martino Parodi, A. M. (3rd Medical Div., G. Gaslini Inst., Genoa Quarto, Italy). *Minerva Pediatr.* 29(5):307-310; 1977.

6318 DETERMINATION OF THE THRESHOLD DOSAGE OF LACTOSE AND ITS SIGNIFICANCE IN INDIVIDUALS WITH DIFFERENT LEVELS OF MILK TOLERANCE. (Cze.) Solc, P. (360 13 Karlovy Vary-Dalovice, lazensky ustav Rozkvet, Czechoslovakia). *Cas. Lek. Cesk.* 116(13):401-404; 1977.

6319 VALUE OF THE DETERMINATION OF SERUM IgE, ANTIMILK REAGINS, AND OF THE LYMPHOBLAST TRANSFORMATION TEST IN DIGESTIVE INTOLERANCE TO COW MILK PROTEINS [Abstract]. (Fre.) Mougenot, J. F.; Baudon, J. J.; Deville-Chabrolle, A.; Mathe, J. C.; Polonovski, C. (Hopital Trousseau, Paris, France). *Gastroenterol. Clin. Biol.* 1(3):310; 1977.

6320 MECHANISM AND ORIGIN OF HYPEROXALURIA IN MALABSORPTION SYNDROME [Abstract]. (Fre.) Modigliani, R.; Labayle, D.; Aymes, C.; Bernier, J. J. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, 75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(5):486; 1977.

6321 THREE CASES OF EXUDATIVE ENTEROPATHY. (Rus.) Frolkis, A. V.; Ryzhanov, V. I.; Rutgaizer, Ya. M.; Bushkova, R. K.; Zobova, Z. N. (Dept. Propedeutics Internal Diseases, O. V. Kuusinen Univ., Petrozavodsk, USSR). *Ter. Arkh.* 49(3):129-131; 1977.

See also, 6043, 6162, 6163, 6167, 6263, 6288, 6303, 6586, 6595, 6596, 6606, 6609, 6610.

6322 ARTERIOVENOUS MALFORMATIONS OF THE COLON. (Eng.) Hagihara, P. F.; Chuang, V. P.; Griffen, W. O. (Dept. Surgery, Univ. Kentucky Coll. Medicine, Lexington, KY 40506). *Am. J. Surg.* 133 (6):681-687; 1977.

The case reports of four patients (a 60-yr-old man and 3 women, 72, 43, and 50 yr old) in whom arteriovenous malformations were recognized as the major cause of massive rectal bleeding of colonic origin are discussed. Selective mesenteric angiography was used to correctly diagnose the site of vascular malformations in these patients and hemicolectomy or colostomy was performed after the diagnosis. Although an arteriographic unit capable of serial magnification was ideal for detecting arteriovenous malformations in the bowel, the diagnosis may be made by a combined approach of conventional arteriography, colonoscopy, laparotomy, and operative judgement. The final diagnosis and proof of correct surgical extirpation rests on gross and histologic demonstration of vascular malformations in the excised specimen.

6323 BREATH-METHANE IN PATIENTS WITH CANCER OF THE LARGE BOWEL. (Eng.) Haines, A.; Dilawari, J.; Metz, G.; Blendis, L.; Wiggins, H. (Northwick Park Hosp., Watford Rd., Harrow, Middlesex HA1 3UJ, England). *Lancet* 2(8036):481-483; 1977.

The breath methane levels were compared in 30 patients with carcinoma of the rectum or colon, 64 patients with nonmalignant large bowel disease, and 208 subjects without large bowel disease. Eighty percent of the patients with large bowel cancer had detectable levels of methane (i.e., 1 ppm above the methane content of room air, which is usually 2-3 ppm) in their breath, compared with 39% of the patients with nonmalignant large bowel disease and 40% of subjects without disease. These findings suggest that there may be a difference in anaerobic intestinal bacteria between patients with large bowel cancer and those without the disease.

6324 BOWEL TRANSIT-TIME AND STOOL WEIGHT IN POPULATIONS WITH DIFFERENT COLON-CANCER RISKS. (Eng.) Glober, G. A.; Kamiyama, S.; Nomura, A.; Shimada, A.; Abba, B. C. (Kuakini Medical Center, 347 N. Kuakini St., Honolulu, HI 96817). *Lancet* 2(8029):110-111; 1977.

Bowel transit time was studied in 25 Caucasians living in Hawaii, 67 Japanese living in Hawaii, and 28 Japanese living in Japan to determine why the incidence rate for colon cancer in the two groups living in Hawaii is higher than that for the Japanese living in Japan. The mean bowel transit times in Caucasians, Japanese from Hawaii, and Japanese from Japan were 56.2, 31.4, and 33.9 hr, resp.; thus, the transit times in the two Japanese groups were similar ($p=0.47$), and the transit time in the Caucasians was significantly higher than that in both the Hawaiian Japanese ($p<0.001$) and in the Japanese from Japan ($p<0.005$). The Japanese in Japan had significantly heavier stool specimens (194.7 g) than did the Caucasians (119.7 g, $p<0.01$) and the Japanese living in Hawaii (120.7 g, $p<0.001$). The mean interval between bowel movements was similar in the three groups. Correlation between bowel transit time and estimated weekly consumption of 33 different food items was investigated; the foods included beef, bacon, celery, tomatoes, lettuce, milk, rice, noodles, and green tea. No food correlated with bowel transit time in the three groups. Stool weight may be indirectly related to the risk of colorectal cancer, polyposis, or diverticulosis in the Japanese.

6325 THE DIAGNOSTIC PATTERN OF DNA-CONTENT IN THE "BORDERLINE" NEOPLASM OF THE LARGE INTESTINE. (Eng.) Shindo, K. (Dept. Surgery, Osaka Univ. Hosp., Osaka 553, Japan). *Am. J. Proctol.* 28(4):57-64; 1977.

Microspectrophotometric measurements of DNA content were done in normal, benign, "borderline" (atypical neoplasm--neither benign nor malignant), and malignant epithelial cells of the large intestine of man (30 specimens) and rat (42 specimens). The distribution of the DNA values was very narrow in normal mucosa (less than 1.5 n, a near diploid value), narrow in benign lesions (less than 2.2 n, the hyperdiploid range), and broad in malignant lesions (more than 4.2 n, the hypotriploid range). The rate of number of nuclei greater than the tetraploid value (4.0 n) was null in normal, less than 5.3% in benign, and more than 6.7% in malignant cells. This method was found useful for diagnostic means or for evaluation of the prognosis in the borderline lesions. The borderline lesions could be designated malignant if the mean DNA value is >2.5 n, the nucleus over 4 n is >6%, and the width of distribution is >2.8 n. It is suggested that these criteria may be applied to the experimental animal to determine the presence of malignancy.

6326 THE EARLY DETECTION OF COLORECTAL CANCER. (Eng.) Miller, S. F.; Knight, A. R. (Miami Valley Hosp., 1 Wyoming St., Dayton, OH 45409) *Cancer* 40(1):945-949; 1977.

The results of a screening program for the early detection of colorectal cancer are presented. Among 2,332 individuals screened, 2 of 28 with rectal masses (detected by rectal examination) and 1 of 11 with positive Hemoccult slides on two sets of testing were found to have early colorectal carcinoma. Rectal examination revealed two individuals with carcinoma of the rectum (one a Dukes' A and the other a Dukes' B), and a barium enema examination revealed one case of Dukes' B carcinoma of the rectosigmoid colon. Although both proctosigmoidoscopy and guaiac impregnated filter slide paper methods have been productive in the early diagnosis of colorectal cancer, the Hemoccult test is inexpensive, can be used on a routine basis, is easier for patients to perform themselves, and represents a significant cost savings over proctosigmoidoscopy. It is recommended that the Hemoccult test be routinely used in all patients over 40 yr of age. Patients who have persistently positive Hemoccult tests after diet therapy should be submitted to proctosigmoidoscopy and barium enema examination.

6327 MUCIN PRODUCING CARCINOID TUMOURS OF THE VERMIFORM APPENDIX. (Eng.) Haqqani, M. T.; Williams, G. (Dept. Pathology, Stopford Building, The Univ., Manchester M13 9PT, England). *J. Clin. Pathol.* 30(5):473-480; 1977.

Six cases of an unusual mucoid variant of carcinoid tumor of the appendix are reported. These lesions are small, detected incidentally, and carry a good prognosis. All tumors had similar histological appearances of well-differentiated microacini and cellular rosettes infiltrating the base of the mucosal glands or the deeper muscle layers in four cases and as far as the serosa in two cases. The dominant picture was that of cellular rosettes and clusters lacking a central lumen; the cytoplasm was distended with mucin, giving a vacuolated appearance. Nuclei were basal, small, ovoid, and regular with delicate nuclear membranes and finely dispersed chromatin. There was no pleomorphism or cellular atypia. Paneth cells were usually present and an invasion without necrosis was reported. Appreciable numbers of argentaffin and argyrophil cells were reported in mucinous carcinoids. These tumors showed distinct differences from ordinary carcinoid tumors and adenocarcinoma, even though the mucin secreted by goblet cells of the normal mucosal epithelium and by the cells of these carcinoid tumors showed similar histochemical similarities (Alcian blue binding occurred in 0.2-0.6 M concentration of electrolyte). It is suggested that appendectomy is curative and right hemicolectomy is unnecessary unless the base of the appendix or adjacent cecum is invaded.

6328 ISCHEMIC COLITIS ASSOCIATED WITH CARCINOMA OF THE COLON. (Eng.) Whitehouse, G. H.; Watt, J. (Univ. Liverpool, Nuffield Unit Medical Genetics, Crown St., Liverpool L69 3BX, England). *Gastrointest. Radiol.* 2(1):31-35; 1977.

wo cases of ischemic colitis occurring proximal to arcinoma of the colon are described, with special eference to the barium enema and pathological findngs. The first patient, a 52-yr-old man, presented ith lower abdominal pain and rectal bleeding. The arium enema examination revealed typical changes f colitis with "thumb printing" proximal to a neolasm of the transverse colon. In the second paient, a 67-yr-old man, the presenting features ere those of a lower colonic obstruction without ectal bleeding, and the radiological examination evealed a smooth and obviously benign stricture roximal to a stenosing carcinoma of the descending olon. In both cases, the gross pathology and the icroscopic changes in the bowel proximal to the umor were consistent with those of ischemic coltis in a subacute or chronic phase. The ischemic rigin of the mucosal ulceration and other changes that occur proximal to obstructive colonic neoplasms may be initially suspected on the basis of the clinical presentation. Ischemia of the bowel wall in these cases, and particularly where the transverse colon is involved (as in the first patient), may not be dependent upon defects in arterial anastomoses as in "ischemic colitis" occurring in the absence of an obstructive lesion.

6329 ANTIBIOTIC-ASSOCIATED COLITIS. (Eng.) Miller, R. R.; Jick, H. (Boston Collaborative Drug Surveillance Program, 400 Totten Pond Rd., Waltham, MA 02154). *Clin. Pharmacol. Ther.* 22(1):1-6; 1977.

Data on 26,294 patients hospitalized since 1966 were examined to provide some index of the frequency of antibiotic-induced colitis. Among the 26,294 patients, 8,948 received at least one antibiotic (ampicillin, 3,988; chloramphenicol, 437; lincomycin, 90; clindamycin, 163; tetracycline, 1,517). None of these patients were diagnosed as having drug-induced colitis due to in-hospital antibiotic exposure. However, seven patients who had taken antibiotics as outpatients were admitted with antibiotic-associated colitis. Six patients had taken lincomycin, and one had taken ampicillin. Six patients were hospitalized in New Zealand and one in Canada. The five patients with lincomycin-associated colitis at the New Zealand hospital were admitted over an 11-month period. Severe colitis due to antibiotics has been a rare event, especially in the United States.

6330 COLONIC ILEUS. (Eng.) Meyers, M. A. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *Gastrointest. Radiol.* 2(1):37-40; 1977.

Nine cases of colonic ileus, characterized by selective or disproportionate distention of the large intestine without organic obstruction, are summarized. The patients ranged in age from 33 to 80 yr, and all patients had a prior systemic abnormality or had undergone a pelvic operation (acute myelocytic leukemia, lymphosarcoma, hip nailing, total abdominal hysterectomy, appendectomy, suprapubic prostatectomy, lumbar laminectomy, and Caesarian section). The clinical picture was similar to that of mechanical colonic obstruction; progressive abdominal distention became apparent in 2-7 days in those patients who underwent surgery, although the passage of liquid feces and gas did occur. Abdominal radiographs demonstrated striking dilatation of the colon with gas; this was present to the hepatic flexure in one case, to the splenic flexure in six cases, to the distal descending colon in one case, and to the mid-descending colon in one case. Massive distention of the cecum dominated the radiographic presentation, and the cecal diameter ranged between 8.5 and 18 cm. Minimal small bowel dilatation was present in two patients. The symptoms resolved with conservative therapy in six patients. Cecostomy was necessary to prevent peritonitis in two patients, and the remaining patient died from cecal perforation. The clinical importance of this type of colonic ileus lies in its distinction from true mechanical obstruction and in the fact that it can progress to perforation.

6331 NONISCHEMIC INTUSSUSCEPTION. (Eng.) Janik, J. S. (Cook County Hosp., 1825 W. Harrison, Chicago, IL 60612). *J. Pediatr. Surg.* 12(4):567-570; 1977.

The symptoms, diagnosis, and therapy of 20 children with nonischemic intussusception are reported. These children were among 123 patients treated for intussusception at one hospital during a 1-yr period. Unlike patients with acute intussusception, these children exhibited signs of incomplete bowel obstruction, no intestinal ischemia, and a longer duration of symptoms (usually 4-14 days). Approximately 50% of the 20 children did not demonstrate rectal bleeding or a palpable abdominal mass. The incidence of diarrhea among these patients (45%) was three times that in patients with acute intussusception. The incidence of specific lead point pathology among the children with nonischemic intussusception (25%) was twice that in patients with acute intussusception. The correct diagnosis was made on admission in only 45% of the patients with nonischemic intussusception, whereas this incidence was 70% in the children with acute intussusception. Most often, the diagnosis of gastroenteritis was made instead. Of the 20 children, barium hydrostatic reduction was attempted in 12. Six of these intussusceptions were successfully reduced, but three of these reductions were not recognized until laparotomy was carried out. The intussusception was manually reduced at surgery in 11 cases, and resection was required in the remaining three patients. Pathologic examination did not demonstrate gangrene in any case. Meckel's diverticulectomy was performed in four children. No morbidity, mortality, or recurrence was recorded following therapy in any of the 20 patients. Despite the longer duration of symptoms in nonischemic intussusception, it can be treated initially with a careful attempt at barium hydrostatic reduction. If this fails, easy operative manual reduction is possible.

6332 WHEAT FIBRE AND IRRITABLE BOWEL SYNDROME: A CONTROLLED TRIAL. (Eng.) Manning, A. P.; Heaton, K. W.; Harvey, R. F.; Uglow, P. (Duke Univ. Medical Center, Durham, NC). *Lancet* 2(8035):417-418; 1977.

A controlled trial was carried out in 26 patients with the irritable bowel syndrome to determine the effect of a high- or low-fiber diet. After 6 weeks on a high wheat fiber regimen (adding 5.6-6.6 g of wheat fiber to the existing diet of 60 ml fine unprocessed wheat bran), the frequency of pain was significantly reduced ($p<0.05$); this did not occur in the patients on the low-fiber diet. The patients on the high-fiber diet also showed a significant decrease in the pain-severity score ($p \approx 0.01$), whereas those on the low fiber diet did not. On the high-fiber diet, bowel habit was improved in seven patients, unchanged in six, and worse in none. On the low fiber diet, two patients improved, five were unchanged, and four became worse; this difference in response to the diets was significant ($p<0.05$). Colonic motor activity was significantly reduced on the high-fiber diet ($p<0.01$) but was unchanged on the low-fiber diet. Patients with the irritable bowel syndrome should be encouraged to increase their daily intake of wheat fiber.

6333 THE CLINICAL SIGNIFICANCE OF PNEUMATOSIS CYSTOIDES INTESTINALIS: A REPORT OF 5 CASES. (Eng.) Thomson, W. O.; Gillespie, G.; Blumgart, L. H. (Royal Infirmary, Glasgow, Scotland). *Br. J. Surg.* 64(8):590-592; 1977.

The cases of five patients with pneumatosis cystoides intestinalis are presented. The patients ranged in age from 41 to 72 yr (2 women, 3 men). Chronic bronchitis was present in three patients. The symptoms included abdominal pain, flatulence, constipation, diarrhea, rectal bleeding, and mucous discharge per rectum. In one patient, the results of a barium enema examination were thought to indicate gross polyposis, and an unnecessary colectomy with ileorectal anastomosis was carried out; in another patient, polyposis was misdiagnosed at sigmoidoscopy, and laparotomy was only avoided when a radiological review indicated the presence of pneumatosis. This patient and another responded to conservative treatment. Chest x-ray in one patient revealed a massive amount of free gas under the diaphragm, with downward displacement of the liver and interposition of loops of bowel between the liver and diaphragm (Chilaiditi's sign). Although intestinal gas cysts were not visualized, the presence of a chronic asymptomatic pneumoperitoneum together with this sign suggested pneumatosis. A fifth patient had pneumatosis in association with a small bowel fistula, multiple abdominal adhesions, and intermittent obstructive episodes, eventually necessitating a colostomy. These cases illustrate the variety of presentations of pneumatosis cystoides intestinalis. Good results can be achieved in most cases by conservative means.

6334 THE EPIDEMIOLOGY OF COLORECTAL POLYPS: PREVALENCE IN NEW ORLEANS AND INTERNATIONAL COMPARISONS. (Eng.) Correa, P.; Strong, J. P.; Reif, A.; Johnson, W. D. (Dept. Pathology, Louisiana State Univ. Medical Center, 1542 Tulane Ave., New Orleans, LA 70112). *Cancer* 39(5):2258-2264; 1977.

The prevalence of colorectal polyps in New Orleans is reported and compared with data on this disease from other geographic locations to explore the epidemiological aspects of the polyp-cancer relationship. A close parallelism in the epidemiology of colon cancer and adenomatous polyps (proliferations of intestinal epithelial cells arranged in tubular fashion) is noted. Both conditions are statistically associated with respect to geography (in men, 63% prevalence of polyps--very high frequency of colon cancer in Hawaii-Japanese population; 37% prevalence of polyps--high frequency of colon cancer in New Orleans population), anatomic localization (17.5% of polyps were located between 10 and 22 cm from the anorectal junction in the New Orleans population, which is comparable to the 1.7 times excess of cancer in the sigmoid area in this population when compared to other populations), socio-economic class, migration experience (the Japanese and South African blacks have low rates in their home countries but have high incidence after migration), and time trends (age adjusted prevalence increased from 17 men in St. Louis, MO in 1947 to 63 men in Honolulu, HI in 1972). The size (average 6.5 mm) and prevalence of adenomatous polyps increased with age in the New Orleans population. The association favors the notion of direct, positive correlation between multiplicity, size, and atypia of polyps and cancer risk. The epidemiologic findings are coherent with other biologic facts derived from clinical, morphological, and experimental studies. Adenomatous polyps are a good epidemiologic indicator of colon cancer risk, and their presence should be helpful in studying the epidemiology of precursor lesions of colon cancer.

6335 SYPHILITIC PROCTITIS. (Eng.) Akdamar, K.; Martin, R. J.; Ichinose, H. (Tulane Univ. Sch. Medicine, Tulane Ave., New Orleans. LA 70112). *Am. J. Dig. Dis.* 22(8):701-704; 1977.

The cases of two male homosexuals with syphilitic proctitis are presented. One patient presented with symptoms similar to those reported previously: lower abdominal pain, blood-streaked stool, tenesmus, and rectal bleeding. A generalized macrulopapular skin rash was present. Proctoscopy revealed tender fibrotic-appearing lesions on the anterior and posterior rectal wall at 2, 7, and 9 cm. Biopsy showed an inflammatory vasculitis, and Warthin-Starry silver stain demonstrated many spirochetes. The patient's liver function test was abnormal, SGOT being 225 mU/ml, and the alkaline phosphatase being 170 mU/ml. The other patient was unusual in that there was no rectal pain and diffuse involvement of the rectum up to 20 cm was present. He had a 5-month history of abdominal discomfort associated with excessive mucoid diarrhea. Severe rectal bleeding occurred following biopsy. The biopsy material revealed a mixed lymphocytic and histiocytic vasculitis with reactive submucosal granulation tissue. Spirochetes were not demonstrated by the Warthin-Starry silver-stained sections. The patient experienced a Jarisch-Herxheimer reaction following the first injection of penicillin. There was no history or evidence of an external primary chancre in either patient, and both responded to penicillin therapy.

6336 VOLVULUS OF THE TRANSVERSE COLON. (Eng.) Eisenstat, T. E.; Raneri, A. J.; Mason, G. R. (Univ. Maryland Hosp., Baltimore, MD 21201). *Am. J. Surg.* 134(3):396-399; 1977.

The case reports of five patients with volvulus of the transverse colon are presented. Two patients had acute volvulus, the presentation being characterized by early obstruction of the mesenteric vessels. The other three patients presented with chronic volvulus, which was characterized by a gradual onset of symptoms, with periods of spontaneous decompression and exacerbations, painless abdominal distention, and an infrequent history of vomiting. A barium enema examination was carried out in three patients, two of which revealed obstruction at the splenic flexure. No reductions of the volvulus were accomplished by the enema. The diagnosis of volvulus of the transverse colon was not made preoperatively in any patient. Among the patients with chronic volvulus, one underwent resection with colostomy and mucous fistula, one underwent cecostomy only, and one underwent primary anastomosis with no fecal diversion; all patients recovered. Preparation of the patients with acute volvulus for surgery required aggressive fluid replacement and correction of severe acid-base imbalances. The course of one patient with acute volvulus was complicated by respiratory compromise secondary to dilated intestine and elevated diaphragm. A gangrenous transverse colon was found at laparotomy. Resection with colostomy and mucous fistula were carried out in both patients. Two of the five patients had had previous operations for colonic volvulus. The level of volvulus dictates the limitations of diagnostic aides and appropriate treatment.

6337 CECAL CHANGES FOLLOWING APPENDECTOMY. (Eng.) Ekberg, O. (Malmo General Hosp., S-21401 Malmo, Sweden). *Gastrointest. Radiol.* 2(1):57-60; 1977.

The appearance of the cecum was followed from 2 days to 18 months after appendectomy in 12 patients. All patients had histologically normal appendices but had signs of terminal ileitis *(Yersinia enterocolitica)* with edematous and hyperemic serosa together with enlarged lymph nodes. The appendix was removed, and the stump was invaginated twice in all cases. Radiologic examination of the ileocecal area was carried out on a total of 31 occasions during the 18-month period, and each patient had at least two examinations. Four kinds of cecal changes were seen: general deformation of the whole cecum, localized deformation of the medial aspect of the cecum, combination of a localized deformation with a general deformation of the whole cecum, and normal cecum. General deformation of the cecum or general deformation together with medial deformation occurred in five patients. Five of seven patients examined within 2 weeks after surgery had the localized deformation, and two were normal. Seven of the 11 patients examined within 6 weeks of surgery had the localized deformation, and 4 were normal. This condition disappeared within 18 months in four of the eight patients in whom it was present at one time or other. The localized defect was consistent in size and measured an average of 2 x 2 cm.

6338 COMBINATION OF ACUTE APPENDICITIS AND ACUTE DYSENTERY IN CHILDREN. (Rus.) Polishchuk, F. A.; Sheinbaum, M. P. (Rovny Municipal Children Hosp., USSR). *Khirurgiia* (4):124-125; 1977.

6339 DIAGNOSIS AND TREATMENT OF RECTAL CARCINOMA IN ELDERLY PATIENTS. (Rus.) Yudin, I. Yu.; Ozhiganov, E. L. (Cancer Res. Center, Moscow, USSR). *Klin. Med.* 55(4):97-101; 1977.

6340 ERRORS IN THE DIAGNOSIS OF ACUTE APPENDICITIS IN CHILDREN IN INFECTIOUS AND THERAPEUTIC HOSPITALS. (Ukr.) Yakovlev, Ya. Ya.; Gegenava, O. P. (Kuibyshev Medical Inst., USSR). *Pediatr. Akush. Ginekol.* (3):3-4; 1977.

6341 TREATMENT OF APPENDICULAR INFILTRATES. (Rus.) Khachaturyan, N. M. (All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Miscow, USSR). *Khirurgiia (Mosk.)* (6): 114-116; 1977.

6342 CLINICAL AND MORPHOLOGICAL PARALLELS IN ACUTE APPENDICITIS IN CHILDREN. (Rus.) Soinov, N. N.; Smirnov, V. V. (Tiraspol Republican Hosp., USSR). *Khirurgiia (Mosk.)* (8):52-55; 1977.

6343 DESTRUCTIVE DIVERTICULITIS IN COMBINATION WITH INVAGINATION OF THE CECUM AND SIGMOID COLON. (Rus.) Tregubov, G. S.; Kushch, Yu. B.; Khasarov, G. B. (Susuman Central Regional Hosp., USSR). *Khirurgiia (Mosk.)* (8):129; 1977.

6344 POSTOPERATIVE COMPLICATIONS IN ACUTE APPENDICITIS. (Rus.) Polikarpov, M. Ya.; Rychagov, G. P.; Mazurin, B. G. (No affiliation given). *Khirurgiia (Mosk.)* (8):122-124; 1977.

6345 DIFFICULTIES WITH THE CLINICAL AND MORPHOLOGICAL DIAGNOSIS OF RECTAL MELANOBLASTOMAS. (Rus.) Yudin, I. Yu.; Protchenko, N. V.; Solodar, I. M.; Revsis, M. G. (Inst. Experimental and Clinical Oncology, Moscow, USSR). *Klin. Khir.* (5):75-76; 1977.

6346 ONCE MORE ON ROENTGENOLOGICAL DIAGNOSIS OF DIVERTICULOSIS AND DIVERTICULITIS OF LARGE INTESTINE. (Rus.) Diakonov, V. T.; Bashkirova, V. B.; Sidorov, V. S. (Scientific Res. Lab. and Clinic Proctology, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (4):93-94; 1977.

6347 ACUTE APPENDICITIS IN CHILDREN YOUNGER THAN ONE YEAR. (Rus.) Mogilevskaya, K. A.; Loiko, E. E. (Zhitomir Regional Hosp., USSR). *Klin. Khir.* (6):80; 1977.

See also, 6144, 6149, 6156, 6165, 6166, 6194, 6197, 6263, 6290, 6294, 6296, 6300, 6302, 6350, 6352, 6356, 6375, 6380, 6430, 6529, 6540, 6585, 6588, 6589, 6596, 6598, 6601, 6603, 6604, 6605, 6607, 6614, 6616, 6630, 6636, 6638, 6642, 6653, 6665, 6667, 6668, 6669, 6671, 6672, 6676.

LARGE INTESTINE

Ulcerative Colitis

6348 BILE ACIDS IN LIVER DISEASE ASSOCIATED WITH INFLAMMATORY BOWEL DISEASE. (Eng.) Siegel, J. H.; Morris, J. S. (Royal Free Hosp., London, England). *Digestion* 15(6):469-481; 1977.

Bile acids in portal blood and gallbladder bile were studied in 9 patients with chronic bowel disease alone, 13 patients with bowel disease (ulcerative colitis) and liver disease, 10 patients with chronic liver disease alone, and 14 control patients to investigate the possibility that bowel-related liver disease is due to accumulation of abnormal bile acids in the enterohepatic circulation. There was no difference in the composition and concentration of bile acids (cholic, chenic, deoxycholic, and lithocholic acids) in bile and portal blood of patients without clinical liver disease compared with the control patients. Lithocholic acid was detected in small concentration (<1 μM). Bile acid concentrations and composition were similar in the two groups of patients with liver disease, whether they had bowel disease or not. Lithocholic acid was found in concentrations of up to 1.5-1.8 μM in 6 of 13 patients with liver disease. Postprandial serum bile acid concentrations were not elevated in the group of patients with chronic bowel disease, suggesting normal liver function in this group. No evidence was reported to support the hypothesis that bowel-related liver disease in man results from the action of abnormal bile acids.

6349 IMMUNOHISTOCHEMICAL AND ELECTRONMICROSCOPIC OBSERVATIONS ON THE LOCAL IMMUNE RESPONSE IN ULCERATIVE COLITIS.

(Eng.) Gebbers, J. O.; Otto, H. F. (Pathologisches Institut der Universitat, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 374(4): 271-273; 1977.

Colonoscopically obtained biopsy specimens of 50 young patients with ulcerative colitis were examined for the presence and distribution of immunoglobulin-containing cells by the indirect immunoperoxidase method and by electron microscopy. The numbers of plasma cells and of IgG-containing cells were increased, and there was a relative decrease in IgA cells. The IgM and IgE cell populations were not altered quantitatively. Free interstitial IgG was demonstrated in the lamina propria, and this was bound to the basement membrane of the surface epithelium. Complement was observed at this site and was also found in the intercellular space of the surface epithelium. This latter finding was seen only in cases of acute relapse of the disease. Russell bodies and Mott cells were seen within the plasma cells. There were numerous necrobiotic plasma cells, explaining the deposits of interstitial immunoglobulin. Close topographical relationships of lymphocytes and macrophages were observed, and both cell types appeared to be activated. Lymphocytes and plasma cells were clustered around activated macrophages, which may be the morphological expression of a functional involvement of macrophages in the local B-cell response. The findings support the suggestion that immune complexes occur locally in ulcerative colitis and play a part in the pathogenesis of this disease.

6350 IMMUNE COMPLEXES IN ULCERATIVE COLITIS AND CROHN'S DISEASE.

(Eng.) Hodgson, H. J. F.; Potter, B. J.; Jewell, D. P. (Royal Free Hosp., London NW3, England). *Clin. Exp. Immunol.* 29(2):187-196; 1977.

Sera from 156 patients with ulcerative colitis (UC) and Crohn's disease (CD) and from controls (normal subjects and hospital in-patients with diseases believed not to affect their immunological status) were tested for the presence of immune complexes by the detection of anti-complementary activity and ^{125}I-labeled Clq precipitation. Using aggregated IgG, a comparison between the two tests indicated that the anti-complementary test was the most sensitive to aggregates of 11S in size, while the ^{125}I-labeled Clq test detected aggregates over 20S in size. The correlation coefficient between the two tests was 0.2060 ($p<0.01$). Anti-complementary activity in excess of 1.90 CH_{50} units was seen in 29 of 90 patients with ulcerative colitis and 17 of 64 patients with Crohn's disease (both accompanied and not accompanied by extra-intestinal manifestations such as acute and chronic arthritis, ankylosing spondylitis, and liver disease). Large complexes were common only in patients with liver disease. When patients with extra-intestinal manifestations were excluded, a higher proportion of patients with moderate or severe disease showed excess anti-complementary activity, compared with patients with mild disease or in remission (CD, $p<0.05$; UC, $p<0.1$). The mean anti-complementary activity of 18 patients in remission fell as their clinical state improved ($p<0.001$). The immunoglobulin levels showed no such consistent changes. It is suggested that immune complexes in the gut mucosa play a role in the pathogenesis of these diseases, and that the deposition of circulatory immune complexes may explain at least some of the extra-intestinal manifestations.

6351 ULCERATIVE COLITIS IN A PATIENT WITH ANTI-B LYMPHOCYTOTOXIN AND HYPOGAMMAGLOBULINEMIA.

(Eng.) Matuchansky, C.; Messing, B.; Tursz, T.; Galian, A.; Bernier, J. J.; Seligmann, M.; *et al.* (Hotel-Dieu, 86021 Poitiers, France). *Gastroenterology* 73(3):578-582; 1977.

The case of a 32-yr-old woman with chronic ulcerative colitis, primary hypogammaglobulinemia and a very low number (0.5-1.5%) of bone marrow-derived (B) lymphocytes in peripheral blood is described. A lymphocytotoxin (LCT) reacting specifically with B cells was demonstrated in the serum by cytotoxicity and direct immunofluorescence experiments. Intestinal immunofluorescence studies indicated a dichotomy between blood and gut immunoglobulins, and showed a heterogeneous distribution of plasma cells of the three major classes from the jejunum to the rectum. The dissociation between blood and gut immunoglobulins may have been due to the fact that the intestine was, in this patient, a privileged site for differentiation of B cells.

6352 COLECTOMY AND ILEORECTAL ANASTOMOSIS FOR COLITIS: REPORT ON A PERSONAL SERIES, WITH A CRITICAL REVIEW.

(Eng.) Jones, P. F.; Munro, A.; Ewen, S. W. B. (Woodend General Hosp., Aberdeen, AB9 2YS, Scotland). *Br. J. Surg.* 64(9):615-623; 1977.

In a consecutive series of 86 patients who required total colectomy for inflammatory bowel disease, 36 had an ileorectal anastomosis. On review between 1 and 18 years after the operation, there were 25 patients who retained the anastomosis, all of whom were in good general health. Bowel obstruction (3 patients) and lung and pelvic abscess (1 patient) were the major problems encountered after the operation. Five patients died of various causes after surviving for 5 months to 14 year. Four patients required laparotomy for adhesive intestinal obstruction at a late stage. One patient who had ankylosing spondylitis before operation was reported to have symptoms intermittently, and another patient developed arthritis. Of the 25 survivors, 23 had had ulcerative colitis (UC) and 2 had had Crohn's disease. All 23 patients with UC lead a normal life. The frequency of bowel movement is 3-6 stools daily. No evidence of precancer in the biopsies of the rectal stumps of 22 patients was reported. Only nine of the patients have been on sulphasalazine continuously. The results are compared with other published reports in a critical review of the present standing of ileorectal anastomosis. Ileorectal anastomosis is a good operation for suitable patients, but, due to risk of development of carcinoma of the rectum in patients with UC, it is suggested that patients be available for and willing to undergo annual sigmoidoscopic examination.

6353 ULCERATIVE COLITIS AND CROHN'S COLITIS: DIFFERENTIAL DIAGNOSIS AND TREATMENT. (Eng.) Northfield, T. C. (St. George's Hosp. Medical Sch., Cranmer Terrace, London SW 17 ORE, England). *Drugs* 14(3):198-206; 1977.

6354 INCREASED PROSTAGLANDIN PRODUCTION IN ULCERATIVE COLITIS [Letter to Editor]. (Eng.) Gould, S. R.; Brash, A. R.; Conolly, M. E. (St. Mark's Hosp., London EC1V 2PS, England). *Lancet* 2(8028):98; 1977.

6355 AIR CONTRAST STUDIES OF THE COLON IN INFLAMMATORY BOWEL DISEASE. (Eng.) Laufer, I. (Univ. Pennsylvania Hosp., Philadelphia, PA). *CRC Crit. Rev. Diagn. Imaging* 9(4):421-447; 1977.

6356 CHRONIC INFLAMMATORY BOWEL DISEASE. (Eng.) Cavell, B.; Hildebrand, H.; Meeuwisse, G. W.; Lindquist, B. (No affiliation given). *Clin. Gastroenterol.* 6(2):481-496; 1977.

6357 THE ACTIONS OF SULPHASALAZINE. (Eng.) Khan, A. K. A.; Truelove, S. C. *In: Topics in Gastroenterology*. Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):367-381; 1976.

See also, 6160, 6586, 6603, 6667, 6676.

PANCREAS

6358 AMYLASE THERMOLABILITY IN BODY FLUIDS. (Eng.) Donaldson, L. A.; McIntosh, W. B.; Brodie, M. J. (Stobhill General Hosp., Glasgow, Scotland). *Scand. J. Gastroenterol.* 12(5):637-639; 1977.

In an attempt to differentiate the isoenzymes of human amylase, the thermolability of amylase was measured in saliva, pancreatic juice, urine, and adult and neonatal sera. Amylase activity was estimated before and after heating the test fluids at 65 ± 0.5 C for 15 min. The mean percentage thermolability from these fluids was 100%, 99%, 87%, 44%, and 23%, resp. In patients with acute pancreatitis and mumps, the amylase was 84% and 83% thermolabile during the acute phase. On resolution of the pancreatitis, this dropped towards normal. Patients with a pancreatic pseudocyst showed a high mean percentage thermolability (82%). These results suggest that a component of amylase in human serum is not of pancreatic or salivary origin. In addition, this simple technique may be helpful in the diagnosis of pancreatic pseudocyst.

6359 SONOGRAPHIC DIAGNOSIS OF PANCREATIC DISEASES. (Eng.) Lutz, H. T. (Dept. Medicine, Univ. Erlangen-Nurnberg, D-8520 Erlangen, W. Germany). *Ultrasound Med. Biol.* 3(1):55-57; 1977.

The diagnostic accuracy of ultrasonography was compared with that of endoscopic retrograde pancreatography (ERP) in 316 patients. Among 130 patients with pancreatitis, 48 with pseudocyst, 37 with carcinoma, and 101 with a normal pancreas, ultrasound was not possible in 6.7%, provided a borderline diagnosis in 8.5%, was false-negative in 1.9%, was false-positive in 5.4%, and indicated the correct diagnosis in 77.5%. In the same patients, ERP was not possible in 14.9%, was false-negative in 3.8%, was false-positive in 0.6%, and indicated the correct diagnosis in 80.7%. Among the 191 patients in whom ultrasonography indicated some type of pancreatic disease, the differential diagnosis was further aided by this procedure in 138. The results indicate that ultrasonography is the safest and least expensive diagnostic method in pancreatic diseases.

6360 TREATMENT OF ADVANCED ADENOCARCINOMA OF THE PANCREAS WITH COMBINATIONS OF STREPTOZOTOCIN PLUS 5-FLUOROURACIL AND STREPTOZOTOCIN PLUS CYCLOPHOSPHAMIDE. (Eng.) Moertel, C. G.; Douglas, H. O., Jr.; Hanley, J.; Carbone, P. P. (Mayo Clinic, Rochester, MN). *Cancer* 40(2):605-608; 1977.

Combination chemotherapy with streptozotocin and 5-fluorouracil or combined streptozotocin and cyclophosphamide were compared in 116 patients with advanced and metastatic pancreatic adenocarcinoma. Toxic reactions to each regimen were qualitatively similar and consisted of nausea and vomiting during treatment and subsequent leukopenia and thrombocytopenia. Renal toxicity was less frequent and only rarely severe. Among 51 eligible and evaluable patients treated with the streptozotocin-cyclophosphamide combination, 12% showed objective response and among 42 patients treated with streptozotocin plus 5-fluorouracil, 12% showed objective response. The streptozotocin plus 5-fluorouracil-treated patients showed a slight advantage in survival. Neither regimen can be considered of substantive value to the patient with advanced pancreatic carcinoma.

6361 PERCUTANEOUS FINE NEEDLE ASPIRATION BIOPSY OF PANCREATIC CARCINOMA. (Eng.) Clouse, M. E.; Gregg, J. A.; McDonald, D. G.; Legg, M. A. (New England Deaconess Hosp., 185 Pilgrim Rd., Boston, MA 02215). *Gastrointest. Radiol.* 2(1):67-69; 1977.

The use of percutaneous fine needle aspiration biopsy in the diagnosis of pancreatic carcinoma was evaluated in 13 patients with carcinoma. The tumor was localized by angiography in eight, ultrasound in five, and endoscopic retrograde pancreatography in three patients. In four patients aspiration was performed using two of the three localizing techniques. Tumor cells were aspirated in six of the eight patients in whom angiography was used to localize the tumor. Positive aspirates were obtained in two of three patients using endoscopic retrograde pancreatography and in three of six patients using ultrasound. Among the patients in whom two localizing techniques were used, tumor cells were not aspirated (false-negative) in one patient using angiography and ultrasound and in a second patient using both ultrasound and endoscopic retrograde pancreatography. Positive cytology was obtained in a total of 10 patients, the diagnostic yield being 77%. There were a total of three false-negative and no false-positive diagnoses. Cytological diagnosis of pancreatic carcinoma can be made accurately by percutaneous fine needle aspiration of the tumor and operative intervention may be avoided in those patients who do not require operative bypass procedures. Percutaneous fine needle aspiration can be used with equal facility with arteriography, ultrasound, or endoscopic retrograde pancreatography.

6362 THE DIAGNOSIS OF THE SMALL RESECTABLE PANCREATIC CARCINOMA. (Eng.) Ariyama, J.; Shirakabe, H.; Ikenobe, H.; Kurosawa, A.; Owman, T. (Dept. Gastroenterology, Juntendo Univ., Tokyo, Japan). *Clin. Radiol.* 28(4):437-444; 1977.

The use of endoscopic retrograde cholangiopancreatography (ERCP) in combination with angiography for the preoperative diagnosis of 31 of 32 pancreatic carcinomas is reported. In 19 cases, the tumor affected the head, in 11 cases, the body and/or tail, and in 2 cases, the entire pancreas. Of the 32 cases of pancreatic carcinoma, 10 were resectable. Of these, eight were located in the head, one in the body, and one in the tail of the pancreas. Of the 10 cases that were resected, 6 (5 in the head and 1 in the body of the pancreas) were regarded as small carcinomas (less than 2 cm in diameter). The ERCP findings in these six cases of small carcinoma were occlusion of the main pancreatic duct in three cases, stenosis of the main pancreatic duct in two cases, and rarefaction of pancreatic duct branches with a normal main pancreatic duct in one case. In all cases of small pancreatic carcinoma, superselective angiography was necessary to make a definitive diagnosis. Angiographic findings were arterial encasement, occlusion, and an avascular area; these changes were limited to intrapancreatic arteries. While ERCP is the only examination for detecting small pancreatic carcinoma, angiography is indispensable for evaluating the extent and size of the carcinoma, for predicting the resectability of the tumor, and for differentiating between pancreatitis and pancreatic carcinoma.

6363 COMPUTED TOMOGRAPHY IN THE EVALUATION OF PATIENTS WITH SUSPECTED CARCINOMA OF THE PANCREAS. (Eng.) Sheedy, P. F., II; Stephens, D. H.; Hattery, R. R.; MacCarty, R. L. (Mayo Clinic, Rochester, MN 55901). *Radiology* 124(3):731-737; 1977.

Results obtained with computed tomography (CT) in the evaluation of 151 patients with suspected pancreatic carcinoma are reported. The CT diagnoses were divided into four categories based on the original interpretation: mass or carcinoma (53 scans); normal pancreas (68 scans); normal pancreas, but another pathologic process discovered on CT (20 scans); and unsatisfactory or indeterminate examinations (10 scans). Subsequent surgery, biopsy, or clinical follow-up verified the presence of carcinoma in 31 of 53 scans positive for carcinoma. Carcinoma of the pancreas was not observed in 21 patients with positive scans, but in 12 of these patients, surgery or angiography revealed a significant mass lesion near the pancreas. No pancreatic disease was found at surgery in nine patients with scans positive for carcinoma. Significant pancreatic disease was found in 2 of 68 patients with scans showing normal pancreas; surgery revealed a 5-cm carcinoma in the uncinate process in 1 patient, and autopsy revealed acute hemorrhagic pancreatitis in the other. There were 5 proven carcinomas in 10 patients with CT scans that were unsatisfactory or indeterminate. In these 10 cases, there was contrast material or gas artifacts in 4, ascites and postoperative adhesions in 3, excessive "noise" in 1, and "cuts" too low in the abdomen in 1. One patient did not fit the scanner. In cases of erroneously positive examinations where surgery or angiography revealed mass lesions that simulated pancreatic carcinoma, an accumulation of experience and refinement of technique should permit the accurate differentiation of several lesions. In other false-positive cases, refinement of technique, including the increased use of oral contrast material, examinations using overlapping slices, and improvement of equipment function, should result in substantially fewer false-positive interpretations.

6364 LATE-ONSET INTESTINAL OBSTRUCTION IN CYSTIC FIBROSIS--MECONIUM ILEUS EQUIVALENT. (Eng.) Edge, W. E. B.; Nuss, D.; Loening, W. E. K. (1521 Durdoc Centre, 460 Smith St., Durban, South Africa). *S. Afr. Med. J.* 52(7):271-274; 1977.

The cases of four patients with cystic fibrosis who were treated surgically for late-onset bowel obstruction (meconium ileus equivalent) are presented. The patients included an 11-week-old girl, an 8-month-old girl, a 12.5-month-old boy, and a 16-yr-old boy. The fecal impaction occurred in the midjejunum, terminal ileum, terminal ileum, and cecum in each patient, resp. The obstruction was associated with a decrease in the usual dose of pancrelipase in the third patient and with dehydration in the first. In patients 1 and 2, no pancreatic supplements had yet been given, while in patient 4 severe dietary fat restriction appeared to play a major role. The diagnosis of obstruction was made in all cases by review of the patients' history and by the abdominal films. The latter showed the typical appearance of small bowel obstruction as well as the ground-glass or soap-bubble appearance usually associated with meconium ileus. Conservative treatment (the administration of Gastrografin by nasogastric tube and enema) was attempted only in patient 3, but this failed to dislodge the obstruction. All patients recovered after surgery. The authors recommend that conservative management be tried before surgery.

6365 SPONTANEOUS HEMORRHAGE DUE TO PSEUDOCYSTS OF THE PANCREAS. (Eng.) Wu, T. K.; Zaman, S. N.; Gullick, H. D.; Powers, S. R., Jr. (Veterans Admin. Hosp., Albany, NY 12208). *Am. J. Surg.* 134(3):408-410; 1977.

The cases of three patients with spontaneous hemorrhage due to pancreatic pseudocysts are presented. The first patient, a 57-yr-old man, presented with pain in the high lumbar area associated with intermittent chills and fever for 5 weeks. Abdominal exploration revealed a retropancreatic cystic mass connected to the abdominal aorta with a perforation measuring approximately 2 cm in diameter. A portion of the abdominal aorta including the perforation was resected and replaced with a Dacron graft, but the patient died 4 hr after surgery. The pancreatic pseudocyst was first discovered at autopsy. The cyst occurred at the area of uncinate process dorsal to the superior mesenteric artery; it was firmly attached to the abdominal aorta, and the site of perforation was infrarenal. In the second patient, a 58-yr-old man with liver cirrhosis, erosion of the superior pancreaticoduodenal artery was diagnosed preoperatively by selective angiography. The gastroduodenal artery was ligated before the cyst was opened. Although there was no fistula detected between the pseudocyst and the gastrointestinal tract, it is likely that the patient's previous episodes of gastrointestinal bleeding originated from the pseudocyst. In the third patient, a 56-yr-old woman, a ruptured pseudocyst was discovered at laparotomy with hemorrhage into the retroperitoneal space. As in the second patient, dissection of the aorta below the diaphragm to obtain adequate control was essential before the pseudocyst was manipulated. After gastroduodenal artery ligation, the bleeding was controlled by suture-ligating the bleeder from the inside of the cyst. Surgery was successful in the last two patients. These cases indicate that operative treatment of this condition offers a better prognosis than more conservative management.

6366 PANCREATIC PSEUDOCYSTS COMMUNICATING WITH THE STOMACH: DEMONSTRATION BY ENDOSCOPIC RETROGRADE PANCREATOGRAPHY. (Eng.) Sugawa, C.; Walt, A. J.; Sankaran, S.; Bouwman, D.; Weaver, D. (Wayne State Univ., 540 E. Canfield Ave., Detroit, MI 48201). *Arch. Surg.* 112(9):1050-1053; 1977.

The cases of four patients in whom pancreatic pseudocysts communicating with the stomach were demonstrated by endoscopic retrograde pancreatography (ERP) are presented. The patients ranged in age from 34 to 57 yr. Alcoholic pancreatitis was the cause of the pseudocyst in all patients. Two patients presented with nausea, vomiting, and epigastric pain; one presented with epigastric pain alone and one presented with progressive abdominal distention. In one patient, a repeat ERP revealed that the pseudocyst had spontaneously drained into the stomach, and surgery was unnecessary. Distal pancreatectomy was successful in the treatment of one patient with pancreatic ascites and one patient with a left-sided pleural effusion. None of the patients had a pseudocyst converted into a pancreatic abscess. No unusual inflammatory features were seen in the two operated patients. These cases emphasize the potential diagnostic value of ERP in determining the presence and the fate of pseudocysts.

6367 CT DEMONSTRATION OF THE SPLENIC VEIN--PANCREATIC RELATIONSHIP: THE PSEUDO-DILATED PANCREATIC DUCT. (Eng.) Seidelmann, F. E.; Cohen, W. N.; Bryan, P. J.; Brown, J. (Upstate Medical Center, Syracuse, NY 13210). *Am. J. Roentgenol.* 129(1):17-21; 1977.

The cross-sectional anatomy of the splenic vein-pancreatic relationship, as visualized by computed tomography, was studied in 86 patients who had undergone abdominal scanning. A layer of fat that is normally present between the splenic vein and the pancreas may simulate a dilated pancreatic duct. Distinct demonstration of the splenic vein as a structure separate from the pancreas was possible in 43 of the 86 patients. An additional 25% of the patients had partial or indistinct demonstration of the splenic vein. Appreciation of this normal relationship on CT is imperative to avoid misinterpretation of the fat layer as a dilated pancreatic duct. In addition, the measured size of the pancreas may be overestimated by addition of the splenic vein width if the intervening fat is not identified.

6368 PROPHYLAXIS AND TREATMENT OF POSTOPERATIVE COMPLICATIONS IN PANCREATIC NECROSIS. (Rus.) Shigarev, T. D. (N. A. Semashko Municipal Emergency Hosp., Orel, USSR). *Khirurgiia* (3):114-116; 1977.

6369 ALCOHOLIC LESIONS OF THE PANCREAS. (Rus.) Mukhin, A. S.; Lebedev, S. P.; Kamalov, Yu. R. (I. M. Sechenov First Medical Inst., Moscow, USSR). *Klin. Khir. (Mosk.)* 55(6):72-76; 1977.

6370 DIAGNOSIS OF PRIMARY HEPATOCELLULAR CARCINOMA WITH ^{99m}TC-ACETYLMETHIONINE. (Jpn.) Kusakabe, K.; Yamasaki, T.; Ono, Y.; Ishikawa, R.; Maki, M.; Akiba, H. (Tokyo Women's Medical Sch., Tokyo, Japan). *Jpn. J. Nucl. Med.* 12(1):43-47; 1975.

6371 PANCREATIC EXTRACTS. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8028):73-74; 1977.

6372 PSEUDOCYST OF THE PANCREAS WITH MEDIASTINAL EXTENSION: AN ULTRASONOGRAPHIC DEMONSTRATION. (Eng.) Gooding, G. A. W. (Editorial Office, 380-M, Dept. Radiology, Univ. California, San Francisco, CA 94143). *J. Clin. Ultrasound* 5(2):121-123; 1977.

6373 CARCINOMA OF THE PANCREAS. (Eng.) Gursel, E. M.; Imamoglu, K. H.; Nickel, W. O. (Wayne State Univ. Sch. Medicine, 540 E. Canfield Ave., Detroit, MI 48201). *Am. J. Surg.* 134(3):353-355; 1977.

6374 MEDIASTINAL PANCREATIC PSEUDOCYST IN INFANCY. (Eng.) Mallard, R. E.; Stilwell, C. A.; O'Neill, J. A., Jr.; Karzon, D. T. (Vanderbilt Univ. Hosp., Nashville, TN 37232). *J. Pediatr.* 91(3):445-447; 1977.

6375 UNUSUAL MORTALITY EXPERIENCE OF PRINTING PRESSMEN. (Eng.) Lloyd, J. W.; Decoufle, P.; Salvin, L. G. (AFL-CIO, CLC, Washington, DC). *J. Occup. Med.* 19(8):543-550; 1977.

6376 PANCREATIC FISTULA: MANAGEMENT GUIDED BY ENDOSCOPIC RETROGRADE CHOLANGIOPANCRETOGRAPHY. (Eng.) Paloyan, D.; Simonowitz, D.; Blackstone, M. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201). *Arch. Surg.* 112(9):1139-1140; 1977.

See also, 6148, 6151, 6178, 6179, 6180, 6181, 6182, 6183, 6192, 6195, 6267, 6389, 6556, 6643.

PANCREAS

Pancreatitis

6377 STATISTICAL METHODS FOR QUANTIFYING THE SEVERITY OF CLINICAL ACUTE PANCREATITIS. (Eng.) Ranson, J. H. C.; Pasternack, B. S. (New York Univ. Medical Center, 550 First Ave., New York, NY 10016). *J. Surg. Res.* 22(2):79-91; 1977.

A statistical study was done of factors that have substantial prognostic value for identifying high-risk patients with acute pancreatitis. Two groups of patients were studied. Group 1 consisted of 244 patients who recovered without any major life-threatening complication, and group 2 consisted of 56 patients with severe pancreatitis of whom 22 died. Twelve variables were associated with increased risk of death or serious illness, and nine of them led to correct classification of 96% of the patients. These nine variables are age, blood sugar, SGOT, number of previous episodes, LDH at the time of admission, hematocrit fall, lowest serum calcium, lowest arterial oxygen tension, and estimated fluid sequestration during the initial 48 hr after admission. The variables most strongly related to severity of disease were LDH (group 1, 230.8 ± 133.7; group 2, 449.6 ± 394.5), blood sugar levels (group 1, 144.8 ± 50.2; group 2, 216.2 ± 108.1), and SGOT (group 1, 136.4 ± 184.2; group 2, 234.0 ± 443.4). An accurate prediction of death or serious illness was possible using these nine factors and their interrelationships.

6378 THE EFFECTS OF SOMATOSTATIN ON HORMONAL AND METABOLIC RESPONSES IN CHRONIC PANCREATITIS. (Eng.) Botha, J. L.; Vinik, A. I.; Le Roith, D.; Child, P. T.; Jackson, W. P. U. (Dept. Medicine, Univ. Cape Town, South Africa). *S. Afr. Med. J.* 51(24):872-875; 1977.

The effects of somatostatin on the immunoreactive glucagon responses to arginine and insulin-induced hypoglycemia were studied in five normal men and five men with chronic pancreatitis. Unmodified synthetic somatostatin (200/μg, i.v. bolus + 200 μg infused over 3 hr) had no effect on basal plasma insulin and pancreatic glucagon-like immunoreactivity (GLI) levels in controls or patients. Somatostatin inhibited insulin-hypoglycemia-induced pancreatic GLI release in controls and in patients with pancreatitis, and prolonged the insulin-induced fall in blood glucose in the patients. Arginine (10 mg/kg/min, i.v., 30 min) caused a decrease in free fatty acids (FFA) in controls, which was inhibited by somatostatin. Somatostatin abolished the rebound rise in plasma FFA in patients with pancreatitis after insulin-hypoglycemia. This effect may be related to inhibition of pancreatic GLI release or may be a direct action of somatostatin on lipolysis.

6379 DIABETES AND HYPOGLYCEMIA IN CHRONIC PANCREATITIS. (Eng.) Linde, J.; Nilsson, L. H.; Barany, F. R. (St. Erik's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 12(3):369-373; 1977.

The frequency of diabetes and hypoglycemia was studied in 59 patients with chronic pancreatitis, and the hypothesis that insulin sensitivity associated with pancreatitis is due to a destruction of α_2-cells, resulting in glucagon deficiency, was tested. Overt diabetes occurred in 36 patients. Half of the diabetics were insulin-dependent; among these patients, labile diabetes with hyperglycemia and high amounts of glucose in the urine was not uncommon. Hypoglycemic episodes were noted in 14 of the 18 insulin-treated patients, and in 3 patients severe hypoglycemia was believed to be the cause of death. Pancreatic glucagon was measured in the plasma of two patients with pancreatic diabetes and severe brain damage following hypoglycemic coma. Low basal glucagon values (0.12 and 0.17 ng/ml) were found, and the normal rise upon insulin-induced hypoglycemia was not seen. The results suggest that glucagon should be used in the management of severe hypoglycemia in chronic pancreatitis, and a certain degree of hyperglycemia should be allowed in the treatment of diabetes in these patients.

6380 COLONIC NECROSIS COMPLICATING PANCREATITIS. (Eng.) Dallemand, S.; Farman, J.; Stein, D.; Waxman, M.; Mitchell, W. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203). *Gastrointest. Radiol.* 2(1):27-30; 1977.

Two cases are presented of colonic necrosis resulting from acute pancreatitis, with particular attention to the radiologic findings. The first patient, an 86-yr-old man, presented with abdominal pain and guaiac-positive stool. Plain abdominal x-ray demonstrated several dilated small bowel loops and colon extending to the splenic flexure, and a barium enema examination revealed spasm and poor distention in the proximal descending colon. Laparotomy revealed an edematous pancreas and a necrotic descending colon. Pathologic examination of the resected colon confirmed extensive omental and serosal fat necrosis. The descending colon was altered because of hemorrhagic necrosis of all intestinal layers with only minimal acute inflammation. Several serosal veins were occluded by thrombi. Splenectomy was performed in the second patient, a 14-yr-old boy who had sustained a lacerated spleen in an automobile accident. All other abdominal organs were normal. An upper gastrointestinal and small bowel series were carried out after he developed watery diarrhea and abdominal pain. Ischemic changes were noted in the distal small bowel, cecum, and ascending colon. Arterial occlusions were evident at selective superior mesenteric arteriography. At laparotomy the cecum and ascending colon were necrotic and a longitudinal perforation was identified with barium spillage in the peritoneal cavity. Widespread fat necrosis was present in the peritoneal cavity and also involved the omentum. The pancreas was markedly swollen and edematous. The thrombi demonstrated angiographically were identified in the ileocolic artery and mesenteric branches to the ascending colon. Involvement of the mesenteric branches in pancreatitis was probably responsible for the intestinal ischemia in these patients.

6381 A CAUSE OF MISLEADING SERUM AMYLASE CONCENTRATIONS IN ACUTE PANCREATITIS. (Eng.) Donaldson, L. A.; McIntosh, W. (Stobhill General Hosp., Glasgow, Scotland). *Scot. Med. J.* 22(2): 151-153; 1977.

6382 COMPUTERIZED TOMOGRAPHY AND ULTRASONOGRAPHY IN PANCREATITIS. (Eng.) Ponette, E.; Pringot, J.; Baert, A. L.; Marchal, G.; Dardenne, A. N.; Coenen, Y. (Leopold III laan 22, B-3030 Heverlee, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):402-404; 1976.

6383 ERRORS IN THE DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. (Rus.) Nesterov, S. S. (Gorky Medical Inst., USSR). *Khirurgiia* (7):123-125; 1977.

6384 EXTRAPANCREATIC LESIONS IN PANCREATITIS IN CHILDREN. (Ukr.) Gudzenko, Zh. P. (Kiev Inst. Advanced Training for Physicians, USSR). *Pediatr. Akush. Ginekol.* (3):13-16; 1977.

6385 ALCOHOL AND THE PANCREAS. (Eng.) Sarles, H. (U31 INSERM, 46, Chemin de la Gaye, F-13009 Marseilles, France). *Nutr. Metab.* 21(1/3): 175-185; 1977.

6386 GALLIUM-67 SPREAD TO THE ANTERIOR PARARENAL SPACE IN PANCREATITIS: CASE REPORT. (Eng.) Myerson, P. J.; Berg, G. R.; Spencer, R. P.;

Myerson, D. (Univ. Connecticut Health Center, Farmington, CT 06032). *J. Nucl. Med.* 18(9):893-895; 1977.

6387 SERUM OR URINARY AMYLASE ESTIMATIONS IN CHILDREN WITH ACUTE ABDOMINAL PAIN. (Eng.) Sibert, J. R. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XW, Wales). *Arch. Dis. Child.* 52(8):658-659; 1977.

6388 ACUTE PANCREATITIS ASSOCIATED WITH PREGNANCY. (Eng.) Woodhouse, C. R. J. (North Middlesex Hosp., London N.18, England). *Br. J. Clin. Pract.* 31(6):79, 84; 1977.

6389 PANCREATITIS: PANCREATIC PSEUDOCYSTS AND THEIR COMPLICATIONS. (Eng.) Winship, D.; Butt, J.; Henstorf, H.; Ivey, K.; Smith, J. N.; Trenbeath, M.; *et al.* (Univ. Missouri Medical Center, Columbia, MO 65201). *Gastroenterology* 73(3):593-603; 1977.

6390 REVIEW: ACUTE PANCREATITIS. PATHOGENETIC FACTORS AS A BASIS FOR TREATMENT. (Eng.) Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(5):513-517; 1977.

6391 ACUTE PANCREATITIS AFTER TRANSLUMBAR AORTOGRAPHY. (Eng.) Imrie, C. W.; Goldring, J.; Pollock, J. G.; Watt, J. K. (Royal Infirmary, Glasgow G4 0SF, Scotland). *Br. Med. J.* 2(6088):681; 1977.

6392 ASEPTIC (ISCHEMIC) NECROSIS OF THE FEMORAL HEAD. (Eng.) Dalinka, M. K.; Alavi, A.; Forsted, D. H. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *JAMA* 238(10):1059-1061; 1977.

See also, 6151, 6180, 6358.

LIVER AND BILIARY TRACT

6393 THE USE OF PROSTAGLANDIN F_2 ALPHA IN SELECTIVE HEPATIC ANGIOGRAPHY. (Eng.) Legge, D. (Mater Misericordiae Hosp., Dublin, Ireland). *Radiology* 124(2):331-335; 1977.

The results of slow infusion hepatic angiographic studies obtained before and after the intra-arterial injection of prostaglandin F_2 alpha (60 µg) in 50 patients were compared. The prostaglandin injection resulted in increased caliber of the hepatic arteries, increased opacification of the parenchyma of the liver, and improved visualization of the gallbladder wall. Poorly vascularized metastatic lesions were better shown on the prostaglandin studies, and carcinoma of the gallbladder was diagnosed in two instances. The demonstration of 12 highly vascularized metastatic tumors was enhanced on the prostaglandin studies, but further improved after the injection of angiotensin (1 µg). The use of slow infusion hepatic angiography, augmented by prostaglandin, should reduce the diagnostic error rate for poorly vascularized hepatic tumors, and should aid the preoperative diagnosis of gallbladder carcinoma.

6394 A SIMPLE ULTRASONIC METHOD FOR EVALUATING LIVER SIZE. (Eng.) Holmes, J. H.; Sundgren, C; Ikle, D; Finch, J. (Univ. Colorado Medical Center, 4200 E. Ninth Ave. No. C277, Denver, CO 80262). *J. Clin. Ultrasound* 5(2):89-91; 1977.

A simple semiquantitative index, relating liver size of a specific patient to the normal range, is described. By measuring the liver area (maximum section) and plotting this against intra-abdominal area at the same level, tolerance levels were calculated for 80% of 63 normal subjects with a 95% confidence. The use of this method in 14 patients with liver diseases was also demonstrated. Eight patients fell within normal range. Six patients fell outside the normal range; these included one with idiopathic hepatomegaly, one with liver abscess, one with metastasis, one with obstructive jaundice, one with pancreatic tumor, and one with leiomyosarcoma. While liver size changes may be of limited diagnostic value in liver disease, the regression technique seems to be a simple approach to the estimation of liver size.

6395 ASSESSMENT OF ANTITOXIC LIVER FUNCTION BY ^{131}I-ORTHO-IODO-BENZOIC ACID. (Rus.) Dognalek, J.; Eisselt, M. (Medical Faculty, J. E. Purkinje Univ., Brno, Czechoslovakia). *Med. Radiol. (Mosk.)* 22(4):42-47; 1977.

The efficacy of an ^{131}I-ortho-iodo-benzoic acid (^{131}I-OIBA) metabolism assay for the assessment of hepatic antitoxin function was tested in more than 2,500 patients. The patients received the preparation on an empty stomach (2 mg, p.o., 20-30 μCi); OIBA metabolites were separated electrophoretically in the daily urine. It was found that the patients with chronic liver lesions had increased glucuronidation (binding of the foreign substances with glucuronic acid and formation of the glucuronides). Glucuronidation was significantly decreased in the patients with nontumoral lesions subjected to surgery under prolonged anesthesia; this was probably due to the liver hypoxia.

6396 METABOLISM OF FLURAZEPAM BY THE SMALL INTESTINE.

(Eng.) Mahon, W. A.; Inaba, T.; Stone, R. M. (Toronto General Hosp., Toronto, Ontario M5G 1L7, Canada). *Clin. Pharmacol. Ther.* 22(2):228-233; 1977.

The metabolism of 5-^{14}C-flurazepam was studied in three patients following catheterization of the portal and hepatic veins. Flurazepam (1.4-1.5 mg) was administered through a tube into the stomach in one patient and into the duodenum in two patients. Thin-layer chromatographs of portal vein blood showed that there was a rapid and early appearance of metabolites of flurazepam, consistent with the metabolism of the flurazepam by the intestinal mucosa, and at times when the concentrations in the hepatic vein and peripheral blood were very much lower than those in the portal vein. The major metabolites identified in portal vein blood were the mono- and didesethyl metabolites of flurazepam. Considerable hepatic uptake of flurazepam and its metabolites occurred, as evidenced by the lower concentrations of the parent compound and metabolites in the hepatic vein. Thus, "first-pass" metabolism of flurazepam following p.o. administration occurs in the small bowel mucosa of man as well as in the liver.

6397 EFFECT OF PHENOBARBITAL ON BILIARY LIPID METABOLISM IN NORMAL MAN.

(Eng.) Ginsberg, R. L.; Garnick, M. B. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *Gastroenterology* 72(6):1221-1227; 1977.

The effect of phenobarbital on biliary lipid composition in humans without gallbladder disease was investigated by determining parameters of biliary lipid metabolism in eight healthy subjects before and after p.o. phenobarbital administration (3 mg/kg/day for 25-54 days). Phenobarbital did not produce any statistically significant changes in bile lipid composition; cholesterol saturation index; total bile acid pool size; daily fractional turnover rate of cholic acid; hepatic secretion rates of cholesterol, bile acids, or phospholipids; and the fraction of the total bile acid pool represented by individual bile acids. Therefore, phenobarbital is not an effective agent, at least when used alone, in inducing changes in bile lipid composition during short-term administration in normal man. This indicates that phenobarbital would not be a useful modality in the prevention of the development of cholesterol gallstones; its prophylactic value in subjects with bile of higher lithogenicity cannot be predicted from these studies.

6398 MAJOR HEPATIC RESECTION AND PORTAL PRESSURE.

(Eng.) Buerk, C. A.; Putnam, C. W.; Starzl, T. E. (Univ. Colorado Medical Center, Denver, CO). *Surg. Gynecol. Obstet.* 144(6):853-854; 1977.

Portal pressures were obtained before and after resection in three patients undergoing hepatic trisegmentectomy in whom 80% or more of the liver was removed. The patients' case reports are presented. The preoperative portal pressures (taken through a portal vein cannula at surgery, before extensive dissection) were 180, 200, and 160 mm of saline, resp., in the three patients (a 57-yr-old man, a 40-yr-old woman, and a 12-yr-old girl). After completion of the resections, the portal vein pressures in the respective patients were 172, 195, and 154 mm saline. No hypotension occurred during any of the procedures, the central venous pressures remained relatively constant, and there was no evidence of splanchnic engorgement. Although other reports have stressed the inevitability of portal hypertension and splanchnic pooling following major liver resections, with careful anatomic dissection and the absence of clinical disease in the nonresected remnant, major hepatic resections produce no clinical evidence of increased portal pressure or splanchnic sequestration.

6399 ALPHA-1-ANTITRYPSIN GLOBULES IN THE LIVER AND PiM PHENOTYPE.

(Eng.) Bradfield, J. W. B.; Blenkinsopp, W. K. (St. Mary's Hosp., London W2, England). *J. Clin. Pathol.* 30(5):464-466; 1977.

The case of a patient with typical alpha-1-antitrypsin globules in the hepatocytes but a normal serum antitrypsin level and a normal phenotype (PiM) for alpha-1-antitrypsin is presented. The patient, a 79-yr-old man, was hospitalized with non-alcoholic acute pancreatitis. A liver biopsy specimen showed PAS-positive, diastase-resistant globules in the periportal hepatocytes, but no further abnormalities other than excess fat. The globules were identified as alpha-1-antitrypsin by both immunofluorescent and immunoperoxidase methods. The serum antitrypsin level was 2.3 g/l. Phenotyping of antemortem serum and postmortem blood showed the PiM allele, with no evidence of an abnormal allele, on starch gel electrophoresis. Isoelectric focusing confirmed that only the PiM allele was present. The identification of alpha-1-antitrypsin globules can no longer be regarded as conclusive evidence of an abnormal alpha-1-antitrypsin phenotype.

6400 CORRELATIONS BETWEEN THROMBOCYTE COUNT, CLINICAL DIAGNOSIS AND LIVER HISTOLOGY IN PATIENTS WITH CHRONIC LIVER DISEASES.

(Ger.) v. Braun, H. H.; Henning, H.; Luders, C. J.; Probst,

P. (Klinik Fohrenkamp der BfA, Postfach 13 80, 2410 Molln/Lauenburg, W. Germany). *Z. Gastroenterol.* 14(5):538-547; 1976.

The blood thrombocyte content and the histologic findings were compared in 1,488 patients with chronic liver disease. The degree of hepatic injury ranged from fatty infiltration to fatty cirrhosis or from slightly active chronic hepatitis to active postnecrotic cirrhosis. The extent of liver injury (i.e., the presence of cirrhosis) was correlated with a significant decrease in the thrombocyte count. Thrombocytopenia was also present in cases of nonactive liver disease and in posthepatic status. Histologic examination of liver biopsy specimens showed that the thrombocytopenia occurred in cases in which cirrhotic transformation, connective tissue proliferation in the periportal folds, or inflammatory activity had occurred. It is concluded that the decreased thrombocyte count in cirrhosis is related to increased thrombocyte storage in the spleen; this may be due to the altered portal blood flow occurring with portal hypertension. This study demonstrates that there is a correlation between the degree of liver injury, portal pressure, platelet pooling, and the thrombocyte count.

6401 SERUM IgE LEVELS IN PATIENTS WITH LIVER DISEASE. (Eng.) Joske, R. A.; Turner, K. J.; Murphy, B. P. (Perth Medical Center, Shenton Park, Western Australia 6008). *Med. J. Aust.* 2(15):555-557; 1977.

The relation between IgE and the diagnosis and therapy of liver diseases was studied in 120 patients and 413 healthy controls. The patients included 26 with untreated active chronic hepatitis, 36 with treated active chronic hepatitis, 14 with acute hepatitis, 33 with alcoholic liver disease, 10 with congestive hepatomegaly, 14 with neoplastic disease, 17 with obstructive syndromes, and 10 with miscellaneous liver diseases. The mean serum IgE level in the patients (1,215 μg/l) was significantly higher than that in the controls (351 μg/l, $p<0.01$). There was a significant increase in IgE levels in untreated active chronic hepatitis ($p<0.05$), and the IgE levels fell significantly with treatment, so that IgE levels in the treated patients did not differ significantly from those in the control group. The mean IgE level in the patients with alcoholic liver disease (1,638 μg/l) was significantly higher than that in controls ($p<0.05$). There were no significant alterations in IgE levels in other types of acute or chronic liver disease. There were no significant correlations between IgE levels and the age or sex of the patients, or between IgE levels and other laboratory investigations (i.e., eosinophil counts, serum bilirubin, alkaline phosphatase, SGOT, serum albumin, total serum globulin, serum γ-globulin, serum IgA, serum IgG, serum IgM, and the presence or absence of hepatitis B antigen or tissue autoantibodies). It seems improbable that reaginic antibody is important in liver disease generally, or that the liver plays a role in the metabolism of IgE.

6402 ALPHA$_1$-ANTITRYPSIN DEFICIENCY IN CHRONIC LIVER LESIONS. (Pol.) Szczeklik, A.; Stachura, J.; Szczudrawa, J.; Sowa, J.; Wozny, E.; Bogdal, J.; Pieton, R. (Clinic Allergy and Immunology, Inst. Internal Medicine, Krakow, Poland). *Pol. Tyg. Lek.* 32(27):1033-1036; 1977.

The content of serum antitrypsin was assessed in 96 patients with various chronic liver lesions. Clinical and histological diagnosis was of chronic active hepatitis in 28 patients, chronic persisting hepatitis in 15, portal cirrhosis in 24, postnecrotic cirrhosis in 16, primary biliary cirrhosis in 1, liver steatosis in 6, and hepatocarcinoma in 4; 2 patients were not accounted for. Alpha$_1$-antitrypsin (AAT) level was significantly elevated in 93 patients, all of whom had MM phenotype, while 3 patients with MZ phenotype showed AAT deficiency; clinically, 2 had liver fibrosis and 1 had hemosiderosis of the hepatocytes.

6403 SERUM ALPHA-FETOPROTEIN LEVELS AFTER HEPATIC ARTERY LIGATION AND POSTOPERATIVE CHEMOTHERAPY: CORRELATION WITH CLINICAL STATUS IN PATIENTS WITH HEPATOCELLULAR CARCINOMA. (Eng.) Nagasue, N.; Inokuchi, K.; Kobayashi, M.; Saku, M. (Kyushu Univ. Sch. Medicine, Higashiku, Fukuoka 812, Japan). *Cancer* 40(2):615-618; 1977.

Eight patients with hepatocellular carcinoma and positive serum alpha-fetoprotein (AFP) levels were treated by hepatic artery ligation and postoperative chemotherapy. After these procedures, changes in serum AFP levels were studied, and the value of AFP in the clinical assessment of treatment was investigated. Three patterns of clinical response were discerned. First, a marked decrease in AFP levels was found in five patients following the treatment. Three of these patients are alive, all with lowered or normal serum AFP levels at 20, 22, and 60 weeks after operation. Second, two patients displayed only a transient decrease in AFP levels followed by a gradual increase. Third, there was a continuous increase in AFP levels in one patient who showed no clinical improvement. The serum AFP levels in each case appeared to correlate with the prognosis of these patients. Therefore, serial measurements of AFP levels may provide an index to assess the clinical result of hepatic artery ligation in patients with hepatoma.

6404 SERUM ALPHA FETOPROTEIN IN HEPATOCELLULAR CARCINOMA. (Eng.) Chen, D. S.; Sung, J. L. (Natl. Taiwan Univ. Hosp., 1-Chang-Te St., Taipei, China 100). *Cancer* 40(2):779-783; 1977.

The serum alpha-fetoprotein level (AFP) was determined by double immunodiffusion and radioimmunoassay in 125 histologically verified cases of hepatocellular carcinoma, 66 other malignancies, 74 cases of liver cirrhosis, 60 of chronic aggressive hepatitis, 12 of chronic persistent hepatitis, 16 of subacute hepatitis, 36 of acute viral hepatitis, and 13 healthy hepatitis B surface antigen (HBsAg) carriers. AFP greater than 10 ng/ml appeared in 90% of the 125 patients with hepatocellular carcinoma and was above 400 ng/ml in 69%. In 80% of those above 400 ng/ml, AFP was demonstrated by immunodiffusion. The AFP level in hepatocellular carcinoma declined as age increased. It also appeared to be related to the tumor cell type; the relatively immature cell type was more frequently associated with a higher AFP level. The presence of HBsAg did not influence the AFP level. Although the AFP in other malignancies and liver diseases was abnormal in 14%-69%, the level did not exceed 400 ng/ml. It appears that an AFP level of 400 ng/ml or greater is useful in the diagnosis of hepatocellular carcinoma.

6405 EXCESSIVE ALPHA-FETOPROTEIN CONCENTRATIONS IN HEPATOCELLULAR CARCINOMA. (Eng.)

Amery, A. H.; Alston, W. C.; Kohn, J.; White, W. F. (Frimley Park Hosp., Frimley, Surrey GU16 5UJ, England). *Br. Med. J.* 2(6087):611-612; 1977.

The case of a patient with hepatocellular carcinoma, whose serum concentration of alpha-fetoprotein exceeded 4,800,000 μg/1 and whose serum produced an extra band on protein electrophoresis is presented. The patient, a 16-yr-old boy, presented with a 2-week history of abdominal distention and right shoulder pain. Ascites, hepatomegaly, and increased serum bilirubin, alkaline phosphatase, and transaminase levels were present. The initial alpha-fetoprotein level of 4,800,000 g/l increased to 7,400,000 g/l during i.v. alimentation. Upon serum protein electrophoresis on cellulose acetate, the serum formed an extra band between albumin and alpha$_1$-globulin. Despite treatment with x-irradiation and a course of doxorubicin, the patient died 5 months after presentation. The maximum alpha-fetoprotein concentration in this patient is thought to be the highest ever reported. To appear as a separate band on routine electrophoresis, alpha-fetoprotein must be present in a concentration exceeding 0.5 g/l.

6406 INFANTILE HEPATIC HEMANGIOENDOTHELIOMAS ASSOCIATED WITH HEMIHYPERTROPHY. (Eng.)

Wood, B. P.; Putnam, T. C.; Chacko, A. K. (Univ. Rochester Medical Center, 601 Elmwood Ave., Rochester, NY 14642). *Pediatr. Radiol.* 5(4):242-245; 1977.

The case of an infant with marked hemihypertrophy, multiple liver hemangioendotheliomas, and a thoracic paraspinal hemangioendothelioma is presented. The infant, a 10-month-old girl, had congenital left-sided hemihypertrophy, hepatomegaly, and a low thoracic paraspinal mass at presentation. A liver scan showed multiple defects in the uptake of radioisotope. Surgical exploration revealed multiple infantile hemangioendotheliomas of the liver and a paraspinal hemangioendothelioma. A review of 69 reported cases of infantile hemangioendothelioma of the liver and viscera revealed no previous reports of hemihypertrophy associated with this abnormality.

6407 THE PATHOLOGY OF LIVER CELL CANCER. (Eng.)

Cameron, H. M. *In: Liver Cell Cancer.* Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Co.): pp. 17-43; 1976.

A description of the gross and microscopic pathology of liver cell cancer, its routes of spread, and differential diagnosis is presented. The gross pathology of liver cell cancer may be nodular (multiple nodules, often widely dispersed), massive (one dominant large mass from which there is a variable degree of spread, usually as nodules, into the neighboring parenchyma), or, less commonly, diffuse (extensive, fine, non-nodular infiltration). Microscopically, hepatocellular carcinoma is most commonly a well-differentiated tumor, bearing resemblance to the parent tissue. Because of the high degree of differentiation in most liver cell carcinomas, diagnosis is usually straightforward if representative tissue is available. Hepatocellular carcinoma can be distinguished from cholangiocarcinoma, since the latter is seldom multifocal and tends to invade the surrounding parenchyma in an irregular fashion that differs from the rounded lobulated masses seen in most hepatocellular tumors. Liver cancer spreads by local extension and by invasion of venous and lymphatic channels. It enlarges centrifugally, advancing into neighboring parenchyma, which has been devitalized by pressure and by derangement of its blood supply. There may also be perisinusoidal invasion with tumor cells replacing liver cell plates. Hepatocellular carcinoma is commonly associated with liver cirrhosis, most commonly of the macronodular type (posthepatic or postnecrotic). In liver cell cancer accompanied by cirrhosis, there may be an increase in the frequency of diabetes according to one study, which found diabetes in 23% of such cases, but in only 7.8% of cancers without cirrhosis. There is also a recognized association between liver cell cancer and hemochromatosis. Ectopic hormone syndromes ascribed to liver cell cancer are polycythemia, hypoglycemia, hypercalcemia, the carcinoid syndrome, and excess secretion of gonadotropins.

6408 SURGICAL TREATMENT OF PRIMARY LIVER CARCINOMA. (Eng.)

Flatmark, A.; Frethem, B.; Knutrud, O.; Lande, G. (Natl. Hosp. Norway, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(5):571-575; 1977.

The management and surgical treatment of 45 patients with primary liver carcinoma during a 15-yr period were reviewed. Sixteen patients were less than 15 yr of age. All patients underwent diagnostic laparotomy, and liver resection was performed in 16 (36%). Resectability was higher in children than in adults. Left lobectomy was performed in eight patients, right lobectomy in three, and an extended right lobectomy in five patients. One patient died postoperatively. Of the surviving 15 patients, 4 died from metastatic tumor within 18 months after surgery. Patient survival at 2 yr was 73%. The results indicate radical surgery or primary liver carcinoma whenever possible.

6409 RECURRENT MASSIVE HAEMORRHAGE FROM BENIGN HEPATIC TUMOURS SECONDARY TO ORAL CONTRACEPTIVES. (Eng.) Bein, N. N.; Goldsmith, H. S. (Thomas Jefferson Medical Coll., 1025 Walnut St., Philadelphia, PA 19107). *Br. J. Surg.* 64(6):433-435; 1977.

The case of a patient who, while taking oral contraceptives, had a hepatic hemorrhage from an adenoma 3 yr after an initial hepatic hemorrhage is presented. The patient, a 34-yr-old woman with an 11-yr history of taking oral contraceptives, had intraperitoneal bleeding following a traumatic hepatic laceration. At laparotomy, the liver was enlarged, and a 4.5 x 4 x 3 cm mass was removed from the right lobe; this was described as showing "focal nodular hyperplasia." She continued to take oral contraceptives and remained well for 3 yr. At this time, massive hepatic hemorrhage recurred, and a massive lesion involving the entire right lobe was found. She underwent resection of the entire right and medial segments of the left hepatic lobes. A 4-cm mass located deep within the remaining part of the liver was left intact. The final histological diagnosis of the liver mass was hepatic adenoma with necrosis and hemorrhage. The patient has refrained from taking oral contraceptives since surgery. A hepatic arteriogram taken 8 months after operation showed that the liver adenoma that had been left intact had decreased 25% in size in relation to a preoperative arteriogram. Any patient taking oral contraceptives who presents with right upper quadrant pain, hemoperitoneum, and vascular collapse must be considered to be bleeding from an hepatic tumor until proved otherwise.

6410 CAROLI'S DISEASE: AN ULTRASONIC DIAGNOSIS. (Eng.) Bass, E. M.; Funston, M. R.; Shaff, M. I. (Groote Schuur Hosp., Observatory, Cape Town 7925, South Africa). *Br. J. Radiol.* 50(593):366-369; 1977.

The case of a patient in whom Caroli's disease was diagnosed by ultrasonography and confirmed by transhepatic cholangiography is presented. The patient, a 19-yr-old woman, experienced recurrent episodes of jaundice and rigors. She was first thought to have infectious hepatitis, but her jaundice never settled and a liver biopsy was compatible with cholangitis and biliary stasis. When she became pyrexial and her liver was enlarged by 3 cm, longitudinal and transverse grey-scale ultrasonography was carried out. Four transonic lesions, varying from 2-5 cm in diameter, were detected in the region of the porta hepatis; their cystic nature was confirmed by the absence of internal echoes at high and low gain and clear definition of their posterior walls. An undilated gallbladder was identified, and superior to the gallbladder and within the liver substance were three cystic lesions. The diagnosis of congenital cystic dilatation of the intrahepatic bile ducts was confirmed by transhepatic cholangiography and at surgery. A 6-cm diameter choledochal cyst containing 12 calculi was found, and a cholecystectomy and Roux-en-Y choledocystjejunostomy were carried out.

6411 STIMULATION OF DRUG METABOLISM BY RIFAMPICIN IN PATIENTS WITH CIRRHOSIS OR CHOLESTASIS MEASURED BY INCREASED HEXOBARBITAL AND TOLBUTAMIDE CLEARANCE. (Eng.) Zilly, W.; Breimer, D. D.; Richter, E. (Luitpoldkrankenhaus, Josef-Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Eur. J. Clin. Pharmacol.* 11(4):287-293; 1977.

The enzyme-inducing ability of rifampicin was studied in 11 patients with liver cirrhosis or cholestasis, and the ability of this drug to improve hepatocellular function was assessed. The patients received rifampicin, p.o., in a dose increasing from 150 mg to 600 mg daily for 7-132 days. Ten patients received hexobarbital (7.32 mg/kg) and five received tolbutamide (20 mg/kg) by i.v. infusion prior to and after rifampicin treatment; plasma concentrations of the two test compounds were determined during and after infusion. The average elimination half-life of hexobarbital decreased from 624 to 262 min, and that of tolbutamide from 292 to 160 min, following rifampicin treatment. The metabolic clearance of hexobarbital increased more than twofold and that of tolbutamide almost twofold. The results suggest that rifampicin stimulates hepatic drug metabolism in patients with liver disease. The induction did not lead to improvement of hepatocellular function during disease, as judged by laboratory findings.

6412 ACUTE LIVER FAILURE: EXPERIENCE IN A SPECIAL UNIT. (Eng.) Ward, M. E.; Trewby, P. N.; Williams, R.; Strunin, L. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5, England). *Anaesthesia* 32(3):228-239; 1977.

The management of acute liver failure is discussed. Clinical manifestations of acute liver failure include neurological, acid-base, cardiac, renal, metabolic, and hematological disturbances. Fetor hepaticus may be present, and the liver is often small on percussion. Clinical jaundice develops over a few days and, in most cases, is preceded by signs of encephalopathy. Specific treatments for the management of acute liver failure include the use of corticosteroids, extracorporeal animal liver perfusion, human cross-circulation, exchange blood transfusion, hepatic transplantation, and hemodialysis. Although each treatment has been successful on occasion, the success of any of these treatments has not been substantiated by controlled trials. Extracorporeal charcoal hemoperfusion has also been used for the treatment of acute liver failure. Total heparinization is important and is achieved by an initial bolus plus intermittent doses of heparin to maintain a Lee-White clotting time of 20-30 min. Initial results with charcoal hemoperfusion in 22 patients showed an improvement in survival rate from 13% to 45%. The major problem presently encountered with charcoal hemoperfusion is hypotension, which generally responds to volume replacement. Recent clinical experience since 1975 with a new hemodialysis membrane prepared from polyacrylonitrile shows this technique to be twice as efficient as charcoal hemoperfusion in clearing toxic water-soluble compounds from the blood. It is also free from many of the side-effects associated with charcoal hemoperfusion. Among 23 patients treated with this new hemodialysis membrane, 9 have survived. The monitoring of patients with acute liver failure includes daily measurements of prothrombin time, plasma bilirubin, aspartate aminotransferase, and alkaline phosphatase. Prothrombin time has proved useful in assessing the return of liver function. Neither serum bilirubin nor hepatic enzyme activity are of prognostic value.

6413 ABNORMAL PLATELET FUNCTION AND ULTRASTRUCTURE IN FULMINANT HEPATIC FAILURE.

(Eng.) Rubin, M. H.; Weston, M. J.; Bullock, G.; Roberts, J.; Langley, P. G.; White, Y. S.; *et al.* (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5, England). *Q. J. Med.* 46(183): 339-352; 1977.

To study the nature of the bleeding diathesis of fulminant hepatic failure, platelet function was studied in 12 patients with severe liver necrosis and fulminant hepatic failure and 16 patients with less severe damage uncomplicated by hepatic coma. Platelets from six patients with severe liver necrosis required a higher concentration (threshold concentration) of ADP to reach second-phase aggregation than those from controls (12.3×10^{-6} M compared with 2.2×10^{-6} M, $p<0.001$). Platelets from another six patients with severe liver necrosis failed to show second phase aggregation at the highest concentration of ADP used (32×10^{-6} M). The degree of aggregation at a fixed ADP concentration (3.2×10^{-6} M) was significantly less than in controls (34.2% compared with 57.5%). Capillary bleeding times correlated positively with the abnormalities of platelet aggregation. In crossover studies, platelet-poor plasma from these patients did not inhibit platelet aggregation in controls, nor did platelet-poor plasma from controls enable patients' platelets to reach second-phase aggregation, suggesting that factors other than the plasma were responsible for this abnormal platelet function. Platelet function was normal in the 16 patients with virus hepatitis or liver damage (without fulminant hepatic failure) following paracetamol overdose. Electron microscopy of platelets from patients with fulminant hepatic failure showed many structural abnormalities, including numerous pseudopods, vacuoles, and blurred plasma membranes. Most striking were the numbers of platelets showing microtubules, and the increased microtubular content per platelet. As patients recovered from fulminant hepatic failure, platelet function improved and platelets with normal ultrastructure appeared among the abnormal ones. The abnormal-looking platelets may be responsible for the abnormalities of platelet function, but kinetic studies are required to elucidate their source and fate.

6414 CONGENITAL HEPATIC FIBROSIS. (Eng.)

Partovi, P. (N. 5901 Lidgerwood, Suite 219, Spokane, WA 99207). *Int. Surg.* 62(6/7):361-363; 1977.

The case of a patient with congenital hepatic fibrosis is presented. Liver cirrhosis was diagnosed at the age of 11 months, and one of his eight siblings had died from hemorrhage from esophageal varices. The patient had mild hypertension that responded to antihypertensive medication. Massive upper gastrointestinal bleeding occurred when the patient was 31. At laparotomy, the spleen and liver were enlarged, and large esophageal varices were present. Engorgement of the splanchnic veins was compatible with portal hypertension. A branch of the superior mesenteric vein was cannulated, and a portal pressure reading of 42 cm of water was obtained; a splenic pulp pressure of 44 cm water substantiated the presence of portal hypertension. An inferior vena cava-superior mesenteric shunt was performed, and splenic pulp pressure dropped to 24 cm of water. A liver biopsy specimen showed a network of dense, fibrous tissue dividing the liver into compartments without distorting the original lobular pattern. The fibrous bands were up to 100 μ thick. The liver cells were normal without evidence of necrosis or any regenerating nodule. The portal triads were normal, but a paucity of portal vein branches was observed. Following the patient's discharge, i.v. pyelography showed typical bilateral polycystic kidneys. About 3 yr after surgery, the patient developed acute strangulating small bowel obstruction, which resulted from adhesions. At this time, hepatosplenomegaly was still present. The mesocaval anastomosis was intact and there were no signs of portal hypertension.

6415 EXCESSIVE HEPATIC GLYCOGEN STORAGE IN GLUCOSEPHOSPHATE ISOMERASE DEFICIENCY.

(Eng.) Van Biervliet, J. P. G. M.; Staal, G. E. J. (Akademische Ziekenhuis, St. Jan, Sint Pieters, Brugge 8000, Belgium). *Acta Paediatr. Scand.* 66 (3):311-315; 1977.

The case of a patient with generalized glucose phosphate isomerase deficiency in whom large amounts of glycogen were found in the liver and RBC is presented. A liver biopsy was carried out after a 15-hr fast. Abundant cytoplasmic glycogen stored as beta particles was still present. The mean mitochondrial volume was normal, although some mitochondria were enlarged. The RBC glycogen content was 190 μg/g hemoglobin (controls 23-64 μg/g). A low carbohydrate diet, frequent meals, and avoidance of peak carbohydrate challenges resulted in a significant decrease in liver volume without affecting the hematological condition. Studies of carbohydrate metabolism showed normal responses to glucose, insulin, free fatty acids, and glucagon. There were low levels of lactic acid. The galactose tolerance test showed a low lactic acid response, normal galactose clearing, no glucose response, and a low free fatty acid response. The fructose tolerance test revealed a marked decrease in lactic acid and no glucose response, indicating diversion of fructose towards the glycolytic sequence below the deficient glucose phosphate isomerase step. These results exclude the presence of liver glycogenosis caused by deficiencies of glucose-6-phosphatase or branching and debranching enzymes and of the enzymes of the phosphorylase system. The glycogen storage in this patient was caused by an imbalance between carbohydrate intake and the metabolic capacity of the glycolytic sequences.

6416 HEPATORENAL SYNDROME: REVERSAL BY PERITONEOVENOUS SHUNT.

(Eng.) Fullen, W. D. (Univ. Cincinnati Medical Center, Cincinnati, OH 45267). *Surgery* 82(3):337-341; 1977.

The cases of two patients with hepatorenal syndrome who were treated by insertion of a peritoneovenous shunt are presented. The renal deficit was corrected rapidly in both cases. A 62-yr-old woman with a slow onset syndrome with urine output of 100-150 ml/day and urinary sodium excretion of 1 mEq/day responded with large volume urinary output and sodium excretion. She is alive with minimal ascites 18 months after shunt. A 53-yr-old man with severe nutritional cirrhosis, alcoholic hepatitis, and eventual massive necrosis was treated for bleeding esophageal varices by portacaval shunt. Postoperative massive ascites progressed to acute hepatorenal syndrome. Insertion of a peritoneovenous shunt reversed the renal deficit. He eventually died due to a hemorrhagic diathesis caused by massive hepatic necrosis. The advantages of the peritoneovenous shunt over other therapeutic methods include technical simplicity, both immediate and long-term effectiveness, and minimal operative stress and risk.

6417 LIVER DYSFUNCTION IN HYPERTENSION.

(Eng.) Ramsay, L. E. (Western Infirmary, Glasgow, Scotland). *Lancet* 2(8029):111-114; 1977.

Liver function tests were carried out routinely in 582 hypertensive patients. The tests were abnormal in 10.5% of all patients and in 15.8% of men and 6.2% of women. The patients studied appeared to be representative of the whole clinic population. Liver dysfunction was related to alcohol consumption, heavy body weight, male sex, young age, and higher diastolic blood pressure. It is suggested that alcohol and obesity were the principal causal factors and that fatty infiltration of the liver was the probable pathology. Liver dysfunction was unrelated to treatment. Alcohol use was found to be heavy in 12% of male patients attending the clinic. The possibility that alcohol abuse may have a causal role in hypertension needs further study.

6418 RESPIRATORY PROPERTIES OF PORTAL BLOOD IN PATIENTS WITH HEPATIC INSUFFICIENCY.

(Rus.) Sulima, S. Ya. (Dept. Faculty Surgery, Medical Inst., Ivano-Frankovsk, USSR). *Vestn. Khir.* (6):44-46; 1977.

Changes in the gaseous composition of the blood from the portal vein and femoral artery were studied in 48 patients with hepatic insufficiency due to diffuse peritonitis. Five patients developed peritonitis after acute appendicitis; 4 after perforating ulcer of the stomach and small intestine; 3 after ileus; 16 after acute cholecystitis; 12 after acute pancreatitis; 4 after traumatic lesions of the stomach, liver, or intestine; and 4 patients had postoperative peritonitis. Characteristic features of the initial phase of hepatic insufficiency were circulatory hypoxia, decreased oxygen level in the blood from the portal vein, and elevation of arterio-venous difference. During the relapse of hepatic insufficiency, the oxygen level in the portal blood showed further decrease (up to 5.7 ± 0.6%). After intrahepatic infusions of therapeutic agents via the umbilical vein, blood transfusions resulted in a stabilization of the oxygen capacity of the portal blood (19.1 ± 1.2%) and in an elevation of the oxygen level in arterial blood (up to 17.3 ± 1.2%) and in portal blood (up to 10.7 ± 1.1%). Treatment reduced lethality of peritonitis from 15.0% to 6.6%.

6419 OBSTRUCTIVE JAUNDICE AFTER BONE MARROW TRANSPLANTATION.

(Eng.) Lipshutz, G. R.; Katon, R. M.; Lee, T. G. (Univ. Oregon Health Sciences Center, Portland, OR). *Gastroenterology* 73(3): 565-569; 1977.

The case of a patient in whom obstructive jaundice occurring after bone marrow transplantation was attributed to extensive leukemic infiltration of the pancreas and bowel is presented. The patient, a 12-yr-old boy, presented with jaundice, dark urine, light-colored stool, and pruritus 7 months after a successful bone marrow transplant for acute lymphocytic leukemia had been carried out. At that time, he developed jaundice and skin lesions (diagnostic of graft-versus-host disease) that were successfully treated with prednisone. A bone marrow examination at the time the patient presented with jaundice showed active erythrocytic and granulocytic lines with no neoplastic cells; marrow cultures were negative. The patient subsequently developed abdominal pain, gastrointestinal bleeding, and perforation. Abdominal ultrasound, upper gastrointestinal series, and endoscopic biopsy revealed recurrent leukemia at the pancreatic head and descending duodenum. Radiation diminished the obstructive jaundice, although recurrent gastrointestinal hemorrhage, and finally perforation supervened. This case is unusual in that rampant gastrointestinal involvement was manifest at a time when leukemic cells were impossible to find by careful premortem bone marrow examination.

6420 HLA-FREQUENCIES IN INTERMITTENT ACUTE PORPHYRIA. (Eng.) Teuber, J.; Druschky, F.; Franzke, W.; Baenkler, H. W. (Krankenhausstrasse 12, D-8520 Erlangen, W. Germany). *Int. Arch. Allergy Appl. Immunol.* 54(5):473-474; 1977.

Tissue typing was carried out in 20 nonrelated patients with intermittent acute porphyria using the lymphocytotoxicity test in a two-step method. Compared to the normal German population, there was a significant ($p<0.05$) increase in the frequencies of histocompatibility antigen HLA-A1 (45% of patients with porphyria versus 28.1% of normal population), HLA-A10 (30% versus 11.2%), HLA-A29 (20% versus 4.7%), HLA-B13 (15% versus 6.2%), HLA-B14 (20% versus 5.0%), and HLA-B27 (15% versus 8.2%). There was a significant decrease in the frequencies of HLA-A2 (35% versus 51.5%), HLA-A3 (5% versus 30.2%), HLA-A9 (5% versus 20.5%), HLA-A11 (0% versus 9.8%), HLA-A28 (0% versus 7.1%), and HLA-BW15 (5% versus 14.4%). No conspicuous combination between particular HLA alleles was detected. Regarding the number of HLA differences, a relation between the patients due to an undiscovered common ancestor must be considered.

6421 SPONTANEOUS RUPTURE OF THE LIVER: AN UNUSUAL COMPLICATION OF SLE. (Eng.) Levitin, P. M.; Sweet, D.; Brunner, C. M.; Katholi, R. E.; Bolton, W. K. (Moses H. Cone Memorial Hosp., Greensboro, NC 27420). *Arthritis Rheum.* 20(2): 748-750; 1977.

The case of a patient with systemic lupus erythematosus (SLE) in whom spontaneous rupture of the liver occurred secondary to arteritis is presented. The patient, a 27-yr-old woman, developed intermittent abdominal pain, hypertension, ascites, elevated serum creatinine, proteinuria, and renal failure after the delivery of her fourth child. SLE had been diagnosed about 9 yr earlier, and she had responded to treatment with prednisone; the steroid was discontinued in 1970. The abdomen was initially nontender, tense with fluid, and without organomegaly. Four days later, the patient developed severe and constant abdominal pain, which radiated to her right shoulder. Generalized abdominal tenderness was detected. A stool specimen for occult blood was negative, whereas a nasogastric aspirate for blood was slightly positive. Paracentesis yielded serosanguineous fluid. At emergency laparotomy approximately 6 l of bloody ascitic fluid were aspirated from the peritoneal cavity. An extensive hemorrhaging stellate-type laceration was found in the right lobe. Histologic examination of a liver biopsy showed a portal triad artery cut tangentially, and the material in the wall of the blood vessel had the appearance of fibrinoid necrosis. Arteritis of a medium-sized artery was seen in a rectus muscle biopsy. The liver was packed with gauze placed between the liver and diaphragm and brought through a right upper quadrant stab incision. The patient developed postoperative complications and terminal melena and hematemesis. The autopsy specimen revealed arteritis with fibrinoid necrosis of the medium and small triad hepatic arteries; arteritis was also seen in the pancreas, adrenal gland, skeletal muscle, and spleen.

6422 AUTOIMMUNOLOGIC REACTIONS IN SYPHILIS AND THEIR CORRELATION WITH COMPLEMENT FIXATION REACTION AND LIVER FUNCTION TESTS. (Rus.) Davydova, R. Z.; Burshtein, Ch. I.; Abdullaev, A. Kh. (Uzbek Scientific Res. Dermatovenerologic Inst., USSR). *Vestn. Dermatol. Venerol.* (8):44-49; 1977.

The incidence of anti-organ antibodies was studied in 116 patients with contagious syphilis. The patients were divided into three groups: group 1 included 31 patients with primary syphilis; group 2 included 35 patients with the first incidence of secondary syphilis; and group 3 included 50 patients with secondary, recurrent syphilis. The incidence of antibodies against liver, heart, brain, and kidney antigens, assessed by the reaction of antiglobulin consumption (RAC), was more or less similar in all three groups and ranged from 67 to 70%. Treatment with penicillin and cobalt-containing drugs, with bismuth, or with ampicillin alone, resulted in a significant reduction in the incidence of antibodies against heart, kidneys, and brain tissue (positive reaction was observed in 35-44% of the cases), while antiliver antibodies were more resistant and were detected in 62.5% of the cases. The results of RAC with liver antigen and reaction of complement fixation (RCF) coincided in 73% of the patients before the treatment, compared to 60% after treatment. The patients with a positive RAC reaction had an almost twofold increase of turbidity in the thymol test; a correlation between the indices of RCA and the thymol test was detected only before the treatment.

6423 METHODS OF HEMOSTASIS IN LIVER SURGERY (LITERATURE REVIEW). (Rus.) Chalganov, A. I. (S. M. Kirov Military-Medical Acad., Leningrad, USSR). *Khirurgiia* (4):128-131; 1977.

6424 NEONATAL HEPATITIS AND ITS CONSEQUENCES. (Ser.) Janeva, A. B.; Janev, A. (Medical Faculty, Univ. Beograde, Yugoslavia). *Srp. Arh.* (9):663-670; 1976.

6425 EXCRETION OF D-XYLOSE IN CHILDREN WITH CHRONIC LESIONS OF THE LIVER AND BILIARY PASSAGES. (Rus.) Smiyan, I. S.; Slobodyan, L. M. (Ternopol Medical Inst., USSR). *Pediatriia* (3): 60-62; 1977.

6426 ACTIVITY OF LIVER LYSOZYMES IN THE PATHOGENESIS OF INFLAMMATORY DISEASES OF THE HEPATOBILIARY SYSTEM IN CHILDREN. (Rus.) Dorofeichuk, V. G.; Mikheeva, S. M.; Lekomtseva, G. A.; Bogdanovich, N. E.; Dzyubich, L. I. (Scientific Res. Inst. Pediatry, Gorky, USSR). *Pediatriia* (3): 59-60; 1977.

6427 MODIFICATION OF HEMOSTATIC LIVER SUTURE. (Rus.) Sumtsov, N. A. (Scientific Res. Inst. General and Emergency Surgery, Kharkov, USSR). *Khirurgiia* (7):132; 1977.

6428 METABOLISM OF BILE ACIDS AND ITS DISTURBANCES IN CHRONIC LIVER DISEASES. (Rus.) Podymova, S. D.; Kirichenko, A. A. (I. M. Sechenov First Medical Inst., Moscow, USSR). *Sov. Med.* (6):116-122; 1977.

6429 ELEVEN CASES OF MULTIPLE LIVER CYSTS. (Jpn.) Kubo, A.; Kondo, M.; Kobayashi, T.; Kinoshita, F. (Keio Univ. Sch. Medicine, Tokyo, Japan). *Jpn. J. Clin. Radiol.* 20(4):295-300; 1975.

6430 SERUM AND SECRETORY IMMUNOGLOBULINS IN CHRONIC DISEASES OF LIVER, GALLBLADDER AND INTESTINE. (Rus.) Nogaller, A. M.; Nizov, A. A.; Stefani, D. V. (Dept. Propedeutic Therapy, Ryazan Medical Inst., USSR). *Ter. Arkh.* 49(5):93-98; 1977.

6431 CLINICAL SIGNIFICANCE OF URINARY MALATE AND LACTATE DEHYDROGENASE ISOZYMES ASSESSMENT IN CHILDREN WITH CHRONIC LIVER LESIONS. (Rus.) Yurkov, Yu. A.; Volkova, L. D.; Ryzhkova, L. A. (Scientific Res. Inst. Pediatrics, Moscow, USSR). *Vopr. Okh. Materin. Det.* 21(9):41-44; 1977.

6432 HEMODYNAMIC ALTERATIONS IN ORTHOTOPIC ALLOGENEIC LIVER TRANSPLANTATION. (Rus.) Shmidt, D.; Volff, G.; Lauschke, G.; Rader, V. (Carl-Gustav Karus Medical Acad., Dresden, E. Germany). *Khirurgiia* (7):28-31; 1977.

6433 SERUM LIPIDS IN PATIENTS WITH LIVER DISEASE. (Jpn.) Takasugi, Y. (Hokkaido Univ. Sch. Medicine, Sapporo, Japan). *Jpn. J. Clin. Pathol.* 24(3):218-222; 1976.

6434 HB-ANTIGEN AND HEPATOCELLULAR CARCINOMA. (Jpn.) Koji, T.; Munehisa, T.; Kusumoto, Y. (Nagasaki Univ. Sch. Medicine, Nagasaki, Japan). *Jpn. J. Clin. Pathol.* 23(9):693-696; 1975.

See also, 6070, 6072, 6149, 6192, 6193, 6196, 6200, 6268, 6293, 6348, 6364, 6444, 6445, 6466, 6496, 6505, 6525, 6529, 6540, 6542, 6546, 6565, 6566, 6567, 6574, 6578, 6595, 6617, 6643, 6646, 6649, 6651, 6655, 6656, 6660, 6666, 6667.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

6435 INFLUENCE OF GESTATIONAL AGE AND CLINICAL STATUS ON BILIRUBIN-BINDING CAPACITY IN NEWBORN INFANTS: SEPHADEX G-25 GEL FILTRATION TECHNIQUE. (Eng.) Cashore, W. J.; Horwich, A.; Karotkin, E. H.; Oh, W. (50 Maude St., Providence, RI 02908). *Am. J. Dis. Child.* 131(8):898-901; 1977.

To determine the influence of gestational age and clinical condition on bilirubin-binding capacity, total bilirubin-binding capacity was measured by Sephadex G-25 gel filtration in 43 clinically well and 45 clinically ill (jaundiced) newborn infants between 26 and 41 weeks of gestation. In the well patients, bilirubin-binding capacity, serum albumin concentration, and the molar-binding ratio of bilirubin to albumin were directly related to gestational age. In the jaundiced patients, serum bilirubin-binding capacity and albumin concentration also correlated with gestational age; however, from 32 to 41 weeks of gestation, the mean values for the sick infants were significantly lower than for the well infants. In the jaundiced infants, the molar binding ratio of bilirubin to albumin was also lower than in the well patients and did not correlate with gestational age. The data are in agreement with previous clinical findings indicating an increased risk for low bilirubin kernicterus among immature infants and suggest that some critically ill term infants may be at risk for kernicterus at serum bilirubin levels below 20 mg/100 ml.

6436 DIFFERENTIAL DIAGNOSIS AND TREATMENT OF FUNCTIONAL UNCONJUGATED HYPERBILIRUBINEMIAS. (Rus.) Loginov, A. S.; Block, Yu. E. (Central Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 49(6):75-81; 1977.

Problems encountered in the differential diagnosis of nonconjugated bilirubinemias were studied in 109 patients. There were 37 patients with Gilbert's syndrome, 29 with posthepatitis hyperbilirubinemia, 1 with Crigler-Najjar syndrome, 6 with congenital microspherocytic hemolytic anemia, and 36 with organic lesions of liver and gallbladder (6 with adipose liver degeneration, 11 with cirrhosis, 4 with active chronic hepatitis, 3 with chronic persistent hepatitis, 3 with cholelithiasis, 7 with chronic noncalculous cholecystitis, and 2 with chronic recurrent pancreatitis). Characteristic clinical features of functional hyperbilirubinemias included mild hyperbilirubinemia. The level of total bilirubin ranged from 1.05 to 4.4 mg% in the patients with Gilbert's disease and from 1.05 to 3.7 mg% in the patients with posthepatitis bilirubinemia; in almost two-thirds of the patients with both forms of the hyperbilirubinemia, the level of total blood bilirubin did not exceed 2 mg%. A normal size of liver and spleen; normal functional liver indices; and psychasthenia, cholecystitis, and dispeptic syndromes were also included, while all patients with congenital microspherocytosis showed marked splenomegalia and liver enlargement. Treatment of functional hyperbilirubinemias consisted of phenobarbital (50 mg, t.i.d. for 2-3 weeks) for the patients with relatively high bilirubin level (>2 mg%), and psychotherapy for the patients with initial bilirubin level (<2 mg%).

6437 NEONATAL HYPERBILIRUBINEMIA. (Fre.) Calame, A. (Service de pediatrie, CHUV, 1011 Lausanne, Switzerland). *Rev. Med. Suisse Romande* 96(8):635-648; 1976.

6438 DIFFERENTIAL DIAGNOSTIC VALUE OF LIPOPROTEIN X IN RELATION TO OTHER BIOCHEMICAL INDICES DURING HYPERBILIRUBINEMIA. (Pol.) Kryska, A.; Kiczka, W.; Juszczyk, J. (Klinika Chorob Zakaznych Instytutu Chorob Wewnetrznych AM, ul. Wincentego 1, 61-003 Poznan, Poland). *Pol. Tyg. Lek.* 32(31):1203-1206; 1977.

See also, 6674.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

6439 POSSIBILITIES OF DETECTION OF PRECLINICAL FORMS OF TOXIC HEPATITIS BY ASSESSMENT OF ACTIVITY OF OXIDASES OF MIXED LIVER FUNCTION. (Rus.) Popov, T. A.; Kaskevich, L. M. (All-Union Scientific Res. Inst. Pesticides, Plastics and Polymers, Kiev, USSR). *Vrach. Delo* (3):126-130; 1977.

Activity of the oxidases of mixed liver function (OMF) was assessed in 45 persons with an occupational exposure to the pesticide. At clinical examination, diagnosis of mild toxic hepatitis was made in 22 patients and of inflammatory changes and dyskinetic disturbances of the biliary duct in 9 patients. OMF assay, which consisted of assessment of aminopyrin (AP) metabolites in the daily urine after single loading with AP (7 mg/kg, p.o.), showed significant elevation of AP metabolite excretion, and thus, inhibition of OMF in 42 patients. Marked elevation of 4-aminoantipyrine, which was detected in 7 patients without clinical symptoms of liver lesion (12.2 ± 1.25%, compared to 4.22 ± 0.49% in controls), is indicative of significant strain of adaptation mechanisms in the liver. This confirms the hypothesis that adaptation is a preclinical stage of chronic intoxication.

6440 CHRONIC LIVER DISEASE AND ACETAMINOPHEN. (Eng.) Johnson, G. K.; Tolman, K. G. (Univ. Utah Coll. Medicine, Salt Lake City, UT 84132). *Ann. Intern. Med.* 87(3):302-304; 1977.

The case is presented of a 59-yr-old woman who developed acute and chronic liver disease after receiving therapeutic doses of acetaminophen (9 tablets daily, total dose 2,925 mg, for approximately 11 months); the patient then developed anorexia and easy fatigability. The only clinical findings were a tender liver and abnormal liver function tests. A liver biopsy showed disruption of the hepatic architecture, expansion of the portal tracts with acute and chronic inflammation, bile duct proliferation, piecemeal necrosis, and creeping fibrosis throughout the lobule. The pattern was typical of chronic aggressive hepatitis with cirrhosis. The liver function tests returned to normal 5 weeks after acetaminophen was discontinued. Rechallenge with acetaminophen (2,925 mg/day) induced abnormal function tests within 2 weeks. The patient has been followed for 2 yr since that challenge and remains asymptomatic; the liver function tests are normal. The liver disease in this patient was either caused by acetaminophen or an underlying liver disease was exacerbated by the analgesic; in either case, it appears that acetaminophen can aggravate liver disease in doses not generally believed to be hepatotoxic.

6441 CHRONIC EXCESSIVE ACETAMINOPHEN USE AND LIVER DAMAGE.

(Eng.) Barker, J. D., Jr.; de Carle, D. J.; Anuras, S. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Ann. Intern. Med.* 87(3):299-301; 1977.

Three cases of toxic hepatitis associated with the chronic ingestion of excessive doses of acetaminophen are reported. Each patient (1 man, 2 women, aged 50-67 yr) took approximately 5 to 8 g of acetaminophen daily during a period of several weeks. The transient elevations of serum hepatocellular enzyme concentrations and the histologic evidence of toxic hepatitis suggest that the liver damage was related to the use of acetaminophen. Alcohol abuse in one patient and negative nitrogen balance in another may have increased the susceptibility to acetaminophen toxicity. With the increasing popularity of acetaminophen for mild pain relief, hepatotoxicity from acute or chronic ingestion may be more common than previously recognized, especially in those patients with predisposing conditions.

6442 ASPIRIN-INDUCED HEPATOTOXICITY AND ITS EFFECT ON JUVENILE RHEUMATOID ARTHRITIS.

(Eng.) Bernstein, B. H.; Singsen, B. H.; King, K. K.; Hanson, V. (Dept. Pediatrics, Univ. Southern California, P.O. Box 54700, Los Angeles, CA 90054). *Am. J. Dis. Child.* 131(6):659-663; 1977.

The prevalence of hepatic disease in children receiving aspirin for juvenile rheumatoid arthritis (JRA), the relation of hepatic disease to aspirin dose and serum salicylate level, and the effect of hepatic disease on the activity of JRA was investigated in 102 children. Elevated SGOT levels were found in 60 of 102 children taking aspirin for JRA. Serial investigations of SGOT were performed in 46 of these patients, and at least one SGOT value was elevated (>39 IU/1) in 91%. A correlation was noted between the degree and prevalence of SGOT elevation, aspirin dose, and serum salicylate values; however, elevated SGOT was often found in children taking moderate aspirin doses and having serum salicylate levels <25 mg/100 ml. Younger children (below age 11 yr) and patients with systemic JRA received higher aspirin doses than older children and patients with polyarticular or pauciarticular JRA. Elevated SGOT was significantly more prevalent in younger children and patients with systemic JRA. SGOT values above 100 IU/1 were associated with a reduced ESR and, in some cases, reduction of the symptoms. Three children with SGOT values above 500 IU/1 had hepatic biopsies. Mononuclear cell infiltrates in the periportal areas and ballooning of hepatocytes with increased amounts of fat and glycogen were noted, but there were no signs of hepatocellular necrosis or cirrhosis. These data suggest that aspirin should be considered a potential hepatotoxin and that children with JRA receiving aspirin therapy should have periodic liver function studies.

6443 CHOLESTATIC JAUNDICE FOLLOWING AZATHIOPRINE THERAPY.

(Ger.) Freise, J.; May, B.; Schmidt, E. (Medizinischen Hochschule, Karl-Wiechert-Allee 9, 3000 Hannover 61, W. Germany). *Dtsch. Med. Wochenschr.* 101(33):1223-1226; 1976.

The case reports of two patients, a 41-yr-old man and a 36-yr-old woman, who developed severe cholestatic jaundice after receiving prednisolone (48 mg/day to less than 18 mg/day) and azathioprine (150 mg/day-200 mg/day) for chronic progressive hepatitis and Wegener's granulomatosis are presented. The most prominent clinical feature was reversible abnormal liver function involving both elimination and synthesis. After unsuccessful treatment with prednisolone for chronic aggressive hepatitis, the first patient received azathioprine (150 mg/day). The patient experienced severe itching, jaundice, darkened urine, steroid acne (face and thorax), and an inflamed liver. There was also an 18-fold increase in the serum bilirubin level (304 μM). After discontinuation of the azathioprine treatment and an increase in the prednisolone dose to 60 mg/day, the serum bilirubin level decreased to 53 μM, but there was a short-termed increase in the transaminase, the α-LDH, the alkaline phosphatase, and the α-glutamyl transpeptidase levels. Normal values were reestablished after 6-8 weeks of this increased treatment. Similar results were observed for the 36-yr-old woman with Wegener's granulomatosis, who had received 200 mg/day azathioprine and 30 mg/day prednisolone. A high serum bilirubin level of 618 μM was observed. Histologic examination of liver biopsy indicated an intrahepatic cholestasis. Following cessation of azathioprine therapy and an increase in steroid dose (60 mg/day), a decrease in bilirubin level was observed. Over longer periods of azathioprine treatment (indirect optional hepatotoxin), regular monitoring of blood counts and liver functions seems necessary.

6444 CHOLESTATIC JAUNDICE FOLLOWING CHLORPROPAMIDE SELF-POISONING.

(Eng.) Frier, B. M.; Stewart, W. K. (Ninewells Hosp. and Medical Sch., Univ. Dundee, Dundee DD2 1UB, Scotland). *Clin. Toxicol.* 11(1):13-17; 1977.

The case of a patient who survived a massive overdose of chlorpropamide and developed cholestatic jaundice as a delayed complication is presented. The patient, a 19-yr-old woman, ingested 150 100-mg chlorpropramide tablets, and gastric lavage 6 hr later produced no tablet return. The patient was treated with glucagon (1 mg, i.m., every 4 hr) and required parenteral glucose for 6 days until normoglycemia was maintained by normal feeding. Fourteen days after poisoning, she developed nausea, anorexia, and pruritus, and by 21 days she was frankly icteric with dark urine and pale stools. The serum bilirubin reached 113.4 μM and the alkaline phosphatase level was 22 King-Armstrong U/dl.

A liver biopsy confirmed cholestasis with ballooning of the hepatocytes around centrilobular areas. Liver function tests returned to normal within 4 weeks, and clinical improvement occurred without specific therapy.

6445 CHOLESTATIC LIVER DISEASE ASSOCIATED WITH DIPHENYLHYDANTOIN THERAPY: POSSIBLE PATHOGENIC IMPORTANCE OF ALTERED BILE SALT METABOLISM. (Eng.) Campbell, C. B.; McGuffie, C.; Weedon, A. P.; Powell, L. W. (Christchurch Clinical Sch., Christchurch, New Zealand). *Am. J. Dig. Dis.* 22 (3):255-262; 1977.

The case of a 10-yr-old boy who presented with a prolonged cholestatic liver disease 5 weeks after starting diphenylhydantoin therapy is presented. The initial phase of illness was characterized by hepatocellular damage with swollen liver cells and centrilobular cholestasis. Severe hyperlipoproteinemia with eruptive xanthomata developed within 3 weeks of his initial jaundice. The second phase of illness was characterized by portal tract inflammation, with bile ductular proliferation and chronic cholestasis gradually resolving over a period of 15 months. It is postulated that diphenylhydantoin sensitivity produced swollen hepatocytes with hypertrophy of the smooth endoplasmic reticulum, reducing hepatic sinusoidal blood flow and the clearance of secondary bile salts. A fall in clearance of lipoproteins, including the cholesterol precursor of primary bile acid synthesis, may have been responsible for a reduction in serum bile acid concentration. High levels of serum lithocholic acid, largely unsulfated presumably due to decreased hepatic uptake, may have produced the prolonged second phase of this illness, in which histological changes resembled those seen in experimental animals following lithocholic acid administration.

6446 ERYTHROMYCIN JAUNDICE: DIAGNOSIS BY AN IN VITRO CHALLENGE TEST. (Eng.) Cooksley, W. G. E.; Powell, L. W. (Royal Brisbane Hosp., Brisbane, 4029, Australia). *Aust. N.Z. J. Med.* 7(3):291-293; 1977.

Lymphocyte transformation tests were carried out in a patient who had suffered from erythromycin estolate-associated jaundice 2.5 yr earlier. The patient, a 51-yr-old woman, presented with jaundice, pale stools, dark urine, pruritus, fever, and a palpable liver. The serum total bilirubin was 17.1 mg/dl, and the alkaline phosphatase and transaminases were also raised. Percutaneous transhepatic cholangiography did not outline the biliary tree, and endoscopic retrograde cholangiography showed a possible filling defect in the common bile duct. At laparotomy, there was a single stone in an otherwise normal gallbladder and no evidence of extrahepatic biliary obstruction. A liver biopsy revealed marked central hepatic cholestasis with scattered necrotic hepatocytes and moderate mononuclear cell infiltration in the portal tracts; these features suggested drug-induced hepatitis. The patient's peripheral venous lymphocytes were cultured in the presence of 5 and 80 μg/ml erythromycin estolate, erythromycin stearate, or erythromycin base. Whereas the transformation indices in the patient were 7.3 and 2.35 using homologous and autologous serum, resp., at an erythromycin estolate concentration of 5 μg/ml, the mean transformation index in controls was 0.60 ± 0.31; at 80 μg/ml, the indices in the patient were 0.96 and 0.47 with homologous and autologous serum, and that in the controls was 0.41 ± 0.28. Evidence of blastogenesis was not seen using the same concentrations of erythromycin stearate or erythromycin base. This suggests that the patient was "sensitized" to erythromycin estolate without exposing her to the risk of *in vivo* challenge. The results provide evidence that erythromycin estolate jaundice is mediated by immunological mechanisms.

6447 HALOTHANE MACROPHAGE MIGRATION INHIBITION FACTOR TEST IN HALOTHANE-ASSOCIATED HEPATITIS. (Eng.) Price, C. D.; Gibbs, A. R.; Williams, W. J. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff, Wales). *J. Clin. Pathol.* 30(4):312-316; 1977.

As an index of delayed hypersensitivity, *in vitro* halothane macrophage migration inhibition factor tests (halothane-MIF tests) were carried out on peripheral blood lymphocytes from five patients with halothane hepatitis. Twenty-two subjects exposed to halothane, but with no evidence of jaundice; 5 healthy hospital anesthetists; 9 jaundiced subjects without halothane exposure; and 10 healthy subjects with no history of exposure to halothane were also tested. The halothane-MIF test was positive in four of the five patients with halothane-induced hepatitis; the negative result was in a patient on steroid treatment. The test was negative in all other subjects. The results suggest that the halothane-MIF test may be useful in the diagnosis of halothane-induced hepatitis and as a screening procedure for the identification of susceptible subjects.

6448 LIVER DAMAGE AND HYPOGLYCEMIA IN ACUTE IRON POISONING. (Eng.) deCastro, F. J.; Jaeger, R.; Gleason, W. A., Jr. (Cardinal Glennon Memorial Hosp., St. Louis, MO). *Clin. Toxicol.* 10(3):287-289; 1977.

The case of a 16-month-old boy who died of acute liver failure after ingesting approximately 15 g of ferrous sulfate (5 g of elemental iron) is presented. Two hours after ingesting the iron, the serum iron level was 5,000 μg%. Therapy consisted of nasogastric lavage with sodium bicarbonate alkalinized normal saline, deferoxamine (80 mg/kg for the first 24 hr and 50 mg/kg/day thereafter), three exchange transfusions, and aggressive supportive care to treat acidosis and shock. The patient survived 5 days. On the second day postingestion, the blood sugar was 13 mg%, and the liver enzymes and blood ammonia levels progressively increased from this time to his death. This patient did not die during one of the three phases of acute iron toxicity (i.e., hemorrhagic gastroenteritis, asymptomatic, and cardiovascular collapse); his death was due to severe progressive liver failure that was complicated by pancreatic damage. These complications will probably occur more frequently as aggressive care prevents earlier death in acute iron poisoning.

6449 THERAPEUTIC COMPARISON OF THIOL COMPOUNDS IN SEVERE PARACETAMOL POISONING. (Eng.)

Solomon, A. E.; Briggs, J. D.; Knepil, J.; Henry, D. A.; Winchester, J. F.; Birrell, R. (Scripps Clinic and Res. Foundation, 476 Prospect St., La Jolla, CA 92037). *Ann. Clin. Biochem.* 14(4): 200-202; 1977.

The value of cysteamine in preventing paracetamol-induced liver damage was compared with that of amino acid solutions containing methionine and/or cysteine in 12 patients. The blood concentrations of paracetamol ranged between 0.67 and 1.83 mM. Six patients received an initial dose of 2.0 g of cysteamine i.v. over 10 min followed by 3 x 400 mg doses in 500 ml of 5% glucose infused over periods of 4, 8, and 12 hr; the total dose was 3.2 g over 20 hr. Six patients received an amino acid solution (four with Aminosol 10% in 500 ml saline and two with Aminoplex-14 in 500 ml saline). Five hundred milliliters of the solution was given i.v. per 3 hr to a total dosage volume of 1-1.5 l. The two test groups were comparable in age, sex distribution, and blood paracetamol concentration. Four patients treated with the amino acid solution had taken large amounts of alcohol together with paracetamol. No patient developed severe liver damage. One patient treated with cysteamine had raised AL.T, and two in the amino acid-treated group had mild increases in AL.T. No side-effects were encountered in the amino acid-treated patients, but nausea, vomiting, muscle twitching, and social withdrawal occurred in all patients treated with cysteamine. Amino acid solutions should be used as a temporary measure in patients suspected of massive paracetamol overdose while awaiting estimation of blood paracetamol concentration.

6450 HEPATIC VENO-OCCLUSIVE DISEASE DUE TO PYRROLIZIDINE (SENECIO) POISONING IN ARIZONA. (Eng.)

Stillman, A. E.; Huxtable, R.; Consroe, P.; Kohnen, P.; Smith, S. (2122 N. Craycroft, Suite 2G, Tucson, AZ 85712). *Gastroenterology* 73(2):349-352; 1977.

The case of a 6-month-old Mexican-American girl with documented hepatic veno-occlusive disease due to the ingestion of pyrrolizidine alkaloids is presented. The patient had a distended abdomen and a prominent abdominal venous pattern; her liver span was 9 cm and she had a palpable spleen. The initial SGOT was 794 (normal <120 for an infant), bilirubin 0.5 mg/100 ml, and albumin 3.3 g/100 ml. Radiological examination indicated the presence of ascites and a right pleural effusion. A needle liver biopsy revealed normal hepatic architecture and intact hepatocytes; however, the sinusoids were markedly distended with mature RBC. The wedged hepatic vein pressure was 15 mm Hg and a free hepatic vein pressure was 8 mm Hg. It was then learned that the patient had been fed large quantities of tea prepared by infusion of a locally marketed herb known as gordolobo yerba. This was identified as *Senecio longilobus* that was found to contain large quantities of pyrrolizidine alkaloids. It was calculated that during the 2 weeks before admission, the patient received a total dose of 70-147 mg of combined alkaloid and nitrogen oxide derivative. The patient's abdominal girth decreased and her abdominal venous pattern disappeared after treatment with a diet containing p.o. sodium (100 mg/day) and furosemide (12 mg/day); however, the liver remained firm, with a 9-cm span, and a biopsy 2 months after the initial biopsy revealed extensive central, portal, and sinusoidal fibrosis. Electron photomicrographs showed collagen deposits and fibroblasts in the space of Disse. Mexican-American infants and children with "atypical hepatitis" should be suspected of pyrrolizidine alkaloid ingestion, and a liver biopsy should be carried out.

6451 LIVER DAMAGE FROM LONG-TERM METHYLTESTOSTERONE. (Eng.)

Westaby, D.; Paradinas, F. J.; Ogle, S. J.; Randell, J. B.; Murray-Lyon, I. M. (Charing Cross Hosp. and Medical Sch., London W6, England). *Lancet* 2(8032):261-263; 1977.

To assess the risk of liver damage from long-term treatment with methyltestosterone, 60 patients (42 female-to-male transsexuals and 18 impotent men) receiving long-term therapy with methyltestosterone (50 mg, 3 times/day) were investigated. Nineteen patients had abnormal liver function tests, and 33 of 52 had abnormal liver scans, particularly those who had been treated for more than a year. Liver biopsy specimens showed accumulation of hepatocytes in the liver cords and within the walls of centrilobular veins, and early peliosis hepatis. One patient had a hepatic adenoma. Of the androgens, only 17α-alkylated steroids seem to be implicated in the development of cholestatic jaundice, peliosis hepatis, and liver tumors.

6452 LIVER DAMAGE IN THE HEMOLYTIC UREMIC SYNDROME. (Eng.)

van Rhijn, A.; Donckerwolcke, R. A.; Kuijten, R. H.; van der Heiden, C. (Wilhelmina Children's Hosp., Nieuwe Gracht 137, Utrecht, Netherlands). *Helv. Paediatr. Acta* 32: 77-81; 1977.

Changes in liver function during the acute stage of the hemolytic uremic syndrome (HUS) were studied in 31 patients, and two case reports with enzyme studies that are indicative of liver involvement during the recovery stage of HUS are presented. All patients showed a marked increase in serum LDH (1,910 IU; normal, 78-241 IU) and moderate increases in SGOT and SGPT (54 and 45 IU, resp.; normal <15 IU). Alkaline phosphatase (AP) and 5'-nucleotidase (5'-ND) remained normal. The two children with HUS showed significant increases in SGOT (260 and 441 IU, resp.), SGPT (110 and 156 IU), LDH (1,224 and 825 IU), AP, 5'-ND, and α-glutamyltranspeptidase during the recovery stage (10 and 12 days after admission, resp.), without evidence of HUS recurrence, suggesting parenchymal liver damage. One patient also developed jaundice and hepatomegaly. Overall, 2/31 patients developed signs of liver damage, suggesting an affinity between the etiologic agent of HUS and the liver in both patients.

6453 ELECTRON MICROSCOPIC OBSERVATION OF THE LIVER IN PORTAL HYPERTENSION FOLLOWING CHRONIC EXPOSURE TO VINYL CHLORIDE MONOMER. (Eng.)

Kurokawa, S.; Inagaki, T.; Okuyama, S. (Nakatsugawa Municipal Hosp., Nakatsugawa City, Gifu Prefecture, 508, Japan). *Gastroenterol. Jpn.* 12(2):64-69; 1977.

Liver biopsy specimens from two patients with portal hypertension following chronic exposure to vinyl chloride monomer were studied histologically and ultrastructurally. Noncirrhotic portal hypertension accompanied by esophageal varices and splenomegaly were present in both patients. Histological examination showed hepatic fibrosis. Ultrastructurally, there were large amounts of small, electron-dense, myelin-like lamellar material and marked proliferation and vesiculation of the smooth endoplasmic reticulum in the hepatocyte cytoplasm. The widened Disse's spaces, where the sinusoidal lining cells were arranged in multilayers, were plugged by collagenous fiber bundles. This plugging may be involved in the development of portal hypertension.

6454 EMERGENCY EMBOLIZATION IN BLUNT HEPATIC TRAUMA. (Eng.)

Jander, H. P.; Laws, H.; Kogutt, M. S.; Mihas, A. A. (Univ. Alabama Medical Center, 619 S. Nineteenth St., Birmingham, AL 35233). *Am. J. Roentgenol.* 129(2):249-252; 1977.

The case of a patient in whom a traumatic liver tear was embolized with Gelfoam to stop an otherwise uncontrollable hemorrhage is described. The procedure was probably life saving in this patient. Transient elevated transaminase and bilirubin levels returned to normal 3 weeks after embolization. A repeat hepatic arteriogram 4 months after embolization demonstrated good revascularization of the right hepatic lobe from the left hepatic, left gastric, and gastroduodenal arteries. This case demonstrates the therapeutic value and safety of selective hepatic arterial branch embolization in massive life-threatening hemorrhage.

6455 LIVER FUNCTION IN MECHANICAL INJURIES (LITERATURE REVIEW). (Rus.)

Felitsyn, L. N. (S. M. Kirov Medical-Military Acad., Leningrad, USSR). *Vestn. Khir.* (6):135-139; 1977.

See also, 6556, 6618.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

6456 RECENT ADVANCES IN THE IDENTIFICATION OF HEPATITIS VIRUSES. (Eng.)

Dienstag, J. L.; Purcell, R. H. (Massachusetts General Hosp., Boston, MA 02114). *Postgrad. Med. J.* 53(621):364-373; 1977.

A review of the identification of hepatitis viruses is presented. The discovery of virus-related antigens has resulted in rapid progress in viral hepatitis research in the last decade. The hepatitis B virion has been tentatively identified as a DNA virus with an endogenous DNA polymerase, and new serological markers for type B hepatitis have been discovered. Hepatitis A antigen has been identified on a virus-like particle thought to be the hepatitis A virion. Progressively more sophisticated assays for hepatitis antigens and antibodies have been applied to the study of viral hepatitis epidemiology and biochemical-biophysical characterization of the agents. Most recently, knowledge gained from such studies has been exploited to develop a prototype noninfectious but immunogenic hepatitis B vaccine using hepatitis B surface antigen (HBsAg) purified in large quantities from chronic HBsAg carriers. Especially exciting is the prospect, suggested by serological studies of viral hepatitis, that hepatitis viruses besides hepatitis A and B viruses will be identified.

6457 SIGNIFICANCE OF SUSPECTED "CHRONIC AGGRESSIVE HEPATITIS" IN ACUTE HEPATITIS. (Eng.)

Fauerholdt, L.; Asnaes, S.; Ranek, L.; Schiodt, T.; Tygstrup, N. (Rigshospitalet 2152, 9 Blegdamsvej, DK-2100 Copenhagen, Denmark). *Gastroenterology* 73 (3):543-548; 1977.

The value of histologic criteria in determining the time at which the transition from acute to chronic aggressive hepatitis occurs was investigated. In 17 patients with acute viral hepatitis, observed during a period of 7 yr, a liver biopsy showed changes compatible with chronic aggressive hepatitis and superimposed acute hepatitis. Follow-up biopsies showed normal liver in 14 cases, chronic persistent hepatitis in 1, and cirrhosis in 2. In 12 cases, the initial biopsy, which showed changes suggestive of chronicity, was taken 1 month or later after onset of symptoms of acute hepatitis. The patients developing chronic liver disease showed no characteristic clinical, laboratory, or histological features at the time of the first biopsy. If the diagnosis of chronic active hepatitis is based on histological findings alone in patients with prolonged acute hepatitis, the incidence of this condition will be grossly overestimated. The transition from acute to chronic hepatitis cannot be recognized with any degree of certainty by presently available methods.

6458 VIGOROUS MEDICAL MANAGEMENT OF ACUTE FULMINANT HEPATITIS. (Eng.) Auslander, M. O.; Gitnick, G. L. (Center for the Health Sciences, 10833 LeConte Ave., Univ. California, Los Angeles, CA 90024). *Arch. Intern. Med.* 137(5):599-601; 1977.

The risk factors and the usefulness of vigorous medical management were studied in 20 patients with acute fulminant hepatic failure and stage II, III, or IV hepatic encephalopathy attributable to viral hepatitis. These patients were treated according to a protocol that directed aggressive medical management of fluid balance with electrolyte solutions, plasma, and blood; acid-base balance; coagulation defects with fresh frozen plasma; blood replacement as needed; dietary protein elimination; and p.o. administered neomycin sulfate. Eight patients survived. Seven of the 13 patients who were positive for the hepatitis B surface antigen (HBsAg) survived, while 1 of the 7 patients who were negative for HBsAg survived. The stage of encephalopathy on admission did not correlate with survival. Patients under 40 yr of age had a 43% survival rate, while those over 40 yr had a 33% survival rate. Conservative but vigorous medical management may improve survival in fulminant hepatic failure.

6459 A REVIEW OF LOBULAR, PORTAL, AND PERIPORTAL HEPATITIS: INTERPRETATION OF BIOPSY SPECIMENS WITHOUT CLINICAL DATA. (Eng.) Ludwig, J. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Hum. Pathol.* 8(3):269-276; 1977.

A compilation of clinical diagnoses that must be considered whenever a morphologic diagnosis of lobular, portal, or periportal hepatitis has been made is presented, along with histologic findings that may enable the pathologist to list the suspected clinical conditions in an order of likelihood. Lobular hepatitis without bridging or confluent necrosis is frequent in acute (self-limited) viral hepatitis, is usually mild in unresolved viral hepatitis, and may occur in chronic persistent hepatitis, chronic active hepatitis, drug-induced hepatitis, or extrahepatic diseases (where it is mild). Lobular hepatitis with bridging or confluent necrosis may occur in acute (self-limited) viral hepatitis or drug-induced hepatitis, is always present in fulminant viral hepatitis, is frequent in severe cases of chronic active hepatitis, and is treated as chronic active hepatitis in cases of unresolved viral hepatitis. Portal hepatitis without definite lobular changes is always present in chronic persistent hepatitis; is frequent in unresolved viral hepatitis, extrahepatic diseases, drug-induced hepatitis, and hepatitis associated with chronic inflammatory bowel disease; and may occur in remission in cases of chronic active hepatitis. Periportal hepatitis without definite centrilobular and midzonal changes occurs in drug addicts with acute (self-limited) viral hepatitis; is infrequent in unresolved viral hepatitis and extrahepatic diseases; may occur, but is mild, in cases of chronic persistent hepatitis; is always present in mild or moderately severe cases of chronic active hepatitis; is frequent in hepatitis associated with chronic inflammatory bowel disease; and may occur in drug-induced hepatitis.

6460 STUDIES OF THE AETIOLOGY OF NEONATAL HEPATITIS AND BILIARY ATRESIA. (Eng.) Danks, D. M.; Campbell, P. E.; Jack, I.; Rogers, J.; Smith, A. L. (Royal Children's Hosp. Res. Foundation, Flemington Rd., Parkville, Victoria 3052, Australia). *Arch. Dis. Child.* 52(5):360-367; 1977.

Etiological factors were sought prospectively in 55 infants with extrahepatic biliary atresia, in 105 with neonatal hepatitis, and in 11 with intrahepatic biliary atresia. In neonatal hepatitis, infective causes were shown in 22 infants, galactosemia was seen in 6, and α_1-antitrypsin deficiency was found in 8; familial occurrence was noted in 10 additional infants, and unrelated second diseases were present in 24 of the remaining 59 infants. The only clues to etiology in extrahepatic biliary atresia were a suspicion of time-space clusters, a deficiency of affected infants born to young primiparous women, and an unexpected number of spontaneous abortions in the histories given by the mothers. Genetic factors appeared to be important in intrahepatic biliary atresia, but are not reported in detail. Both neonatal hepatitis and extrahepatic biliary atresia are considered to have multiple causes. Recurrence risks in siblings are one in seven for neonatal hepatitis of unknown cause, negligible in extrahepatic biliary atresia, and usually one in two or one in four in intrahepatic biliary atresia, depending upon the family history.

6461 LIVER INVOLVEMENT IN THE SYNDROME OF MIXED CRYOGLOBULINEMIA. (Eng.) Levo, Y.; Gorevic, P. D.; Kassab, H. J.; Tobias, H.; Franklin, E. C. (New York Univ. Medical Center, 550 First Ave., New York, NY 10016). *Ann. Intern. Med.* 87(3):287-292; 1977.

Because of the suggestion that hepatitis B virus (HBV) may have a role in the pathogenesis of mixed cryoglobinemia, the incidence and nature of liver abnormalities were studied in 36 patients with mixed cryoglobulinemia in the absence of underlying infectious, connective tissue, or lymphoproliferative disorders. Clinical or biochemical evidence of liver dysfunction was present in 84%. Hepatomegaly was detected in 77%, splenomegaly in 54%, and abnormalities in bilirubin, alkaline phosphatase, or serum glutamic oxalacetic transaminase in 77%. Only four patients had overt liver disease. Of 15 biopsies from 12 patients, there was normal tissue structure in 2, minimal nonspecific changes in 1, portal fibrosis in 3, chronic persistent hepatitis in 1, chronic active hepatitis in 2, chronic active hepatitis with cirrhosis in 4, and postnecrotic cirrhosis in 2. These findings, together with the previously reported high incidence of serologic evidence of HBV infection, support the view that the syndrome of purpura, arthritis, and nephritis is often a consequence of immune-complex vasculitis secondary to HBV infection.

6462 MORPHOGENESIS OF LIVER CHANGES IN CHRONIC ACTIVE HEPATITIS.

(Rus.) Bezprozvannyi, B. K.; Aprosina, Z. G.; Semendiaeva, M. E.; Potekaeva, M. A. (Bureau Forensic Medical Examination, Moscow, USSR). *Ter. Arkh.* 48(9):25-36; 1976.

Literature on the etiology and histologic manifestations of chronic active hepatitis (CAH) is reviewed. The chief morphological manifestation of CAH is progressive proliferative reaction of mesenchymal cellular elements. Polymorphic infiltrates of portal tracts consist primarily of lymphocytes, large lymphoid cells, plasmacytic cells, and eosinophilic leukocytes. Changes in the liver parenchyma develop usually only during the relapse of disease and consist of piecemeal necroses and active regeneration of hepatocytes in the zone of active connective tissue. Differences in the relationship between reaction of organization and reaction of rejection in CAH dynamics yield the different outcomes of disease. A predominance of infiltrative processes leads to development of the portal cirrhosis; predominance of necrotic changes leads to postnecrotic cirrhosis. The most pronounced and acute manifestations of rejection reaction lead to extended necroses, *viz.*, acute (in acute viral hepatitis) or subacute (in chronic hepatitis) toxic liver dystrophy.

6463 CHANGE IN THE EXOCRINE FUNCTION OF THE PANCREAS IN INFECTIOUS HEPATITIS.

(Rus.) Golubenko, A. M. (Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Vrach. Delo* (2):140-142; 1977.

To evaluate the exocrine pancreatic function in infectious hepatitis, serum and urine amylase and lipase and urine exopeptidase were assessed in 61 patients with infectious hepatitis and in 32 healthy controls. The patients included 19 with mild manifestations of disease, 32 with moderate manifestations, and 10 with severe manifestations. During relapse, all patients showed elevation of serum and urine amylase activity; during the recuperation, blood amylase in all patients and urine amylase in the patients with moderate infectious hepatitis decreased. In the patients with severe manifestations, urine amylase remained elevated. Blood lipase activity was elevated in patients with severe disease. Activity of urine exopeptidase was increased in all patients.

6464 URINARY ENZYMES IN VIRAL HEPATITIS.

(Eng.) Dart, G. C. (Fairfield Communicable Diseases Hosp., Fairfield, Victoria, 3078, Australia). *Clin. Chim. Acta* 78(3):499-501; 1977.

Urinary aspartate transaminase (AST), fructose monophosphatase (FMPase), fructose diphosphatase (FDPase), and gamma glutamyl transaminase (gamma-GT) were determined in specimens from patients with viral hepatitis, and these levels were compared with those in specimens from normal subjects. All assays were carried out concurrently on pre- and post-dialysis specimens to determine the possible effect of dialysis on assay accuracy and sensitivity. Dialysis had no significant effect on the urinary enzyme activity. The mean post-dialysis levels of AST, FMPase, FDPase, and gamma-GT in specimens from normal subjects were 11.7 ± 3.2, 1.6 ± 0.7, 3.4 ± 3.3, and 35.7 ± 13.9 Karmen U, resp. The mean post-dialysis levels of these enzymes in specimens from hepatitis patients were 14.7 ± 6.2, 2.2 ± 1.2, 2.6 ± 2.0, and 40.7 ± 17.3 Karmen U, resp. Although AST does show an apparent increase in hepatitis patients, the standard deviation is too large to allow a firm conclusion to be drawn.

6465 COMPARATIVE EFFICACY OF SERUM BILIRUBIN, ASPARAGINE- AND ALANINE-AMINOTRANSFERASE DETERMINATION, THYMOL AND ZINC TESTS, AND URINARY UROBILINOGEN CONTENT ASSESSMENT FOR DIAGNOSIS OF ANICTERIC FORMS OF VIRUS HEPATITIS.

(Pol.) Kowalczyk, C. (Dept. Lab. Diagnosis, Health Care Hosp., Leczyca, Poland). *Pol. Tyg. Lek.* 31(35):1537-1539; 1976.

The efficacy of various biochemical tests for the detection of an early form of viral hepatitis was evaluated in 15 patients who had had contact with viral hepatitis. The patients were examined within 1-3 days of developing jaundice. The patients had significantly increased activities of serum asparagine aminotransferase (76 U, compared to 4-40 U in controls) and alanine aminotransferase (149 U, compared to 4-30 U in controls), increased content of serum bilirubin (0.65 mg%, compared to 0.3 mg% in controls), increased index of thymol test (5.8 U, compared to 5 U in controls), decreased index of zinc test (2.7 U, compared to 10 U in controls), and elevated level of urobilinogen. It is concluded that these tests should be used in the differential diagnosis of anicteric forms of viral hepatitis.

6466 ASSESSMENT OF LIVER GLUCONEOGENESIS IN PATIENTS WITH ACUTE AND CHRONIC LIVER LESIONS BY BLOOD LACTATE TURNOVER ASSAY. (Pol.)

Przyjemski, J.; Wlasiuk, M.; Chrostowska, H. (Hosp. Internal Diseases, Gdansk, Poland). *Przegl. Lek.* 33(12):979-983; 1976.

Lactate turnover assay was employed for the evaluation of gluconeogenesis in 37 patients with acute infectious hepatitis, 24 patients with various chronic liver lesions (5 with chronic infectious hepatitis, 12 with chronic aggressive liver inflammation, 1 with chronic liver inflammation, and 6 with cirrhosis), and 9 healthy controls. The level of blood lactate was assessed immediately after administration of 0.12 mM/kg sodium lactate (SL) and 3, 6, 10, 15, 30, 45, and 60 min later. Within 15 min, SL could not be detected in the controls; SL was retained in amounts ranging from 0.13 to 0.19 mM in patients with acute hepatitis to 0.22 mM in the patients with chronic hepatitis. The results demonstrate that lactate elimination disturbances persist longer than changes in other tests used to assess liver function.

6467 INFECTIOUS HEPATITIS AND GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY. (Eng.)

Berry, E.; Melmed, R. N. (Hadassah Univ. Hosp., Jerusalem, Israel). *Isr. J. Med. Sci.* 13(6):600-603; 1977.

To determine the factors that enable a rapid diagnosis of combined infectious hepatitis and glucose-6-phosphate dehydrogenase (G6PD) deficiency, the clinical and biochemical findings in 14 patients were compared with those in 50 patients with uncomplicated hepatitis and those in 14 patients with fulminant hepatitis. Similarities with the latter group included persistence of fever, tachycardia, leukocytosis, and hyperbilirubinemia of greater than 340 μM (20 mg/dl). A rise in bilirubin values of more than 50 μM (3 mg/dl) per day in patients with viral hepatitis strongly suggested the presence of G6PD deficiency. Despite the severity of the illness, prothrombin activity was well maintained in G6PD-deficient patients.

6468 SERUM GLYCOPROTEIN LEVEL IN PATIENTS WITH ACUTE AND CHRONIC HEPATITIS. (Rus.)

Postovit, V. A.; Shcheglova, S. A.; Gundalakh, A. I. (S. P. Botkin Hosp. of Infectious Diseases, Leningrad, USSR). *Klin. Med. (Mosk.)* 54(7):82-87; 1976.

The content of serum glycoproteins was studied in 71 patients with acute viral hepatitis, 52 patients with chronic hepatitis, and 12 patients with cirrhosis. Sialic acids were assessed by diphenylamine (DPA) reaction and by reaction with acetous reagent. Levulose (fructose) was assessed by ammonium molibdate. According to all three reactions, the patients with acute and chronic hepatitis and cirrhosis had significantly decreased level of serum glycoproteins. Treatment with prednisone caused normalization of glycoprotein level in the patients with acute viral hepatitis.

6469 CHARACTERISTIC FEATURES OF PROTEIN SPECTRA AND SERUM CHOLINESTERASE AND PEROXIDASE ISOZYMES IN VIRAL HEPATITIS. (Rus.)

Kazanbiev, N. K.; Bakuev, M. M.; Sultanov, G. V. (Dagestan Medical Inst., Makhachkala, USSR). *Sov. Med.* (5): 23-27; 1977.

Protein spectra and serum cholinesterase (CE) and peroxidase (PO) isozymes were studied in 42 patients with viral hepatitis, 27 with chronic hepatitis, 21 with cirrhosis, and 30 practically healthy subjects. Disc electrophoretic assessment of blood proteins showed more or less uniform changes in the cathode macroglobulins in all patients, while the anode fractions showed significant variability. The prealbumin fraction in the patients with viral hepatitis was significantly reduced over that of healthy subjects; the patients with chronic hepatitis displayed a simultaneous decrease in albumin and prealbumin fractions. The patients with viral hepatitis showed a marked decrease of CE_2-CE_5 activities; quantitative distribution of CE isozymes showed direct correlation with the clinical stages of the disease. PO activity was mildly reduced in 4 patients with chronic hepatitis and in 6 patients with cirrhosis; enzyme activity was slightly elevated in 17 patients with chronic hepatitis and in 4 patients with cirrhosis (6 and 11 patients, resp., showed a normal range of PO activity). All patients with active viral hepatitis had a significant increase in the PO fraction and showed an additional slow fraction.

6470 AUSTRALIA ANTIGEN (HBsAg) IN SERUM AND LIVER TISSUE IN ACUTE AND CHRONIC LIVER LESIONS. (Pol.)

Sowa, J. (Clinic Infectious Diseases, Krakow Medical Inst., Krakow, Poland). *Pol. Tyg. Lek.* 31(40):1713-1715; 1976.

The diagnostic efficacy of the presence of Australia antigen (HBsAg) was studied in 100 patients with various liver lesions. The patients included 19 with acute viral hepatitis (group 1), 3 with subacute hepatitis (group 2), 16 with chronic persisting hepatitis (group 3), 42 with chronic active hepatitis (group 4), 7 with postnecrotic cirrhosis (group 5), and 13 with other liver diseases. Serum HBsAg was assessed by immunoelectroprecipitation or double diffusion assay, and HBsAg in the liver tissue was assessed by immunofluorescent electrophoresis. Serum HBsAg was detected in 22 patients and liver HBsAg in 24 patients. The incidence of serum HBsAg was greater among the patients with acute viral hepatitis (36.8%) than in the other groups (33.3% in group 2, 31.3% in group 3, 16.6% in group 4, and 29.0% in group 5), while the frequency of the liver HBsAg was greater in patients with postnecrotic cirrhosis (43.5%) than in other patients (27.3% in group 1, 25.0% in group 3, 26.2% in group 4, and 7.6% in group 6). The simultaneous presence of HBsAg in the serum and liver tissue was detected in 16.0% of the patients with acute viral hepatitis, compared to 9.5% of the patients with chronic active hepatitis.

6471 BIOCHEMICAL AND BIOPHYSICAL PROPERTIES OF HEPATITIS B CORE PARTICLES DERIVED FROM DANE PARTICLES AND INFECTED HEPATOCYTES.

(Eng.) Fields, H. A.; Hollinger, F. B.; Desmyter, J.; Melnick, J. L.; Dreesman, G. R. (Center for Disease Control, 4402 N. 7th St., Phoenix, AZ 85014). *Intervirology* 8(6):336-350; 1977.

Hepatitis B core antigen (HBcAg) was purified from Dane particles and from infected hepatocytes, and its biochemical and biophysical properties were studied. An identical isoelectric pH of 4.0 was determined for labeled preparations of both Dane-derived and liver-derived HBcAg. Unlabeled liver-derived HBcAg demonstrated a lower isoelectric pH of 3.7. Molecular weight determinations by Sepharose 4B column chromatography revealed that liver-derived HBcAg had a molecular weight of 8.5-9.0 x 10^6 daltons. The sedimentation coefficient of both Dane- and liver-derived HBcAg was found to be 124S. Polyacrylamide gel electrophoresis revealed that iodinated HBcAg derived from Dane particles was very similar in polypeptide structure to HBcAg derived from infected liver tissue. Twelve polypeptides were resolved from Dane core particles, and seven to nine were resolved from liver core particles. Several polypeptides in both preparations comigrated with iodinated hepatitis B surface antigen (HBsAg). However, three polypeptides (88,000, 79,000, and 59,000 daltons) were found in both Dane- and liver-derived HBcAg but not in HBsAg, which suggests that these polypeptides are HBcAg-specific. Endogenous DNA polymerase activity was observed in both Dane- and liver-derived core particles.

6472 SERODIAGNOSIS OF HEPATITIS B VIRUS INFECTION BY ANTIBODY TO CORE ANTIGEN.

(Eng.) Irwin, G. R.; Allen, R. G.; Segal, H. G.; Allen, A. M.; Putnak, J. R.; Cannon, H. G.; *et al.* (Walter Reed Army Inst. Res., Washington, DC 20012). *J. Infect. Dis.* 136(1):31-36; 1977.

A radioimmunoassay inhibition test was used to detect antibody to hepatitis B core antigen (anti-HBc) in a military population in which hepatitis B was endemic. Anti-HBc was found in 39% of acute hepatitis patients negative for hepatitis B surface antigen (HBsAg) and in 96% of HBsAg-positive patients. Persistence of antibody to HBsAg (anti-HBs) in convalescent-phase sera was significantly greater ($p<0.001$) in individuals with acute HBsAg-positive hepatitis B than in patients with clinical HBsAg-negative hepatitis B. The prevalence of anti-HBc in the absence of HBsAg, anti-HBs, and clinical disease was 3.2% in this military population. In longitudinal studies of hepatitis B infection, the presence of anti-HBc preceded the presence of anti-HBs and improved the ability to determine the onset of subclinical infection. Anti-HBc is a useful serologic marker for the study of the epidemiology of hepatitis B and improves the efficiency of detection of hepatitis B virus infection.

6473 HEPATITIS-B VIRUS IN BEDBUGS (Cimex hemipterus) FROM SENEGAL.

(Eng.) Wills, W.; London, W. T.; Werner, B. G.; Pourtaghva, M.; Larouze, B.; Millman, I.; *et al.* (Hopital Claude Bernard, Paris, France). *Lancet* 2(8031):217-219; 1977.

The presence of hepatitis B surface antigen (HBsAg) was studied in bedbugs (*Cimex hemipterus* [F]) collected on four separate occasions from bedding in the huts of village dwellers in Senegal, West Africa. HBsAg was detected in unengorged nymph and adult bedbugs in each of the first three collections. Three of 28 such specimens were HBsAg-positive in the first collection, and 3 of 17 specimens were positive in the second collection. In the third, six of nine were HBsAg-positive when the bed occupant was known to be HBsAg-positive. Two of these six positive insects did not contain human serum proteins. Bedbugs in the fourth collection were captured and kept alive without a blood meal for 30 days. Three of 89 of these samples were HBsAg-positive. These are the highest field infection-rates of hepatitis-B virus reported in any insect species. The bedbug must be considered a potential vector of hepatitis-B virus.

6474 IDENTIFICATION OF LYMPHOCYTES IN PERCUTANEOUS LIVER BIOPSY CORES: DIFFERENT T:B CELL RATIO IN HBsAg-POSITIVE AND -NEGATIVE HEPATITIS.

(Eng.) Miller, D. J.; Dwyer, J. M.; Klatskin, G. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 72 (6):1199-1203; 1977.

To study the nature of the immune response to hepatitis B virus (HBV), the lymphocytes infiltrating the liver were isolated and characterized as thymus-derived (T) or bone marrow-derived (B) cells in 20 patients with hepatitis B surface antigen (HBsAg)-positive acute and chronic hepatitis, 8 patients with HBsAg-negative chronic hepatitis with prior evidence of HBV infection, and 5 patients with HBsAg-negative chronic hepatitis without prior evidence of HBV infection. The predominant cell infiltrating the liver was shown to be a T cell in all categories; however, the ratio of T to B cells was significantly lower (1.96) in the patients without evidence for HBV infection than in the patients who were HBsAg-positive at (7.86), or before (8.85) the time of study. The significantly ($p<0.001$) higher number of B cells in the patients with chronic hepatitis of unknown etiology suggests that a different immunopathogenetic mechanism is operative in this group. A peripheral T lymphocytopenia was observed in patients with both antecedent and existent HBs-antigenemia, but not in the patients without evidence for HBV infection.

6475 LIVER HISTOLOGY IN 34 HBsAg LONG-TERM HEALTHY CARRIERS.

(Eng.) Piccinino, F.;

Sagnelli, E.; Manzillo, G.; Pasquale, G. (Clinica delle Malattie Infettive della 1° Facolta di Medicina della Universita di Napoli, Via Cotugno 1, I-80135 Napoli, Italy). *Acta Hepatogastroenterol. (Stuttg.)* 24(3):148-154; 1977.

Liver biopsy specimens of 34 long-term carriers of hepatitis B surface antigen (HBsAg) with normal liver function tests, discovered among family members of patients with HBsAg-positive liver diseases, were investigated histologically. Of these 34, 12 had normal liver tissue and 8 had mild nonspecific changes, such as focal Kupffer cell hyperplasia or mild lymphocytic infiltrates in the portal tracts. Two subjects showed multiple histioid granulomata scattered in normal liver parenchyma. Of the remaining 12 cases, 8 showed some areas of pin-head necrosis and mild portal tracts infiltration and 4 showed some areas of focal parenchymal infiltration associated with portal tracts inflammation. These histological changes are considered to be very mild lesions within the spectrum of hepatitis. None of the patients had histological evidence of chronic liver disease. It appears that normal liver function tests may be useful in excluding severe histological abnormalities.

6476 PREVALENCE OF HEPATITIS B SURFACE ANTIBODIES IN ETHNIC GROUPS OF A CANADIAN HOSPITAL STAFF POPULATION.

(Eng.) Leers, W. D. (Wellesley Hosp., Toronto, Ontario, Canada M4Y 1J3). *Infect. Immun.* 17(2):257-262; 1977.

The suggestion that ethnic and racial factors influence the prevalence of hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) was investigated in hospital staff members. The staff members were categorized into four "risk groups" according to frequency of exposure to blood, patients' specimens, and patient care. Of the total 526 staff members studied, 51.5% were of North American origin, 25.9% came from Europe, and the rest came from Asia, the West Indies, Africa, and Australia. The prevalence of anti-HBs was lowest among North American staff members (8.1%) and highest among Asians (42.3%, $p \leq 0.05$). Low-risk administrative staff had the significantly lowest number of anti-HBs-positive members (6.1%), whereas low-risk dietary staff (29.6%) and hospital assistants (30.6%) had the significantly highest prevalence of anti-HBs staff members. In contrast, the high-risk group of laboratory workers and special nurses had only 16.1% of staff members with anti-HBs. The results show that ethnic background and socioeconomic conditions have to be considered when various risk groups are compared for the presence of anti-HBs. The frequency of exposure to blood and patients' specimens or patient care is not the only determining factor in the prevalence of anti-HBs in health workers.

6477 HEPATITIS-B SURFACE ANTIGEN (HBsAg) AND ANTIBODY (ANTI-HBs) PREVALENCE AMONG LABORATORY AND NONLABORATORY HOSPITAL PERSONNEL.

(Eng.) Wruble, L. D.; Masi, A. T.; Levinson, M. J.; Rightsell, W. A.; Bale, G. F.; Bertram, P.; *et al.* (Univ. Tennessee Coll. Medicine, 951 Court Ave., Room 335M, Memphis, TN 37163). *South. Med. J.* 70(9):1075-1079; 1977.

The incidence of hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) was determined in 588 hospital laboratory workers and in nonlaboratory hospital workers (controls) matched for race and sex and adjusted for age. The combined prevalence of antigen-antibody positivity among white female technicians was 12% versus 0% of controls ($p<0.005$). The highest prevalence (18%) among laboratory workers was found in chemistry technicians, and significantly elevated frequencies also were noted in histocytologic, hematologic, and general laboratory technicians and blood collectors; this was not explained by a history of previous blood transfusions or hepatitis. Prevalence among pathologists (16%) was significantly greater ($p<0.05$) than among radiologists not routinely performing angiography (2%). Prevalence among black female housekeepers, both laboratory (25%) and nonlaboratory (36%), was the highest, and was significantly greater ($p<0.05$) than among black female technicians (10%). Positivity was not correlated with current residence census tract socioeconomic indicators in black or white women. The data emphasize the need for continued identification of risks and improved protection measures in hospital workers.

6478 THE EFFECT OF HEPATITIS B ON PLASMA CHOLESTEROL AND STEROL BALANCE.

(Eng.) Saudek, C. D. (New York Hosp.-Cornell Medical Center, 1300 York Ave., New York, NY 10021). *Am. J. Med.* 63(3):453-458; 1977.

Cholesterol metabolism was studied in a patient with hepatitis B throughout 29 days of the incubation period, the entire preicteric phase (49 days), and 15 days into the icteric phase. The patient, a 61-yr-old woman, was found to have developed increased transaminase levels 53 days after the infusion of clotting factor. Three weeks after the onset of elevated transaminases, the serum became positive for hepatitis B surface antigen. As hepatic inflammation developed, the plasma cholesterol concentration declined, reaching 56% of its baseline level before the onset of jaundice. Fecal bile acids diminished slightly, whereas fecal neutral steroids were unchanged. As jaundice developed, the plasma cholesterol level rose abruptly, and fecal bile acid excretion decreased markedly. This report suggests that plasma cholesterol is diminished by hepatitis prior to the development of icterus. Cholesterol synthesis is probably decreased.

6479 RATIONAL USE OF HEPATITIS B IMMUNE GLOBULIN.

(Eng.) Iwarson, S. (Ostra Sjukhuset, S-41685 Goteborg, Sweden). *Scand. J. Infect. Dis.* 9(2):67-69; 1977.

Data concerning specific hepatitis B immunoglobulin (HBIg) prophylaxis is reviewed. The introduction of high titer HBIg makes passive immunization against hepatitis B infection possible. HBIg seems to be valuable after well-documented accidental exposure to hepatitis B surface antigen and for regular prophylaxis among dialysis patients. In one study of "needle-stick" postexposure prophylaxis, the incidence of hepatitis after 6 months of observation was 6.8% in gamma globulin-treated staff members and 2.0% among staff members treated with HBIg ($p<0.05$). In one study on dialysis-associated hepatitis prevention, 9.0% of patients who received high-titer globulin developed hepatitis within 8 months of the start of the study, as compared with 33.3% among dialysis patients given standard gamma globulin ($p<0.01$). In both studies, however, the passage of time resulted in more cases of hepatitis among the HBIg-treated subjects, making the final incidence of hepatitis not significantly different from that among gamma globulin-treated subjects. Regular HBIg-prophylaxis among hospital staff is questioned because some controlled studies failed to show any superiority over standard gamma globulin. The value of HBIg-prophylaxis among contacts of hepatitis B patients should be further evaluated. Passive immunization will give protection only for a limited period of time, and the clinical evaluation of vaccines against hepatitis B is awaited with great interest.

6480 HEPATITIS B VACCINES. (Eng.) Zuckerman, A. J. (London Sch. Hygiene and Tropical Medicine, London, England). *Nature* 267(5612):578-579; 1977.

Experimental hepatitis B vaccines, including hepatitis B small particle vaccines, hepatitis B polypeptide vaccines, and synthetic hepatitis B vaccines, are reviewed. The foundations for the development of these vaccines were laid by the demonstration of the relative efficacy of diluted serum containing hepatitis B virus heated to 98 C for 1 min in preventing or modifying the infection in susceptible volunteers. The production of protective surface antibody by hepatitis B surface antigen is the basis for the preparation of experimental vaccines from purified 22-nm spherical surface antigen particles from the plasma of asymptomatic hepatitis B surface antigen carriers. The administration of this vaccine resulted in a marked difference in the incidence of hepatitis B infection in patients and staff of a hemodialysis unit in comparison with a group of patients and staff who had not received the vaccine. Attempts are also being made to prepare vaccines from the constituent polypeptides of the 22-nm spherical particles of the hepatitis B surface antigen. These vaccines would have an added margin of safety since they would be even less likely than the 22-nm particle subunit vaccines to contain infectious virus or contaminating host proteins. An extension of the use of polypeptide immunogens is the isolation and structural identification of a small surface antigen peptide. This peptide could conceivably be synthesized, function as a hapten, and, when coupled to a suitable carrier, may serve as a vaccine. The momentum towards the production of unconventional hepatitis B vaccines is being maintained, and it would be imprudent to speculate whether successful cultivation of hepatitis B virus in tissue culture, which will lead to the development of ordinary vaccines, will be achieved before a synthetic vaccine appears.

6481 SIMULTANEOUS INFECTION WITH TYPE A AND B HEPATITIS VIRUSES. (Eng.) Hindman, S. H.; Maynard, J. E.; Bradley, D. W.; Berquist, K. R.; Denes, A. E. (Center for Disease Control, 4402 N. 7th St., Phoenix, AZ 85014). *Am. J. Epidemiol.* 105(2):135-139; 1977.

The occurrence of a common source hepatitis A epidemic among the residents of a mental institution in which hepatitis B is hyperendemic provided an opportunity to observe concurrent infections with both agents. Nine hepatitis B surface antigen (HBsAg)-positive individuals developed hepatitis A infections, which was documented by hepatitis A antibody seroconversion in eight. The incidence of hepatitis A infections in susceptible HBsAg-positive persons (67%) did not differ from that in HBsAg-negative individuals (63%). The icteric to anicteric infection ratio in the HBsAg-positives (1:1.7) was similar to that in the negatives (1:2.1), and the clinical course in the antigen positives did not differ significantly from that of the antigen negatives. In addition to confirming previous reports that the viruses of hepatitis A and B are immunologically distinct, these results document that infection with either is independent of the other and that the morbidity from simultaneous infection is no greater than that caused by either alone.

6482 SERODIAGNOSIS OF VIRAL HEPATITIS A: DETECTION OF ACUTE-PHASE IMMUNOGLOBULIN M ANTI-HEPATITIS A VIRUS BY RADIOIMMUNOASSAY. (Eng.) Bradley, D. W.; Maynard, J. E.; Hindman, S. H.; Hornbeck, C. L.; Fields, H. A.; McCaustland, K. A.; Cook, E. H. (Center for Disease Control, Phoenix, AZ 85014). *J. Clin. Microbiol.* 5(5):521-530; 1977.

A modified micro solid-phase radioimmunoassay (RIA) for antibody to hepatitis A virus (anti-HAV) was developed, and its specificity and sensitivity were verified by examination of coded human and chimpanzee serum specimens. This double antibody procedure was performed by coating the surface of a polyvinyl microtiter plate "well" with 200 μl of a 1:1,000 dilution of a patient's test serum. Purified HAV and ^{125}I-labeled IgG anti-HAV were sequentially added to form an antibody sandwich. Radioimmunoassay of early acute-phase serum specimens from human cases of hepatitis A revealed the presence of anti-HAV activity. Differential examination by RIA of IgG and IgM fractions of acute-phase sera from experimentally infected chimpanzees demonstrated that IgM contained the bulk of the anti-HAV activity. A modification of the RIA procedure for anti-HAV (RIA-IgM blocking), incorporating an incubation step with anti-IgM (Mu chain specific), was further shown to differentiate acute- from convalescent-phase hepatitis A sera. This adapted RIA-IgM blocking procedure required less than 1 μl of a single acute-phase serum specimen for the diagnosis of viral hepatitis A.

6483 DISTRIBUTION OF ANTIBODY TO HEPATITIS A ANTIGEN IN A POPULATION OF COMMERCIAL PLASMA DONORS. (Eng.) Hall, W. T.; Mondon, F. K.; Madden, D. L.; DeSouza, D.; Kane, J. L. (Electro-Nucleonics Lab., Inc., Bethesda, MD 20014). *J. Clin. Microbiol.* 6(2):132-135; 1977.

Plasma samples from 245 regular plasma donors were tested for the presence of antibody to hepatitis A antigen. Antibody was detected at an immune adherence hemagglutination titer of 1:10 or greater in 91 of the 245 donors. The frequency of anti-hepatitis A was significantly ($p<0.01$) lower in the 18- to 29-yr-old group (30%) than in the 30- to 49-yr-old group (57%). No significant differences between whites and blacks or men and women were observed. Eighty percent of the donors were in the age range of 18-29 yr, whereas 48% of the higher-titered plasmas (≥1:1,000) were in the 30- to 49-yr age group. By preselection of donors, it is possible to produce an immune serum globulin with a specific anti-hepatitis A titer.

6484 ANTIBODY TO HEPATITIS A ANTIGEN IN CHILDREN. (Eng.) Stevens, C. E.; Cherubin, C. E.; Dienstag, J. L.; Purcell, R. H.; Szmuness, W. (New York Blood Center, 310 E. 67th St., New York, NY 10021). *J. Pediatr.* 91(3):436-438; 1977.

The prevalence of antibody to hepatitis A (anti-HA) was determined in two groups of urban children, using immune adherence hemagglutination to detect antibody. Among 106 children without liver disease, 21.7% had anti-HA-positive sera. Anti-HA prevalence in these children increased with increasing age, being present in 8.8% of children under 5 yr, in 24.2% of those 5-9 yr old, and in 30.8% of those 10 yr or older. Among the 97 children without hepatitis B virus marker (hepatitis B surface antigen or antibody), anti-HA was present in the sera of 17.5%, while anti-HA was present in 66.7% of the 9 children with hepatitis B virus marker ($p<0.01$). The second group of urban children consisted of 31 children who had resided in a ward in which an epidemic of hepatitis had occurred 1-2 months prior to blood sampling; this group also included 37 children who had resided in another ward in the same hospital. All but 1 of 31 children residing in the epidemic ward had anti-HA-positive sera. Only 1 of the 37 nonepidemic ward children was anti-HA-positive.

6485 HEMODIALYSIS-ASSOCIATED HEPATITIS IN THE UNITED STATES, 1974. (Eng.) Snydman, D. R.; Bregman, D.; Bryan, J. A. (Viral Diseases Div., Bureau Epidemiology, Center for Disease Control, Atlanta, GA 30333). *J. Infect. Dis.* 135(4):687-691; 1977.

A survey of 312 dialysis units that had dialyzed 15,382 patients for 1 month or more in 1974 revealed that 953 of the dialyzed patients had contracted serologically confirmed hepatitis B infection (attack rate, 6.2%). Of the patients with hepatitis B, 88.6% had become chronic carriers of hepatitis B surface antigen (HBsAg), i.e., HBsAg-positive for 3 months or longer. Only 90 of the 312 units had screened patients for anti-HBsAg, and 165 patients had been positive for anti-HBsAg in 1974. In all, 98% of the units had conducted periodic surveillance of the patient population for HBsAg, and 60% of these units had performed screening once a month. The overall attack rate of hepatitis B among staff members employed for longer than 1 month in a dialysis unit approximated the rate for patients (5.8%); however, the incidence of HBsAg-positive cases among staff was significantly lower than that in the patient population (5.2%, $p<0.01$). Dialysis units that separated HBsAg-positive from HBsAg-negative patients had significantly ($p<0.01$) lower rates of hepatitis B among both patients (9.4%) and staff (10.1%) than did units that did not separate patients (13.4% and 18.5% for patients and staff, resp.).

6486 PROGNOSIS OF BABIES WITH NEONATAL HEPATITIS. (Eng.) Danks, D. M.; Campbell, P. E.; Smith, A. L.; Rogers, J. (Royal Children's Hosp. Res. Foundation, Flemington Rd., Parkville, 3052, Victoria, Australia). *Arch. Dis. Child.* 52(5):368-372; 1977.

To evaluate the prognosis of neonatal hepatitis, 105 infants with this entity were studied carefully and followed for up to 11.5 yr. Ascertainment was complete for those with severe and persistent jaundice, but less complete for mild or anicteric cases. Prognosis was poor (40% death or cirrhosis) in infants with persistently acholic stools, but relatively good (<15% death or cirrhosis) in those with less persistent and less obstructive jaundice. The presence of second diseases (including α_1-antitrypsin deficiency or a family history of other affected children) seemed to play a part in determining poor prognosis. Twenty-two infants presented with acute fulminant illness (with or without jaundice) in the neonatal period. Cytomegalovirus infection carried a relatively good prognosis.

6487 INDICES OF IMMUNITY IN CHILDREN WITH VIRAL HEPATITIS. (Ukr.) Moshchich, P. S.; Blonskaya, L. F. (Kiev Medical Inst., USSR). *Pediatr. Akush. Ginekol.* (3):9-10; 1977.

6488 FUNCTIONAL STATE OF THE VESSELS IN CHILDREN WITH VIRAL HEPATITIS. (Ukr.) Nosova, A. A. (Chernovtsy Medical Inst., USSR). *Pediatr. Akush. Ginekol.* (3):10-11; 1977.

6489 DETECTION OF CHILDREN WITH VIRAL HEPATITIS IN ENDEMIC AREAS. (Ukr.) Khersonskaya, R. Ya.; Rogotskaya, L. T.; Bitenbinder, E. O.; Shtelmakh, O. I.; Makarovskaya, A. I.; Fedorovskaya, E. O. (Scientific Res. Inst. Infectious Diseases, Kiev, USSR). *Pediatr. Akush. Ginekol.* (3):12-13; 1977.

6490 ADVANCES IN VIRAL HEPATITIS. (Eng.) Anonymous. (No affiliation given). *S. Afr. Med. J.* 52(10):386-387; 1977.

6491 HEPATITIS B VIRUS INFECTION ON TAIWAN [Letter to Editor]. (Eng.) Chen, D. S.; Sung, J. L. (Coll. Medicine, Natl. Taiwan Univ., Taipei 100, Taiwan). *N. Engl. J. Med.* 297(12): 668-669; 1977.

6492 ACUTE VIRAL HEPATITIS B. (Eng.) Anonymous. (Communicable Disease Surveillance Center, Public Health Lab. Service, U.K.). *Br. Med. J.* 2(6087:649; 1977.

6493 GEOGRAPHICAL DISTRIBUTION OF THE SUBTYPE OF HEPATITIS B SURFACE ANTIGEN IN CHINESE. (Eng.) Sung, J. L.; Chen, D. S. (Natl. Taiwan Univ. Hosp., 1 Chang-Te St., Taipei, Taiwan). *Gastroenterol. Jpn.* 12(2):58-63; 1977.

See also, 6117, 6184, 6308, 6401, 6434, 6461, 6499, 6501.

LIVER AND BILIARY TRACT

Chronic Hepatitis

6494 EARLY AND LONG-TERM RESULTS OF IMMUNOSUPPRESSIVE TREATMENT OF CHRONIC AGGRESSIVE HEPATITIS. (Pol.) Machalska, M.; Sawaryn, T.; Szymonski, K.; Karasinska, M. (Clinic Infectious Diseases, Inst. Internal Diseases, Katowice, Poland). *Pol. Tyg. Lek.* 32(30):1167-1170; 1977.

From 1970 to 1976, 56 patients with chronic aggressive hepatitis underwent treatment with azathioprine (150-200 mg/day) and prednisone (30-60 mg/day). The patients could be divided into two groups: group 1 consisted of 36 patients with aggressive infectious hepatitis, and group 2 included 20 patients with aggressive hepatitis with clinical manifestations of cirrhosis. The efficacy of treatment, assessed by the decrease of serum bilirubin, alanine and asparagine aminotransferases, and α-globulin content, was evaluated 2 months and within 1-5 yr of the beginning of treatment. Immunosuppressive therapy for 1-3 yr resulted in objective improvement in 39 patients: response to the treatment was observed in 83.3% of the patients in group 1 and 45.0% in group 2.

6495 GIANT MULTINUCLEATED HEPATOCYTES IN AN ADULT WITH CHRONIC ACTIVE HEPATITIS. (Eng.) Richey, J.; Rogers, S.; Van Thiel, D. H.; Lester, R. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 73(3):570-574; 1977.

The case of an adult with giant multinucleated cells occurring in chronic active hepatitis is presented. The patient, a 36-yr-old woman, presented with jaundice, dark urine, and weight loss. She received i.m. tetracycline for 10 days, followed by p.o. dehydrocholic acid for 7 days. Serum hepatitis B surface antigen or antibody, mitochondrial antibody, antinuclear factor, and alpha-fetoprotein were not detected. A liver biopsy revealed features of chronic active liver disease, including extensive portal inflammation, disruption of the limiting plate by the inflammatory infiltrate, focal periportal hepatocellular necrosis, and widespread lesser cellular changes, including cell ballooning. The most striking feature of the infiltrate was the presence of many multinucleated hepatocytes throughout the parenchyma. Seven to 12 nuclei were present in single hepatocytes which, with reticulin staining, were single cells rather than syncytial cells. Her symptoms resolved with prednisone (60-10 mg/day) and cyclophosphamide (50 mg/day), but a liver biopsy 8 months later revealed macronodular cirrhosis and areas of active inflammation. A third biopsy 7 months later showed cirrhosis without inflammation, necrosis, or giant cells.

6496 LYMPHOCYTE POPULATIONS IN LIVER BIOPSY SPECIMENS FROM PATIENTS WITH CHRONIC LIVER DISEASE. (Eng.) Sanchez-Tapias, J.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Gut* 18(6):472-475; 1977.

Rosetting techniques were used to identify lymphocytes obtained from liver biopsies as thymus-derived (T), "activated" T, or constant fragment (Fc)-receptor bearing cells to provide further evidence on the possible involvement of these cells in autoimmune, viral, and alcohol-related liver disease. "Activated" T lymphocytes were present in the liver in alcohol-induced hepatitis, chronic active hepatitis, and in primary biliary cirrhosis but not in inactive cirrhosis, chronic persistent hepatitis, extrahepatic or drug-induced cholestasis. A greater percentage of lymphocytes bore Fc-receptors in chronic active hepatitis than in alcohol-induced hepatitis or cholestatic liver disease. The concentration of "activated" T cells in the peripheral blood in all groups studied was within the normal range, suggesting that the "activated" T cells found in the liver were reacting to either native or foreign antigens within the liver. The data on Fc-receptor-bearing cells are consistent with the involvement of antibody assisted K cell-mediated cytotoxicity in chronic active hepatitis.

6497 INCIDENCE AND IMMUNOCHEMICAL FEATURES OF SERUM CRYOGLOBULIN IN CHRONIC LIVER DISEASE.

(Eng.) Jori, G. P.; Buonanno, G.; O'Onofrio, F.; Tirelli, A.; Gonnella, F.; Gentile, S. (Istituto di Patologia Medica, Piazza Miraglia, 80138 Napoli, Italy). *Gut* 18(3):245-249; 1977.

The frequency of essential cryoglobulinemia was studied in 150 patients with chronic liver diseases. Essential cryoglobulinemia was detected in 44 of the patients. Cryoglobulinemia prevailed in the patients whose hepatic tissue showed more features of active inflammation and in women. There were no correlations between cryoglobulinemia and either hepatitis B surface antigen positivity or alcoholic liver disease. Mixed cryoglobulins made of heterogeneous immunoglobulins without monotypic components were mostly associated with established cirrhosis, whereas monotypic cryoglobulins were exclusively found in patients with either persistent or aggressive chronic hepatitis. Mixed cryoglobulins with a monotypic component were associated with all histological grades of liver damage. These results afford an objective evaluation of both the frequency and immunochemical features of cryoglobulins associated with chronic inflammatory liver disease.

6498 IN VITRO STUDIES ON IgG-MEDIATED LYMPHOCYTE CYTOTOXICITY IN CHRONIC ACTIVE LIVER DISEASE.

(Eng.) Kawanishi, H. (Ann Arbor Veterans Admin. Hosp., Ann Arbor, MI 48105). *Gastroenterology* 73(3):549-555; 1977.

Antibody-dependent cytotoxicity mediated by allogeneic nonimmune lymphocytes (NL) was studied *in vitro* in sera from 10 patients with chronic active liver disease (CALD). NL in significant numbers adhered to the surface of target Chang monolayer cells pretreated with the sera of CALD patients (immune adherence of NL) and were cytotoxic. This phenomenon was blocked by anti-IgG and the constant fragment (Fc) of IgG. Test sera, absorbed with Chang cells or human adult liver tissues, failed to provoke target Chang cell lysis. Small amounts of granular-appearing IgG were demonstrated on the surface of Chang cells treated with the CALD sera from 8 of the 10 patients (membrane-fixed IgG). It is concluded that the antibody-dependent cellular cytotoxicity in this *in vitro* system is mediated by the IgG of CALD sera, most likely bound to target cell surface antigens, and that effector NL appear to lyse the target cells by direct contact through the Fc portion of the above membrane-fixed IgG. This immune cytotoxic process may play a role in the pathogenesis of CALD.

6499 HEPATITIS B ANTIGEN IN CHILDREN WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS.

(Ser.) Filipovic, D.; Popovic, E. (Serbian Inst. Maternity and Child Protection, Novi Beograd, Yugoslavia). *Srp. Arh. Celok. Lek.* 104(6):415-420; 1976.

The presence of hepatitis B antigen (HB Ag) was assessed in 71 children (10 months-15 yr) with chronic liver lesions. There were 41 children with histologically confirmed cirrhosis, 17 with chronic aggressive hepatitis, and 12 with chronic persisting hepatitis. HB Ag was detected in 10 patients with cirrhosis, 7 with chronic aggressive hepatitis, and 3 with chronic persisting hepatitis. Increased serum transaminase activity (up to 200 U/ml) was detected in 25 patients with cirrhosis, in 17 with aggressive hepatitis, and in only 2 with chronic persisting hepatitis. There was no difference in the severity of clinical manifestation of liver lesion between HB Ag-positive and -negative patients.

6500 AUTOIMMUNE COMPONENT IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS AND ITS ASSOCIATION WITH DETECTION OF SURFACE HEPATITIS B ANTIGEN.

(Rus.) Nasonov, E. I.; Burlev, V. A.; Golosova, T. V.; Speransky, A. I.; Somova, A. V.; Podymova, S. D.; *et al.* (Inst. Hematology and Blood Transfusion, Moscow, USSR). *Ter. Arkh.* 49(6):84-89; 1977.

The results of comparative analysis of the incidence and titers of organospecific autoantibodies, rheumatoid factor (RF), concentration of Ig, and incidence of surface hepatitis B antigen (HBsAg) in 71 patients with chronic active hepatitis (CAH) are presented. Antibodies to the smooth muscles (SMA), mitochondrial antibodies (MA), and antinuclear factor (ANF) were assessed by nondirect immunofluorescence; RF was assessed by latex-agglutination; and IgG, IgA, and IgM were assessed by radial immunodiffusion. HBsAg was assessed by the reaction of precipitation in gel (RPG), reverse hemagglutination (HA), and by enzymoimmune assay (EIA). The patients could be divided into two groups. Group 1 included 35 HBsAg-negative patients, and group 2 included 36 HBsAg-positive patients. The patients in group 2 could be further subdivided into subgroup A, 19 patients in whom HBsAg was detected in all assays; subgroup B, 11 patients in whom HBsAg was detected in HA and EIA; and subgroup C, 6 patients in whom HBsAg was detected only in EIA. It was found that regardless of HBsAg detection, the patients with CAH had increased content of IgG and IgM, the presence of organospecific antibodies, and RF. The only exception comprised the patients in subgroup A, who showed dissociation between the high titer of HBsAg and immunologic manifestations of pathologic process.

6501 OBSERVATIONS ON THE COURSE OF HEPATITIS-B-ANTIGEN-POSITIVE CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Ger.) Schimmelpfennig, W.; Maluszek, S.; Wagner, K.; Geserick, G. (II Medizinische Klinik des Bereiches Medizin [Charite], Schumannstr. 20/21, 104 Berlin, W. Germany). *Dtsch. Gesundheitsw.* 32(2):62-64; 1977.

A retrospective study of liver morphology, liver function, and hepatitis B surface antigen (HBsAg) levels in 21 patients with HBsAg-positive chronic hepatitis is presented. Of the 21 patients, 1 had chronic persistent hepatitis, 12 had chronic aggressive hepatitis, 2 had chronic aggressive hepatitis with lesser activity, 1 had cirrhosis of the liver with portal hypertonia, 2 had cirrhosis of the liver without hypertonia, and 3 had cirrhosis of the liver with portasystemic shunt. Of the 21 patients, 6 died during the 1st month to 3.5 yr of examination. In seven cases (5/15 living patients and 2/6 deceased patients), migration electrophoresis indicated negative HBsAg results. Various therapy protocols applied to the 15 patients (azathioprine + prednisolone, prednisolone, azathioprine, tolbutamide) indicated that there was no correlation between therapy and antigenemia. Of the 10 HBsAg positive cases (10/15), there was only 1 case with a deteriorating result (chronic aggressive hepatitis becoming cirrhosis). A favorable development (chronic aggressive hepatitis becoming chronic persistent hepatitis) was seen in five cases. Of the five patients showing no HBsAg activity, three developed cirrhosis. Under immunosuppressive therapy, HBsAg-positive patients exhibited symptoms similar to HBsAg negative patients. Two conclusions on the prognosis of HBsAg positive patients are drawn: when there is an HBsAg persistence in acute hepatitis B, there is a subsequent transformation of the disease into the chronic form with an unfavorable prognosis and when an HBsAg persistence is observed for chronic hepatitis and cirrhosis, there may not necessarily be an increase in the severity of the disease.

6502 BIOCHEMICAL INDICES OF THE CHRONIC PROCESS ACTIVITY IN THE LIVER. (Rus.) Fedyanin, Yu. P. (Dept. Hosp. Therapy, Chita Medical Inst., Chita, USSR). *Klin. Med. (Mosk.)* 55(4):64-68; 1977.

6503 FUNCTIONAL CONDITION OF THE THYROID GLAND AND THYROTROPIC FUNCTION OF THE HYPOPHYSIS IN PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Shlimovich, P. B.; Zus, B. A.; Nikolaeva, A. A. (Dept. Hosp. Therapy, Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Ter. Arkh.* 49(2):75-80; 1977.

See also, 6160, 6184, 6308, 6400, 6402, 6428, 6457, 6457, 6459, 6468, 6474, 6475, 6485.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

6504 ABNORMAL MITOCHONDRIA IN HEPATOCYTES IN HUMAN FATTY LIVER. (Eng.) Petersen, P. (Rigshospitalet, 2100 Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand. [A]* 85(3):413-420; 1977.

Light and electron microscopy of liver biopsies from 30 patients with fatty livers due to alcohol consumption, obesity, or diabetes (overt or latent) were compared with those of liver biopsies from 7 normal control patients. The frequency of hepatocytes containing abnormal mitochondria was significantly ($p<0.02$) higher in patients with fatty liver (16.4%, range 0.6-77.9%) than in controls (1.1%, range 0-3.0%). Hepatocytes containing abnormal mitochondria were found exclusively or predominantly in the periportal area of normal and fatty livers. In normal livers, the frequency of hepatocytes containing abnormal mitochondria was 3.3% (range, 0-7.7%) in the periportal area and 0% in the centrilobular area of the liver ($p<0.01$), while in fatty livers, the corresponding frequencies were 35.8% (range, 1.3-94.0%) and 1.0% (range 0-6.8%), resp. ($p<0.01$). In the periportal area of fatty livers, the frequency of hepatocytes with abnormal mitochondria was again significantly higher ($p<0.01$) than that for normal livers. The occurrence of abnormal mitochondria was not correlated with the degree of steatosis, and the increase in number of abnormal mitochondria was equally high in alcoholics, diabetics, and obese subjects. Electron microscopy of abnormal mitochondria revealed enlarged, irregularly shaped mitochondria that generally contained an increased amount of cristae and always contained paracrystalline inclusions, i.e., parallel-arranged bundles of filamentous-like formations. The higher the frequency of hepatocytes with abnormal mitochondria, the more frequent was the presence of paracrystalline inclusions in the mitochondria. The ultrastructural appearance of the abnormal mitochondria and the periportal localization of hepatocytes containing such mitochondria suggest a hyperfunctioning of mitochondria that may prevent the development of steatosis in these areas.

6505 AMYLASE, HEPATIC ENZYMES AND BILIRUBIN IN SERUM OF CHRONIC ALCOHOLICS. (Eng.)

Skude, G.; Wadstein, J. (Malmo General Hosp., Malmo, Sweden). *Acta. Med. Scand.* 201(1/2):53-58; 1977.

The serum concentration of bilirubin and the activities of aspartate aminotransferase (ASAT, GOT), alanine aminotransferase (ALAT, GPT), γ-glutamyltransferase (GT), total amylase, and pancreatic isoamylase were determined in sera of 182 male chronic alcoholics and 97 male controls. Twelve percent had abnormally high levels of bilirubin, 73% increased activity of S-ASAT, 50% increased S-ALAT, and 69% increased S-GT. The highest values were often found after 5-20 yr of well documented alcoholism. Some patients with alcoholism of more than 20 yr duration displayed a slight tendency towards normalization of the activities. For all parameters, the scatter around the mean was greater in the patients than in the controls. Patients who had had attacks of delirium showed slightly higher S-ASAT and S-ALAT than other alcoholics. Determination of S-ALAT and S-bilirubin did not add to the cases with abnormal laboratory tests, demonstrated by the combination of S-ASAT and S-GT. In 14 patients, the above mentioned parameters were within normal limits, even though severe alcoholism had lasted for many years. Isoamylase determination disclosed 20% to have decreased activity of pancreatic isoamylases in serum, whereas only 6% had low total serum amylase activity.

6506 COMPLICATIONS OF DIURESIS IN THE ALCOHOLIC PATIENT WITH ASCITES: A CONTROLLED TRIAL.

(Eng.) Gregory, P. B.; Broekelschen, P. H.; Hill, M. D.; Lipton, A. B.; Knauer, C. M.; Egger, M.; *et al.* (Stanford Univ. Medical Center, Stanford, CA 94305). *Gastroenterology* 73(3):534-538; 1977.

To determine whether complications arise from diuretic treatment, 43 patients with decompensated alcoholic liver disease and ascites of recent onset were randomized to salt and water restriction alone (controls) or to salt and water restriction plus diuretics (diuresis group). The two treatment groups were comparable in clinical findings and laboratory results. Seven patients in the control group and five patients in the diuresis group died during the acute illness. Weight loss was more marked in the patients given diuretics (24 ± 4 lbs lost versus 6 ± 2 lbs), and the disappearance of ascites was more common in those given diuretics (16/22 versus 4/21). A modest decrease in serum sodium, an increase in serum potassium, and readily reversible elevations of blood urea nitrogen were noted in the diuresis group. Eight patients in each treatment group developed either the hepatorenal syndrome, marked electrolyte abnormalities, or encephalopathy. Diuresis can be accomplished in these critically ill patients without serious complications that can be attributed to the diuretic treatment.

6507 ANTIBIOTIC CONCENTRATIONS IN ASCITIC FLUID OF PATIENTS WITH ASCITES AND BACTERIAL PERITONITIS.

(Eng.) Gerding, D. N.; Hall, W. H.; Scierl, E. A. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *Ann. Intern. Med.* 86(6):708-713; 1977.

To determine the clinical adequacy of systemically administered antibiotics in peritonitis, 35 paired specimens of serum and ascitic fluid from 21 patients with peritonitis and ascites, most with spontaneous bacterial peritonitis and alcoholic cirrhosis, were assayed for antibiotic content after the patients had received i.v., i.m., or p.o. antibiotics. Antibiotics assayed and number of determinations were: gentamicin, 14; tobramycin, 7; ampicillin, 5; clindamycin, 3; penicillin G, 2; cephalothin, 2; chloramphenicol, 2; and cefazolin, 1. In 31 paired specimens, the ascitic fluid antibiotic concentration was about one-half or more of the simultaneous serum level, and in 17, assays exceeded 90% of the serum level. All antibiotics studied penetrated ascitic fluid equally well. Clinical response to antibiotic therapy was good in 12 of 16 patients with culture-proven bacterial peritonitis. Antibiotic levels in ascitic fluid exceeded the minimal inhibitory concentration of the infecting organisms in all but one patient who responded. Direct i.p. instillation of antibiotics does not appear to be necessary routinely; however, there may be an initial lag of several hours before antibiotic concentrations in ascites achieve therapeutic levels.

6508 THE EFFECT OF GLUCAGON ON PLASMA CYCLIC AMP AND GLUCOSE CONCENTRATIONS IN PATIENTS WITH ALCOHOLIC CIRRHOSIS.

(Eng.) Strange, R. C.; Mjos, O. D.; Henden, T.; Jynge, P. (Dept. Clinical Chemistry, Univ. Edinburgh, Edinburgh, Scotland). *Acta Med. Scand.* 202(1/2):87-88; 1977.

The possibility that differences in plasma cyclic AMP or glucose concentrations after the i.v. injection of glucagon can be used to differentiate patients with liver disease from those with a normal liver was investigated in four patients with well-compensated alcoholic cirrhosis and five matched healthy controls. Blood was collected before, during, and 30 min after the i.v. infusion of glucagon (100 ng/kg/min). The plasma glucose concentrations appeared to be higher in the cirrhotic patients, but they were not significantly different from those in the normal subjects at any time. Similarly, the plasma cyclic AMP concentrations were not significantly different in the two groups. The failure to discriminate between healthy controls and cirrhotic patients may partly be explained by the suggestion that diffusible cyclic AMP represents only a small percentage of the total hepatic content of the nucleotide even after enhancement of adenyl cyclase activity by glucagon.

6509 ELEVATED BASAL GROWTH HORMONE LEVELS AND GROWTH HORMONE RESPONSE TO TRH IN ALCOHOLIC PATIENTS WITH CIRRHOSIS.

(Eng.) Zanoboni, A.; Zanoboni-Muciaccia, W. (Istituto di Clinica Medica 4, Padiglione Litta, Universita di Milano, via F. Sforza, 35, 20122 Milano, Italy). *J. Endocrinol. Metab.* 45(3):576-578; 1977.

In an effort to clarify the hormonal derangement frequently seen in men with alcoholic liver disease, the basal plasma growth hormone (GH) level and GH responses after the administration of synthetic thyrotropin releasing hormone (TRH) were studied in nine male alcoholics with cirrhosis. Basal plasma GH levels were elevated in eight cirrhotic patients, the mean level being 8.4 ± 1.4 ng/ml; this level was significantly higher than that in five normal men (2.5 ± 0.9 ng/ml, $p<0.02$). The i.v. administration of TRH (400 µg over 30 min) produced a prompt increase in plasma GH levels, with peak values (13.1 ± 2.0 ng/ml) occurring between 10 and 30 min. The GH concentrations were significantly higher ($p<0.01$) than those of the normal subjects, whose plasma GH was not raised by TRH. The results show that alcoholic cirrhosis, like acromegaly, also induces a GH response to a nonspecific stimulus, TRH.

6510 PLATELET UPTAKE OF OCTOPAMINE AND NOREPINEPHRINE IN HEPATIC ENCEPHALOPATHY.

(Eng.) Morelli, A.; Frintzilas, M.; Zimmon, D. S. (Dept. Medicine, Univ. Perugia, Italy). *Gastroenterology* 73(3):560-564; 1977.

To explore platelets as a model of intracellular amine metabolism in liver disease, platelet uptake of octopamine (OA) was studied in controls and patients with hepatic encephalopathy (HE), and the influence of OA and plasma from patients with HE on platelet norepinephrine uptake was investigated. Normal platelets incubated at 37 C actively accumulated OA. The ratio of platelet OA concentration to plasma concentration was 30:1, and platelet OA uptake was inhibited at reduced temperature; these results suggest uptake by an active process. More than 90% of OA accumulated by platelets was recovered intact after 1 hr. Thrombin released 40% of platelet OA, suggesting sequestration within amine storage granules. OA inhibited the uptake of [^{3}H]norepinephrine by platelets, suggesting that these substances share the same transfer system. Platelets of patients with HE demonstrated decreased uptake of OA and norepinephrine. Inhibition of platelet OA uptake was proportional to the clinical stage of HE. Plasma from patients with HE inhibited norepinephrine uptake by normal platelets. These findings suggest that plasma OA and/or other amines are taken up by platelets where they are protected from degradation. The reduced uptake of OA and norepinephrine by platelets from patients with HE could result from uptake blockade by intraplatelet amines and/or inhibition of platelet amine uptake by plasma amines. The demonstration of altered platelet OA and norepinephrine metabolism in patients with encephalopathy suggest that this model may be useful for the study of intracellular amines in liver disease.

6511 LYMPHOCYTE CYTOTOXICITY IN ALCOHOLIC HEPATITIS.

(Eng.) Kakumu, S.; Leevy, C. M. (Coll. Medicine and Dentistry New Jersey, Newark, NJ 07103). *Gastroenterology* 72(4):594-597; 1977.

The cytotoxicity of peripheral lymphocytes was evaluated in 20 patients with alcoholic hepatitis, 16 alcoholics with a normal liver, 17 patients with fatty liver, 10 with alcoholic-cirrhosis, 9 with chronic active hepatitis, and 4 with rheumatoid arthritis. Lymphocyte cytotoxicity to Chang liver cells was investigated by a microcytotoxicity test, and that to autologous liver cells obtained by percutaneous liver biopsy was studied using a ^{51}Cr release assay. Lymphocytes from patients with alcoholic hepatitis were highly cytotoxic to Chang liver cells and autologous liver cells when compared to those with healthy livers ($p<0.001$). Cell-free supernatant fluid of lymphocytes from patients with alcoholic hepatitis incubated with purified alcoholic hyalin for 5 days was significantly cytotoxic to Chang liver cells ($p<0.01$), indicating that a cytotoxic factor is elaborated by sensitized lymphocytes. A significant reduction in cytotoxicity was noted with disappearance of clinical features or direct addition of a purified isolate of alcoholic hyalin or its preincubation with lymphocytes. Preincubation of sensitized lymphocytes with acetaldehyde increased cytotoxicity for autologous liver beyond that obtained by the combined effects of lymphocytes alone and acetaldehyde alone ($p<0.001$); this indicates that ethanol toxicity and hyperactivity of lymphocytes independently and collectively contribute to development of cirrhosis in patients with alcoholic hepatitis who continue to imbibe alcohol.

6512 ALCOHOLIC HYALIN, MICROFILAMENTS AND MICROTUBULES IN ALCOHOLIC HEPATITIS.

(Eng.) Petersen, P. (Rigshospitalet, 2100 Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand [A]* 85(3):384-394; 1977.

The morphological relationship between alcoholic hyalin fibrils and microfilaments and microtubules in liver parenchymal cells from six patients with biopsy-demonstrated alcoholic hepatitis was investigated using light and electron microscopy. Alcoholic hyalin consisted of light filaments and darker swollen filaments that sometimes formed an amorphous electron-dense core. A highly proliferated rough endoplasmic reticulum (RER), with dilated and frequently invaginated cisternae, surrounded the alcoholic hyalin. The Golgi apparatus was hypertrophied to a high degree. The mitochondria were polymorphous and contained enlarged dark granules in the matrix. Some microtubules were found adjacent to the alcoholic hyalin, occasionally penetrating the hyalin mass. In a few places, microfilaments were in close connection with the light filaments of alcoholic hyalin, and there seemed to be a direct transition between the two types of filaments. Liver cells with only minor alcoholic hyalin content contained a large number of microfilaments in close relationship to or intermingled with microtubules, especially in the region between the proliferated RER and a hypertrophied Golgi complex containing very low density lipoprotein-line particles. These ultrastructural changes in liver cells with a minor amount of alcoholic hyalin may be related to an early stage in the development of alcoholic hyalin. The abundance of microfilaments in liver cells containing very little alcoholic hyalin indicates an increased motility of hepatocytes, which possibly is part of the regenerative processes. The possibility that microfilaments disintegrate and accumulate in the alcoholic hyalin mass is suggested.

6513 ULTRASTRUCTURE OF ALCOHOLIC HYALIN AND FATE OF THE AFFECTED HEPATOCYTES. (Eng.)

Rumpelt, H. J. (Pathologisches Institut der Universitat Mainz, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Virchows Arch.* [*Cell Pathol.*] 23(4): 339-351; 1977.

In liver biopsy specimens, foci of satellitosis (foci of alcoholic hyalin containing hepatocytes surrounded by accumulated WBC) were studied ultrastructurally. Within satellitosis hepatocytes, morphologic variants of alcoholic hyalin similar to those described in nonsatellitosis liver cells were observed. They appeared as clusters of randomly oriented, smooth filaments of homogenous electron density; bundles of filaments aligned in parallel arrays and exhibiting irregular densities and indistinct boundaries; and masses of a strongly osmiophilic amorphous material, presumably lipidic in nature. The individual hyalin body was composed of one, two, or all three components in varying proportions; an uptake by cytosegresomes was never observed. The WBC of satellitosis foci, which were mostly polymorphonuclear without obvious alterations, had close contact to the central hepatocytes and sometimes covered large holes in the hepatocellular plasma membrane. In other cases, hepatocytes and neutrophils were both destroyed, and the hyalin bodies were unaltered within the sinusoids. Alcoholic hyalin may represent an inert proteinaceous storage material, deposited at the site of synthesis, which becomes superimposed by a lipid component. In cases of alcohol-induced hepatocellular lesions, those hepatocytes that produce hyalin bodies may have a special metabolic sensitivity to alcohol; this may result in hyalin synthesis and accumulation, or may, under special conditions, lead to plasma membrane destruction with secondary satellitosis formation.

6514 XENON-133 ACCUMULATION IN HEPATIC STEATOSIS. (Eng.)

Ahmad, M.; Witztum, K. F.; Fletcher, J. W.; Hendershott, L. R.; Klos, D.; George, E. A.; *et al.* (Veterans Admin. Hosp., St. Louis, MO 63125). *J. Nucl. Med.* 18(9):881-885; 1977.

To examine the suggestion that hepatic xenon accumulation might result from increased hepatic fat content, liver ^{133}Xe accumulation was studied in human subjects referred for pulmonary ventilation perfusion study and in paired rat littermates, one group with alcohol-induced fatty liver, and the control fed isocaloric glucose. Xenon accumulation was increased in fatty livers and paralleled the amount of liver fat in the animal experiments; alcohol induced a 23-206% increase in hepatic fat content, in comparison with the paired control littermates. During routine ventilation studies in 42 patients, hepatic xenon accumulation and retention were correlated with alcoholic drinking history and hepatic function studies. Of 15 patients without xenon accumulation, 1 had a drinking history. Hepatic xenon retention was graded visually on a scale of 0 to 4+; no activity discernible in the hepatic area at any time was graded 0, and activity comparable to the greatest intensity in the lung, in the liver at the end of the 10-min "washout phase" was graded 4+. Of 13 patients with 1+ hepatic xenon, 5 had a drinking history, 3 were diabetic, 2 were obese, and 2 had elevated lipid levels. Of six patients with 2+ hepatic xenon, four had a drinking history, one had no drinking history recorded, and one was diabetic; two had abnormal liver function studies. All five patients with 3+ hepatic xenon had a drinking history and abnormal liver function. Of three patients with 4+ hepatic xenon, two had a drinking history and abnormal liver function; the other was an obese diabetic. There was a parallel between the degree of hepatic xenon accumulation and the degree of suspected alcoholic fatty infiltration or diabetes determined from the clinical data. These results suggest the possible utility of hepatic radioxenon accumulation as a diagnostic test for fatty infiltration of the liver.

6515 BIOCHEMICAL BASIS OF THE EFFECT OF ALCOHOL.

(Dut.) Fevery, J. (Dept. Medische Navorsing, Inwendige Ziekten, A.Z. St.-Rafael, Leuven, Belgium). *Tijdschr. Gastroenterol.* 19(2):71-90; 1976.

6516 ACUTE ALCOHOLIC HEPATITIS. (Fre.)

Michel, H. (Hopital Saint-Eloi, F 34059 Montpellier, France). *Gastroenterol. Clin. Biol.* 1(1):77-85; 1977.

See also, 6082, 6401, 6601.

LIVER AND BILIARY TRACT

Cirrhosis

6517 QUANTITATIVE A-SCAN ANALYSIS OF NORMAL AND CIRRHOTIC LIVER. (Eng.) Wells, P. N. T.; Mountford, R. A.; Halliwell, M.; Atkinson, P. *In: Proceedings of Seminar on Ultrasonic Tissue Characterization Held at the National Bureau of Standards, Gaithersburg, MD, May 28-30, 1975. National Bureau of Standards.* (Washington, DC):pp. 61-70; 1976.

The development of quantitative methods of analyzing ultrasonic liver scans, and the results of such scans in normal and cirrhotic liver, are reviewed. These methods are based on measurements of intrahepatic echo amplitudes or echo spacings. The echo amplitude tends to be increased in cirrhosis. Using a frequency of approximately 1-5 MHz, this tendency was confirmed by computer analysis of the measurements of 100 consecutive cycles of the ultrasonic echo wavetrains in each of 30 separate scans from each of 30 individuals with normal livers, and 13 patients with cirrhosis. These data were acquired manually. In cirrhotics, the mean echo amplitude was 6 decibels greater than in normals. Similar results were obtained with an automated system of data acquisition. The results are compatible with a model in which the observed structure is a random noise effect; the dimensions of the pulse determine the scale of the fluctuation which is observed. The echoes from cirrhotic liver, higher in amplitude but otherwise very similar to those from the normal liver, could be due to similar targets with greater characteristic impedance mismatches.

6518 PORTAL PRESSURE MEASUREMENTS DURING ARTERIAL VASOPRESSIN INFUSIONS. (Eng.) Nusbaum, M. (Graduate Hosp., Univ. Pennsylvania, Philadelphia, PA). *Chir. Gastroenterol.* 11(1):153-156; 1977.

Data concerning portal pressure during vasopressin infusion are reviewed. Data in 30 patients in whom direct portal or wedged hepatic vein pressure measurements were carried out before and during the intraarterial infusion of vasopressin demonstrate a variable change in portal pressure despite control of bleeding esophageal varices. Eight-six percent of nonbleeding patients showed a decrease in portal pressure during vasopressin infusion in the superior mesenteric artery, whereas only 50% showed a similar decrease during active variceal hemorrhage. In eight patients, there was no measured change in portal pressure with vasopressin infusion, despite cessation of hemorrhage in seven. A compensatory increase in hepatic artery flow and esophageal smooth muscle contraction produced by vasopressin may explain these results. Of 50 patients with esophageal varices managed by the intraarterial infusion of vasopressin, 24% developed significant complications.

6519 PRESENTATION AND COURSE OF ASYMPTOMATIC PRIMARY BILIARY CIRRHOSIS. (Eng.) Long, R. G.; Scheuer, P. J.; Sherlock, S. (Royal Free Hosp., Pond St., London, NW3 2QG, England). *Gastroenterology* 72(6):1204-1207; 1977.

The cases of twenty patients with asymptomatic primary biliary cirrhosis who have been followed 2-11 yr are described. In every patient, liver histology was diagnostic of, suggestive of, or compatible with the diagnosis. Eighteen patients had a positive serum mitochondrial antibody, 18 had raised serum IgM, and 17 had markedly raised serum alkaline phosphatase values. A mean of 4.5 yr after diagnosis, 10 patients had not developed hepatobiliary symptoms; 4 of these patients have survived 6-10 yr. Ten patients developed symptoms after a mean of 2.2 yr; seven are still alive, but three have died of liver failure. The development of symptoms could not be predicted by either serum biochemical tests or hepatic histology. It is concluded that the diagnosis of asymptomatic primary biliary cirrhosis is compatible with 10 or more asymptomatic years.

6520 JEJUNAL MICROFLORA IN PATIENTS WITH LIVER CIRRHOSIS. (Eng.) Portela-Gomes, G.; Pinto-Correia, J.; Dantas, R.; Pires, I. R.; Laranjeira, M. R.; Figueiredo, A. (Univ. Hosp. Santa Maria, Av. Prof. Egas Moniz, Lisbon 4, Portugal). *Arq. Gastroenterol.* 14(2):72-75; 1977.

The bacteriology of the jejunal fluid was studied in 10 patients with liver cirrhosis and 5 controls. Controls had no Gram-negative aerobic microorganisms, but Gram-positive aerobic bacteria were found in counts near 10^2/ml and anaerobes up to 10^7/ml. Gram-positive aerobic bacteria up to 10^3/ml were found in the cirrhotic patients, and Gram-negative aerobic organisms were found in one case. Eight cirrhotic patients showed several anaerobic bacteria, up to 10^6. There was no significant difference between the bacteriological data of patients with liver cirrhosis and control subjects.

6521 RADIOIMMUNOASSAY OF SERUM BILE ACID LEVELS IN BIOPSY-PROVED CIRRHOSIS. (Eng.) Dasher, C. A.; Hirschowitz, B. I.; Spenney, J. G.; Gibson, R. G.; Mihas, A. A. (Univ. Alabama Medical Center, Univ. Station, Birmingham, AL 35294). *South Med. J.* 70(8):968-969, 973; 1977.

Serum bile acid levels were determined by a radioimmunoassay for conjugates of cholic acid in 18 patients with biopsy-proved cirrhosis, and the results were compared with those of conventional liver function tests. Serum bile acid levels were abnormal in all 18 patients, whereas the results of the other tests were abnormal in only 50% to 72% of patients. In patients with a well established diagnosis of cirrhosis, serum bile acid levels are a more sensitive indicator of liver dysfunction than standard liver function tests.

6522 DEFICIENCY OF CARNITINE IN CACHECTIC CIRRHOTIC PATIENTS. (Eng.) Rudman, D.; Sewell, C. W.; Ansley, J. D. (Emory Univ. Hosp., Atlanta, GA 30322). *J. Clin. Invest.* 60(3):716-723; 1977.

Because protein deficiency is common in the hospital population, the possible occurrence of nosocomial carnitine deficiency was investigated. Fasting serum carnitine concentration was measured in 16 normal subjects and 247 hospital patients in 16 disease groups. The normal range of carnitine was 55-103 μM. Only the cirrhotic group showed significant ($p<0.05$) hypocarnitinemia. Fourteen of 36 hospitalized cirrhotics had subnormal values for serum carnitine. The creatinine/height index, midarm muscle circumference, and triceps skin-fold thickness indicated protein-calorie starvation in the 14 hypocarnitinemic liver patients. In six of the hypocarnitinemic cirrhotics (average serum level 50% of normal), spontaneous dietary intakes of carnitine, lysine, and methionine were only 5-15% as great as in six normocarnitinemic, healthy controls. When these six cirrhotic and six normal subjects were given the same lysine-rich (3,200-3,400 mg/day), methionine-rich (2,000-2,200 mg/day), and carnitine-free (<10 μmol/day) nutritional intake, the normals maintained normal serum carnitine levels and excreted 100 μmol/day. The cirrhotics' serum level fell to 25% of normal, and urinary excretion declined to 15 μmol/day. Seven hypocarnitinemic cirrhotics died. Postmortem concentrations of carnitine in liver, muscle, heart, kidney, and brain averaged only one-fourth to one-third those in corresponding tissues of eight normally nourished nonhepatic patients who died after an acute illness of a 1-3 day duration. These data show that carnitine depletion is common in patients hospitalized for advanced cirrhosis, and that it results from three factors: substandard intake of dietary carnitine, substandard intake of lysine and methionine (the precursors for endogenous carnitine synthesis), and loss of capacity to synthesize carnitine from lysine and methionine.

6523 BILE ACID CONCENTRATIONS IN SYSTEMIC AND PORTAL SERUM IN PRESUMABLY NORMAL MAN AND IN CHOLESTATIC AND CIRRHOTIC CONDITIONS. (Eng.) Lindblad, L.; Lundholm, K.; Schersten, T. (Dept. Surgery, Sahlgrenska sjukhuset, Univ. Goteborg, Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(4):395-400; 1977.

Total bile acid concentration was determined in systemic and portal serum and in liver tissue from patients with normal liver function (control group, 43 patients) and from patients with extrahepatic cholestasis (22 patients) and portal cirrhosis (13 patients). In five patients, in whom a portal catheter was inserted through the umbilical vein, the diurnal variation in systemic and portal serum bile acid concentration was studied. In control patients, the fasting systemic serum bile acid concentration was 4.8 ± 0.5 μM, and the portal concentration was 12.9 ± 1.5 μM. In extrahepatic cholestasis, the bile acid concentration was significantly higher in both systemic (42.9 ± 9.1 μM) and portal serum (47.8 ± 9.2 μM) than corresponding values in cirrhosis (21.0 ± 4.4 and 20.1 ± 3.6 μM, $p<0.001$ and $p<0.05$, resp.). The bile acid concentration gradient between systemic serum, portal serum, liver tissue, and hepatic bile was 1:3:80:2,600 in the patients with normal liver function. In both the cholestatic and cirrhotic conditions, the systemic and portal serum bile acid concentrations were equilibrated. The bile acid concentration increased postprandially in systemic and portal serum, but the gradient between these concentrations was unchanged. It is suggested that portal and systemic serum bile acid concentrations are determined by the intestinal absorption rate in subjects with normal liver function and by the hepatic and renal clearance capacity in cholestatic and cirrhotic conditions.

6524 ANTIHAEMOPHILIC FACTOR A ACTIVITY, F VIII-RELATED ANTIGEN AND VON WILLEBRAND FACTOR IN HEPATIC CIRRHOSIS. (Eng.) Baele, G.; Matthijs, E.; Barbier, F. (Dept. Internal Medicine, Akademisch Ziekenhuis, De Pintelaan 135, B-9000 Ghent, Belgium). *Acta Haematol. (Basel)* 57(5):290-297; 1977.

Antihemophilic factor A (F VIII) activity, F VIII-related antigen (F VIII RA), and von Willebrand factor were measured in 46 patients with hepatic cirrhosis and in 30 normal controls. All three parameters were significantly higher in patients with hepatic cirrhosis than in controls. The mean values of F VIII activity, F VIII RA, and von Willebrand factor were 3.35 U/ml, 5.42 U/ml, and 4.29 U/ml, resp., for cirrhotics and 0.88 U/ml, 0.80 U/ml, and 0.78 U/ml, resp., for controls. In cirrhotics, F VIII activity was significantly lower than F VIII RA ($p<0.001$). These increases were found in decompensated as well as in compensated hepatic cirrhosis; no differences in F VIII activity, F VIII RA, or von Willebrand factor were noted according to the etiology of the cirrhosis. A significant correlation between F VIII activity and F VIII RA was found in cirrhotics ($r=0.5$, $p<0.001$), as well as in controls ($r=0.458$, $p<0.02$). A linear relationship between F VIII RA and von Willebrand factor was found in both cirrhotics ($r=0.338$, $p<0.01$) and in controls ($r=0.719$, $p<0.01$). However, in both groups, no relationship between F VIII activity and von Willebrand factor was noted. Although the existence of a low-grade intravascular coagulation in hepatic cirrhosis may be postulated, more information about the metabolism of F VIII protein is needed before it can be proven.

6525 SERUM GLYCOPROTEINS IN THE LIVER DISEASES. IV. ALPHA-1 ACID GLYCOPROTEIN LEVEL IN LIVER CIRRHOSIS. (Eng.) Arima, T.; Motoyama, Y.; Yamamoto, T.; Nagata, K.; Kondo, T. (Okayama Univ. Medical Sch., Okayama, 700 Japan). *Gastroenterol. Jpn.* 12(2):43-46; 1977.

Circulating alpha-1 acid glycoprotein (AGP) level was determined by radioimmunoassay in 27 cirrhotic patients, 11 patients with chronic active hepatitis with sublobular necrosis, and 10 normal subjects. The AGP levels in liver cirrhosis (49.3 ± 14.5 mg/dl) and in chronic active hepatitis with sublobular necrosis (63.3 ± 25.8 mg/dl) were significantly lower than those in normal subjects (90.4 ± 12.5 mg/dl; $p < 0.001$ and $p < 0.02$ for cirrhosis and hepatitis, resp.). In liver cirrhosis, the serum AGP level correlated negatively with the serum albumin concentration ($r = -0.612$, $p < 0.01$).

6526 CIRCADIAN STUDY OF IMMUNOREACTIVE PROLACTIN IN PATIENTS WITH CIRRHOSIS OF THE LIVER.

(Eng.) Tarquini, B.; Gheri, R.; Anichini, P.; Neri, B.; Buricchi, L. (Istituto di Semeiotica Medica, Villa Monna Tessa, Viale Pieraccini 18, 50139 Firenze, Italy). *Gastroenterology* 73(1):116-119; 1977.

The pattern of immunoreactive prolactin secretion over 24 hr in 7 patients with liver cirrhosis was studied and compared to that of 21 healthy controls. The results were analyzed by use of chronograms and by mean cosinor. Although the daily mean average secretion of serum prolactin by the cirrhotics was not different from that of the control subjects utilizing the standard *t*-test, cosinor analysis of the data failed to demonstrate a circadian rhythm for prolactin secretion in the cirrhotics. This loss of circadian rhythm provides a possible mechanism for the loss of the circadian rhythm of sodium excretion in cirrhotic patients. In addition, the observed prolactin dischronia may account for some other clinical observations (gynecomastia, hypogonadism, fluid balance problems) frequently observed in patients with advanced liver diseases.

6527 SPIRONOLACTONE METABOLISM IN NORMAL SUBJECTS AND IN PATIENTS WITH LIVER CIRRHOSIS.

(Eng.) Varadi, A.; Feher, T.; Bodrogi, L.; Koref, O. (Semmelweis Univ. Medical Sch., Koranyi S. u. 2/A, H-1083 Budapest, Hungary). *Arzneim. Forsch.* 27(8):1618-1620; 1977.

The dynamic excretion of aldadiene, the principal metabolite of spironolactone with biological activity, was studied in 37 controls and in 9 patients with liver cirrhosis following the administration of spironolactone. Aldadiene appeared in the 3-day urine collection, at approximately 3% of the dose. There was no significant difference in the biological half-life, calculated from the urinary pattern, and in the rate of excretion in patients with hepatopathy and the 22 hospitalized controls. Fifteen nonhospitalized controls exhibited the most rapid elimination of the metabolite. Increasing the spironolactone dose from 50 mg to 200 mg enhanced the percent rate of aldadiene excretion, while the biological half-life did not change. Spironolactone decreased the rate of dehydroepiandrosterone and androsterone excretion, even after a single dose. Determination of total 17-ketosteroids is of no value in the evaluation of adrenal function during spironolactone therapy, because the spironolactone metabolites were positive in the Zimmermann test.

6528 ARTHRITIS AND PRIMARY BILIARY CIRRHOSIS.

(Eng.) Child, D. L.; Mathews, J. A.; Thompson, R. P. H. (St. Thomas' Hosp., London SE1 7EH, England). *Br. Med. J.* 2(6086):557; 1977.

The cases of five patients with appreciable arthritic lesions and circulating rheumatoid factor in association with primary biliary cirrhosis are presented. The severity of the arthritic symptoms of the patients and the histological evidence for primary biliary cirrhosis varied, and the two aspects were generally inversely related. Serological results were positive for rheumatoid factor in all patients, and two patients fulfilled the criteria for "definite" rheumatoid arthritis. One of these two patients had severe systemic involvement compatible with rheumatoid disease; articular erosions and nodules were present in the other patient and in an additional patient. Only one of the five patients had hypercholesterolemia. The joint fluid from this patient contained free cholesterol crystals. There were periportal granulomatous changes in the liver biopsy specimens from two patients, and that from a third patient showed abnormal proliferating bile ductules.

6529 DIAGNOSTIC ASPECTS OF NEONATAL ASCITES: REPORT OF 27 CASES.

(Eng.) Griscom, N. T.; Colodny, A. H.; Rosenbert, H. K.; Fliegel, C. P.; Hardy, B. E. (Children's Hosp. Medical Center, Boston, MA 02115). *Am. J. Roentgenol.* 128(6):961-970; 1977.

Data from 27 live-born neonates with ascites were reviewed to analyze the causes and frequency of neonatal ascites. Seven neonates presented with urinary ascites, five had bowel disease, three had cardiac arrhythmias, two had liver disease, and one each had toxoplasmosis, ovarian cyst, and chylous ascites. Ileal perforation was identified as the cause of neonatal ascites in four infants, one infant had ileal atresia, and another had ileal volvulous and cystic fibrosis. Ileal duplication and perforation were found in one infant, and ileal perforation of uncertain origin was present in another infant. There was one case each of ascites caused by intestinal malrotation, volvulus, and ischemia; familial cirrhosis; and probable hepatitis. A protocol for the differential diagnosis of neonata ascites is presented that includes a physical examination, a planned sequence of radiological examinations, and paracentesis for fluid analysis.

6530 DETECTION OF ENDOTOXIN IN PLASMA AND ASCITIC FLUID OF PATIENTS WITH CIRRHOSIS: ITS CLINICAL SIGNIFICANCE.

(Eng.) Tarao, K.; So, K.; Moroi, T.; Ikeuchi, T.; Suyama, T.; Endo, O.; Fukushima, K. (Dept. Internal Medicine, Yokohama City Univ., 1197 Tomioka-machi, Kanazawa-ku, Yokohama 236, Japan). *Gastroenterology* 73(3):539-542; 1977.

Because of the frequency with which endotoxemia occurs in chronic liver disease, endotoxin was measured by the Limulus assay in plasma and ascites in 46 patients with cirrhosis having demonstrable esophageal varices (29/46 had ascites). The assay was positive in ascitic fluid in 23 of the cirrhotic patients with ascites. In plasma, a positive test was obtained in 22 in the group with ascites and in only 4 without ascites ($p < 0.01$). Of the 23 positive ascites specimens, 17 showed high titers ($\geq 10^{-3}$ μg/ml) of endotoxins. Hepatic uptake of ^{198}Au colloid was markedly reduced in 11 of the 17 patients with endotoxemia who were studied by scanning. Death occurred within 6 months in 47.8% of the patients with a positive endotoxin test, whereas only 16.7% of those with a negative test died in the same period ($p < 0.05$). No hypotension was noted in patients with toxemia and only two ran a fever above 37.5 C. Development of tolerance to endotoxin is suspected. A follow-up study has demonstrated sustained endotoxemia in some of these patients.

6531 CLINICAL EXPERIENCE WITH AUTOGENOUS ASCITIC FLUID INFUSION FOR CIRRHOTIC ASCITES. (Eng.) Graziano, J. L.; Reinhardt, G. F.; Howell, H. S.; Hacker, L. C.; Stanley, M. M. (Veterans Admin. Hosp., Hines, IL 60141). *Am. Surg.* 43(8):520-523; 1977.

Experience with autogenous ascitic fluid infusion in the treatment of 24 cirrhotic patients with intractable massive ascites is reported. All patients were men (aged 41-66 yr) diagnosed as having advanced nutritional cirrhosis, disabling ascites, and oliguria. An outflow catheter is placed through the abdominal wall lateral to the rectus sheath below the level of the umbilicus. This outflow catheter is then allowed to drain the ascites into a system of paired, closed sterile bags that are alternately used to infuse the ascites into a central vein. Infusion of ascites is continued at rates ranging from 250-1,000 ml/hr, depending upon the patient's tolerance to infusion. The average volume of ascites infused in the 24 patients was 18.4 l, and the duration of infusion averaged 3.8 days. The effects of ascitic infusion were well tolerated, and there was no mortality either during the infusion or during the subsequent 2-week interval. The average postinfusion weight loss was 11.4 kg. The average abdominal girth decreased 11.2 cm following infusion. The central venous pressure increased an average of 5.9 cm H_2O, and the urinary output during infusion averaged 10.9 l. The hematocrit dropped an average of 2.5%, the serum sodium decreased 0.4 mEq/l, and the serum urea decreased 1.9 mg/100 ml. The serum bilirubin level did not change, but the serum ammonia dropped an average of 21.3 μg/100 ml. Among 18 patients who were nonoperative candidates, 10 died 6 months after infusion due to complications of advanced liver disease. Of the eight others, four were free of ascites during this period. Among five patients who underwent portal decompressive surgery, all were alive 6 months after infusion without evidence of clinical ascites. The remaining operative patient died of hepatoma. Autogenous ascitic fluid infusion, using an alternating bag technique, is a safe and practical method to treat patients with advanced liver cirrhosis complicated by massive ascites.

6532 RENAL FAILURE ASSOCIATED WITH DEMECLOCYCLINE IN CIRRHOSIS. (Eng.) Carrilho, F.; Bosch, J.; Arroyo, V.; Mas, A.; Viver, J.; Rodes, J. (Hospital Clinico y Provincial, Casanova 143, Barcelona-11, Spain). *Ann. Intern. Med.* 87(2):195-197; 1977.

The effects of demeclocycline on renal function were studied in three patients with cirrhosis, ascites, and dilutional hyponatremia. The patients were treated with demeclocycline (600-900 mg/day, 8-9 days, p.o.) in an attempt to correct abnormal water retention. Demeclocycline administration resulted in (a) increased blood urea nitrogen and plasma creatinine concentrations, (b) reduction of inulin clearance by 63-78% and of para-aminohippurate clearance by 36-77%, and (c) an impairment of the renal concentrating ability. Urine osmolality decreased to hypotonic levels, but polyuria did not appear, probably because it was prevented by the reduction of the glomerular filtration rate. Renal failure was reversible when demeclocycline was withdrawn. No causes other than demeclocycline administration could be found to explain the reduction of the glomerular filtration rate and the estimated renal plasma flow.

6533 FAMILIAL PORTAL HYPERTENSION. (Pol.) Gacyk, W.; Celinska, W.; Klimkiewicz, E.; Dybicki, J. (Clinic General Surgery, Gdansk Inst. Surgery, Gdansk, Poland). *Wiad. Lek.* 30(12):969-971; 1977.

A case history of a deaf-mute girl with portal hypertension is presented. Although the patient had repeated hemorrhage from the esophageal varicose nodes and enlarged spleen and liver, she did not show the symptoms of liver dysfunction. Two brothers of the patient died of hemorrhage from the varicose nodes, and the third brother has enlarged liver and spleen. The patient underwent central splenorenal anastomosis, and 3 yr later was in good health and hemorrhage-free.

6534 LIGATION OF THE SPLENIC ARTERY IN PORTAL HYPERTENSION. (Rus.) Sazonov, A. M.; Ender, L. A.; Rodimin, V. V. (Dept. Clinical Surgery, Moscow Oblast Scientific Res. Clinical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (3):54-58; 1977.

The results of splenic artery ligation in 24 patients with portal hypertension syndrome are presented. Included were 12 patients resistant to the conservative treatment for ascites, 10 with hemorrhage from varicose esophageal veins, and 2 patients with varicose esophageal veins without hemorrhage or ascites. Of 12 patients with ascites, 3 died immediately after surgery, and 1 died 6 months after surgery; 8 patients showed improvement. Of 10 patients with hemorrhage (8 had cirrhosis and 2 had subhepatic block of portal circulation), 1 patient died 3 months after ligation, and 2 had recurrences of the hemorrhage (2 yr and 4 yr after surgery, resp.). Both patients with varicose esophageal veins had intrahepatic block of portal circulation; ligation of the splenic artery reduced portal pressure. They were alive and in satisfactory condition 1 and 3 yr, resp., after surgery.

6535 LONG-TERM RESULTS OF SPLENIC ARTERY LIGATION FOR PORTAL HYPERTENSION. (Rus.)

Zubarev, P. N. (S. M. Kirov Military-Medical Acad., Leningrad, USSR). *Vestn. Khir.* (6):47-50; 1977.

The efficacy of splenic artery ligation for the treatment of portal hypertension was evaluated in 17 patients with cirrhosis and in 18 patients with extrahepatic portal hypertension without cirrhosis. Indications for ligation were hemorrhage (16 patients), hypersplenism (10), and ascites (3); six patients had several indications for surgery. Within 8 days to 2 months of ligation, five patients with cirrhosis died (3 of hepatic insufficiency, and 2 of peritonitis); six patients with cirrhosis died within 1-4 yr of surgery (4 of hemorrhage), and six patients were alive for 11, 10, 8, 4, 3, and 2 yr, resp. Of 18 patients with extrahepatic portal hypertension, 2 died of recurrent hemorrhage within 2-5 yr, and 1 died 2 yr 3 months later of diffuse peritonitis; only 3 patients were hemorrhage-free for 1-2 yr. Splenic artery ligation resulted in a decrease of splenic size in 18 surviving patients and in a decrease of portal tension.

6536 EFFECT OF D-PENICILLAMINE ON COPPER RETENTION IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS. (Eng.)

Deering, T. B.; Dickson, E. R.; Fleming, C. R.; Geall, M. G.; McCall, J. T.; Baggenstoss, A. H. (Mayo Clinic, 200 First St. S.W., Rochester, MN 55901). *Gastroenterology* 72(6):1208-1212; 1977.

As part of a double blind, randomized trial evaluating D-penicillamine in primary biliary cirrhosis, urinary copper excretion and hepatic copper concentration were monitored during the 1st year of therapy in 46 patients with cirrhosis. The retention of copper in primary biliary cirrhosis was confirmed by abnormally high levels of copper in almost all patients before treatment. The hepatic copper was elevated (>35 μg/g dry weight) in 43 of 45 patients, the urinary copper was elevated (>45 μg/24 hr) in 42 of 46, and the ceruloplasmin was elevated (>43 mg/dl) in all 46. Urinary copper excretion correlated with the hepatic copper concentration ($r = 0.68$, $p \leq 0.001$). No significant correlation occurred between hepatic copper and ceruloplasmin. Hepatic copper concentrations greater than 400 μg/g of dry weight were found almost exclusively in patients with advanced histological disease ($p \leq 0.01$). Therapy with D-penicillamine (250 mg/day, p.o., increased stepwise to 1 g/day, p.o., over a 4-week period) and a low copper diet sustained increased urinary copper excretion for 1 yr in almost all patients ($p \leq 0.001$). Among patients taking placebo, the median hepatic copper concentration increased 13 μg/g of dry weight after 1 yr. In contrast, among the patients taking D-penicillamine, the median hepatic copper concentration decreased 99 μg/g of dry weight ($p \leq 0.02$). Continued observation of this therapeutic trial may help to clarify the relationship of copper retention and liver injury in primary biliary cirrhosis.

6537 CIRRHOTIC PLEURAL EFFUSION IN THE ABSENCE OF ASCITES. (Eng.)

Singer, J. A.; Kaplan, M. M.; Katz, R. L. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Gastroenterology* 73(3):575-577; 1977.

The case of a patient with cirrhotic pleural effusion in the absence of ascites and other stigmata of chronic liver disease is presented. The patient, a 61-yr-old woman, presented with increasing dyspnea and a 1-month history of ankle edema. A chest x-ray demonstrated a large right pleural effusion with a shift of the mediastinum to the left. The SGOT level was 71 IU, SGPT 36 IU, alkaline phosphatase 4.0 Bodansky U, and total bilirubin 1.6 mg/100 ml. Pleural fluid was drained at a rate of 3.0 l/day; this fluid became transiently bloody. The patient became lethargic, and asterixis was noted; her mental status improved with treatment for hepatic encephalopathy. A liver scan revealed hepatosplenomegaly, and a liver biopsy revealed postnecrotic cirrhosis. An abdominal echo revealed no ascites. The pleural effusion cleared over several weeks with salt restriction and diuretic therapy; however, a recurrent effusion 3-4 months later failed to respond to medical therapy. Ascites were again absent. She developed symptomatic hyponatremia, requiring the administration of hypertonic saline; this led to the appearance of ascites for the first time. At autopsy there was approximately 200 ml of ascitic fluid that readily flowed through a 1-mm hole in the tendinous portion of the right hemidiaphragm when the body was tilted. The lack of acute or chronic inflammation and the absence of hemosiderin in the connective tissue adjacent to the defect suggested that local trauma did not play a role in its production.

6538 PERCUTANEOUS TRANSHEPATIC CATHETERIZATION OF THE PORTAL VEIN FOR THE STUDY OF PORTAL HEMODYNAMICS AND SHUNTS: A PRELIMINARY REPORT. (Eng.)

Okuda, K.; Suzuki, K.; Musha, H.; Arimizu, N. (Chiba Univ. Hosp., Chiba, Japan 280). *Gastroenterology* 73(2):279-284; 1977.

A technique for catheterizing the portal vein transhepatically, based on the authors' method for percutaneous transhepatic cholangiography, is described, and its use in 21 patients with hepatic cirrhosis, 4 with idiopathic portal hypertension, 2 with hepatic steatosis, 2 with chronic hepatitis, and 1 with drug-induced cholestatic hepatitis is reported. Using this technique, quantitation of the intrahepatic shunt and extrahepatic shunt from the splenoportal axis is possible. It involves injection of ^{99m}Tc-macroaggregated albumin into the splenic vein at the splenic hilum and injection of ^{131}I-macroaggregated albumin into the portal trunk, followed by differential counting over predetermined areas of the liver and lungs. Catheterization was successful in 20 of the 30 patients. The intrahepatic shunt indices varied from 1.0 to 78.4% and the extrahepatic shunt indices ranged from 0 to 49.9%. These values appeared to correlate closely with the size of collaterals opacified by portography.

6539 ISOLATED CIRRHOSIS OF LEFT LIVER LOBE. (Rus.) Kuzin, A. I. (Rostov Medical Inst., USSR). *Khirurgiia* (7):133-135; 1977.

See also, 6160, 6308, 6400, 6401, 6402, 6412, 6416, 6417, 6428, 6453, 6461, 6496, 6497, 6499, 6502, 6503.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

6540 ENDOTOXIN AND BACTERIA IN PORTAL BLOOD. (Eng.) Jacob, A. I.; Goldberg, P. K.; Bloom, N.; Degenshein, G. A.; Kozinn, P. J. (Maimonides Medical Center, 4802 10th Ave., Brooklyn, NY 11219). *Gastroenterology* 72(6):1268-1270; 1977.

To determine whether endotoxin is normally found in the portal system, intraoperative samples of portal and peripheral blood were drawn from 34 consecutive elective abdominal surgery patients. The limulus lysate test was used to detect endotoxin. Twenty-four patients had samples of portal and systemic blood taken just before the conclusion of surgery; 10 patients had samples taken at the beginning of surgery, before any manipulation of the bowel. Ninety-seven percent of all patients had a positive limulus test in portal blood. Twelve of these patients were tested for portal bacteremia, and only one showed growth. Four patients also had systemic endotoxemia; three of these had liver disease, and one had a gram-negative sepsis. This study demonstrates that endotoxin is a normal constituent of portal venous blood in man and does not represent a pathological process. It is suggested that the Kupffer cells of the liver normally protect the systemic circulation from endotoxin, and that endotoxin is present in systemic blood only when liver function is impaired or gram-negative bacteremia is present.

6541 STUDIES ON THE BIOSYNTHESIS OF ALBUMIN AND PROTEINS IN HUMAN LIVER TISSUE. (Eng.) Lundholm, K.; Schersten, T.; Lindstedt, G.; Lundberg, P. A. (Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *Eur. J. Clin. Invest.* 7(4): 275-282; 1977.

Human hepatic albumin and protein biosyntheses were studied by determining the incorporation rate of leucine into albumin and the incorporation rate of leucine into hepatic proteins in liver slices. Leucine was linearly incorporated into hepatic tissue albumin, into albumin released into the incubation medium, and into hepatic proteins during 4 hr incubation. Amino acids stimulated the albumin and hepatic protein synthesis *in vitro* and *in vivo*. The incorporation rate of leucine into hepatic albumin and tissue proteins was correlated with hepatic RNA concentration. In 21 experiments, the mean incorporation rate of leucine into hepatic tissue immunoreactive albumin was 5.1 ± 0.6 μmol/leucine/hr/g albumin and 0.87 ± 0.17 μmol leucine/hr/g albumin into albumin released to the incubation medium. By crossed immunoelectrophoresis, the hepatic immunoreactive albumin could be partly resolved into two components, one of which migrated at the same rate and the other at a lower rate than serum albumin. Treatment of the slowly migrating component with a low concentration of trypsin (0.2 μg/100 μg of fraction) changed its mobility to that of serum albumin. Gel filtration through Sephadex G-100 of the slowly migrating fraction showed that it had a molecular size similar to that of serum albumin. The results support the hypothesis that human hepatic albumin biosynthesis involves a polypeptide precursor similar to that described for the rat liver.

6542 PHARMACOLOGY OF CHENODEOXYCHOLIC ACID. II. ABSORPTION AND METABOLISM. (Eng.) van Berge-Henegouwen, G. P.; Hofmann, A. F. (St. Radboud Hosp., Nijmegen, Netherlands). *Gastroenterology* 73(2):300-309; 1977.

The absorption and metabolism of chenodeoxycholic (chenic acid) were studied in healthy volunteers and gallstone patients on maintenance therapy with chenic acid for gallstone dissolution. Preliminary studies in two healthy subjects showed that chenic acid was completely absorbed in doses up to 400 mg when infused as a micellar solution into the jejunum. The increase in levels of unconjugated chenic acid in peripheral blood was directly proportional to dose, i.e., that a constant fraction of the administered dose appeared in peripheral blood, indicating that hepatic fractional clearance was constant in doses up to 400 mg. A preparation of ^{3}H-chenic acid (250 mg, p.o.) was completely absorbed. To test the bioavailability of the eight commercial preparations, 400 mg of a given preparation was mixed with 40 mg of ^{3}H-chenic acid. Radioactivity and unconjugated chenic acid, determined by gas-liquid chromatography, were measured in peripheral blood, and the ratio of mass to radioactivity was used to calculate absolute bioavailability. All preparations were completely absorbed, with the exception of one sample, which consisted of large crystals; after milling, this preparation was also completely absorbed. First-pass clearance was determined by comparing the integrals of the plasma concentration time curve after i.v. administered ^{14}C-chenic acid with those after simultaneous p.o. ingestion of ^{3}H-chenic acid; it averaged 62%. Chenic acid was completely absorbed in gallstone patients on maintenance chenic acid therapy, irrespective of whether the agent was ingested during fasting, with meals, or 1 hr after a meal. After ingestion of ^{3}H-chenic acid, all radioactivity in peripheral blood had the chromatographic behavior of unconjugated chenic acid, suggesting that no biotransformation occurred during intestinal absorption. Chenic acid, administered i.v., was promptly excreted in bile as its glycine and taurine conjugates. These studies indicate that chenic acid, if sufficiently small in particle size, is rapidly and completely absorbed, efficiently extracted by the liver, and excreted in bile as chenodeoxycholyl conjugates.

6543 INORGANIC PHOSPHORUS IN HUMAN BILE. (Eng.)

Sutor, D. J.; Wilkie, L. I. (Dept. Chemistry, Univ. Coll., Gower St., London WC1E 6BT, England). *Clin. Chim. Acta* 77(1):31-36; 1977.

Inorganic phosphorus (Pi) concentration was measured in fresh bile from patients undergoing cholecystectomy, usually because of cholelithiasis. Common duct bile Pi was significantly greater ($p<0.01$) for patients with cholesterol on the stone surface (0.45 ± 0.03 mM; range, 0.17-0.90 mM) than for patients with some calcium carbonate on the stone surface (0.20 ± 0.03 mM; range, 0.09-0.28 mM). For patients with functioning gallbladders, Pi in common duct bile was always less than that in gallbladder bile. The ratio of Pi in gallbladder bile/Pi in common duct bile was significantly greater ($p<0.02$) for patients with some calcium carbonate on the stone surface (3.87 ± 0.20) than for those with only cholesterol on the stone surface (2.28 ± 0.42). For six cholesterol-stone formers, there was a significant correlation ($p<0.03$) between Pi in the common duct bile and Pi in the gallbladder bile. In bile from functioning gallbladders, Pi was linearly related to pH for cholesterol-stone formers ($p<0.001$), but was not related to pH for calcium carbonate-stone formers. The results indicate that bile from calcium carbonate-stone formers is more dilute with respect to Pi, and probably also than cholesterol-stone formers.

6544 ROUTINE PREOPERATIVE UPPER GASTROINTESTINAL SERIES (UGIS) IN PATIENTS WITH BILIARY TRACT DISEASE: A PLEA FOR MORE SELECTIVITY.

(Eng.) Max, M. H.; Polk, H. C., Jr. (Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Surgery* 82(3):334-336; 1977.

The clinical value of upper gastrointestinal roentgenograms was assessed in 250 patients who had consecutive cholecystectomies performed in one hospital. One hundred and five of these patients did not have upper gastrointestinal series (UGIS) prior to operation, and no gastroduodenal disease was discovered at operation. Thirty-nine positive x-ray examinations were obtained among the 145 patients who had preoperative UGIS. In only three of these patients was a gastric procedure added at operation; no unexpected cancers were found. In the other 36, "positive" findings consisted of (1) small hiatal hernias, (2) diverticula of the esophagus, stomach, or duodenum not clinically significant, or (3) postgastrectomy anatomic abnormalities. This review suggests that routine preoperative UGIS may not be warranted in such patients and urges greater selectivity of patients having this procedure.

6545 COMPLICATIONS AND ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY: A REVIEW OF THE LITERATURE AND PRESENTATION OF A DUODENAL PERFORATION.

(Eng.) Ihre, T.; Hellers, G. (Serafimer Hosp., Stockholm, Sweden). *Acta. Chir. Scand.* 143 (3):167-171; 1977.

The case of a patient in whom duodenal perforation occurred during endoscopic retrograde cholangiopancreatography (ERCP) is presented, and the literature concerning complications in association with ERCP is reviewed. The patient, a 68-yr-old woman, underwent ERCP because of recurrent cholangitis. At the first attempt to perform ERCP, one of the maneuvering wires broke, and gas was insufflated through the instrument into the biliary tree. ERCP was again attempted several days later, at which time it was again very difficult to pass the instrument into the descending duodenum. The perforation occurred at this time. The cannulation of the papilla was performed in the usual manner. At laparotomy 3 hr later, the perforation was found to penetrate into the lesser sac at the top of the right side of the duodenum about 4 cm from the pylorus. The perforation was closed, and a choledochotomy was performed. The rate of complications in ERCP is estimated to be 2.6%. Fifty percent of these are due to pancreatitis, and 30% are due to cholangitis. The mortality rate is 0.1%, and all reported deaths have occurred in patients with pancreatitis or cholangitis. The frequency of perforation occurring in ERCP is estimated to be about 0.05%.

6546 INITIAL EXPERIENCE OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY USING A FINE GAUGE NEEDLE. (Eng.) Lavelle, M. I.; Owen, J. P.; McNulty, S.; Hamlyn, A. N. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *Clin. Radiol.* 28(4):453-456; 1977.

Experience with percutaneous transhepatic cholangiography using a fine gauge (Chiba) needle on 41 occasions in 40 patients with jaundice or abnormal liver function is reported. The ages of the patients ranged from 3 months to 80 yr, and the youngest successful cannulation was carried out on a 15-month-old child. There were 32 cases of extrahepatic biliary obstruction, the site being shown in 28 (87.5%) and the nature correctly predicted in 22 (69%). One of two patients in the post obstructive phase and one of two with intrahepatic cholestasis were cannulated and showed bile ducts of normal caliber. Three of four patients with hepatocellular disease were successfully examined, and obstruction was excluded by showing normal bile ducts. Delayed films taken up to 2 hr later were found valuable, particularly in cases of obstructive jaundice. The technique is easier and less expensive to perform than endoscopic retrograde cholangiography. No major complications occurred, suggesting that the modified technique is now a safe procedure for investigating jaundice or disordered liver function in both adults and children.

6547 INVESTIGATION OF THE NON-JAUNDICED PATIENT BY PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (Eng.) Frankel, M.; Gordon, R. L. (Hadassah Univ. Hosp., Jerusalem, Israel). *Clin. Radiol.* 28 (2):129-135; 1977.

Percutaneous transhepatic cholangiography was successfully used to obtain diagnostic examinations n 15 consecutive non-jaundiced patients. After remedication with meperidine, promethazine, and tropine, a Longdwell 6-inch, 18-gauge needle enheathed with a teflon cannula was passed rapidly nto the liver during apnea. The point of entry as in the eighth or ninth intercostal space in he right midaxillary line. The needle was reoved, leaving the teflon cannula in place, and hallow breathing was resumed. The cannula was lowly withdrawn until bile was obtained freely. he above lateral approach is preferred to other pproaches because there is less danger of puncturng the gallbladder or common bile duct. Bile as aspirated before the injection of 30-100 ml rografin 60 under fluoroscopy, and radiographs ere taken. As much bile and contrast medium as ossible were aspirated before the cannula was emoved. In 10 patients, the method was successul in establishing the presence or absence of tones or other operable lesions after previous liary surgery. The method was also successful in establishing the diagnosis in three patients with highly suggestive biliary histories who had not undergone previous biliary surgery and in providing detailed anatomical information in one patient with a choledochal cyst and in another patient with a common duct stricture after cholecystectomy. Complications associated with this diagnostic procedure were minimal.

6548 GRAY-SCALE ULTRASONOGRAPHY AND THIN-NEEDLE CHOLANGIOGRAPHY: EVALUATION IN THE JAUNDICED PATIENT. (Eng.) Goldstein, L. I.; Sample, W. F.; Kadell, B. M.; Weiner, M. (Univ. California Los Angeles Center for the Health Sciences, Los Angeles, CA 90024). *JAMA* 238(10):1041-1044; 1977.

Gray-scale ultrasonography (GSU) and thin-needle cholangiography (TNC) were carried out in 35 consecutive patients with unexplained jaundice to assess the ability of GSU to distinguish dilated and nondilated bile ducts in such patients. The status of the biliary tree was correctly assessed by GSU in 33 of 35 cases; in 2 patients, technical difficulty prevented definitive assessment. Neither false-positive nor false-negative results were encountered. There were no discrepancies between the results of GSU and TNC. It is concluded that GSU provides a safe, highly reliable method of assessing the jaundiced patient and should be the preferred initial procedure in the diagnostic evaluation of patients with jaundice when the major differential diagnosis lies between the medical and surgical types. If GSU does not demonstrate a dilated biliary system, TNC is unnecessary, and other diagnostic studies should be undertaken.

6549 VISUALIZATION OF THE COMMON BILE DUCT DURING CAERULEIN CHOLECYSTOGRAPHY. (Eng.) Fujita, R.; Matsumoto, K.; Ikeda, T. (Tokyo Metropolitan Cancer Detection Center, Tokyo, Japan). *Acta Gastroenterol. Belg.* 40(3/4):167-174; 1977.

Cerulein (0.2 g/kg, i.m.) was used as a cholecystokinetic agent during oral cholecystography, and the frequency of common bile duct visualization obtained with cerulein was compared with that obtained with yolk product. Thirty-nine normal subjects, 20 patients with cholelithiasis, and 8 patients with a nonvisualized gallbladder received yolk product. Forty-three normal subjects, 16 patients with cholelithiasis, 2 patients with common duct dilation, and 6 patients with a nonvisualized gallbladder received cerulein. X-rays were taken before and 5, 10, 15, and 30 min after the injection of cerulein or yolk product. If patients in whom the gallbladder was not visualized were excluded, visualization of the common bile duct was obtained in 64.0% of the patients who received cerulein and in only 3.4% of those who received yolk. Visualization of the common bile duct was achieved 5-15 min after the injection. The frequency of common bile duct visualization was lower in the patients with cholelithiasis (56%) than in the normal subjects (67%). The common duct was not visualized in 22 cases. Among these, six patients showed poor gallbladder contraction and five showed poor gallbladder visualization. The results suggest that a high rate of common bile duct visualization can be obtained using cerulein.

6550 VISUALIZATION OF THE GALLBLADDER WALL AT EXCRETORY UROGRAPHY: IMPLICATION FOR INFUSION TOMOGRAPHY OF THE GALLBLADDER.

(Eng.) Morin, M. E.; Baker, D. A.; Marsan, R. E. (Veterans Admin. Lakeside Hosp., 33 E. Huron St., Chicago, IL 60611). *Radiology* 125(1):35-38; 1977.

A prospective study was undertaken in 2,867 patients who received excretory urography at one institution during a 2-yr period to determine whether the normal gallbladder wall is demonstrable through examination of conventional excretory urogram images. Of these patients, 63 had clear visualization of a curvilinear opacified density surrounding a right upper quadrant (RUQ) lucency thought to represent the gallbladder wall and lumen, resp. This visualization was apparent in at least two images in all patients. None of the 63 patients had epigastric, right flank, or RUQ pain at the time of the urogram, or at any time during hospitalization. Of 23 patients returned for p.o. cholecystography, the gallbladder was well-visualized in 21, and gallstones were present in only 2. Confirmation of the curvilinear RUQ density as the gallbladder wall was provided in 21 patients by p.o. cholecystography, and by an additional image with patient positioning and beam-centering identical to the excretory urogram. The data indicate that the normal gallbladder wall can be demonstrated during i.v. infusion of diatrizoate. This suggests that visualization of the normal gallbladder wall occurs frequently enough to severely limit the usefulness of infusion tomography of the gallbladder in the diagnosis of cholecystopathies.

6551 ENDOSCOPIC LITHOTRIPSY IN THE COMMON BILE DUCT.

(Eng.) Koch, H.; Stolte, M.; Walz, V. (Medizinische Universitats Klinik, 8530 Erlangen, W. Germany). *Endoscopy* 9(2):95-98; 1977.

A new method of lithotripsy and its use in human bile duct stones is described. The method involves the use of a lithotripsy probe, to which a Dormia basket is attached. The common duct stones found in 20 cadavers were crushed. Electrohydraulic lithotripsy was then carried out in three patients in whom stones in the common bile duct were so large that they could not be extracted even after extensive papillotomy. In all patients, the common duct was first filled with contrast medium to facilitate the localization of the stones. After the probe was introduced into the common duct, the Dormia basket was advanced; the stone was caught in the basket and drawn up against the tip of the probe. A hypertonic liquid (30% glucose and physiological saline) was instilled via the probe channel, and the spark discharges were then triggered. The calculi were fragmented in all three patients, but subsequent stone extraction was possible in only one case. No complications occurred.

6552 ELECTROENTEROGRAPHY AFTER CHOLECYSTECTOMY: THE ROLE OF HIGH EPIDURAL ANALGESIA.

(Eng.) Gelman, S.; Feigenberg, Z.; Dintzman, M.; Levy, E. (Beilinson Medical Center, Petah Tikva, Israel). *Arch. Surg.* 112(5):580-583; 1977.
1977.

To investigate the effect of high epidural analgesia on stomach and intestinal motility following upper abdominal surgery, the electrical activity of the stomach and intestine was monitored during the postoperative period in 30 patients who underwent cholecystectomy. All patients received standard general anesthesia with artificial ventilation during the operation; some received high epidural analgesia during surgery and postoperatively, and others, fentanyl analgesia during surgery and nicomorphine afterwards. Electroenterography (EEnG) showed that electrical activity decreased following surgery and returned to base line on the third or fourth day after surgery. A marked increase in amplitude and frequency of EEnG oscillations was recorded in 80% of the patients who received bupivacaine injections into the epidural space. A decrease was almost always recorded after nicomorphine injections. During the postoperative period, eating caused a considerable increase in the amplitude and frequency of the electrical activity of the stomach and intestine in patients treated by epidural analgesia, whereas no observable change was recorded in patients treated by nicomorphine injections. It appears that high epidural analgesia may be useful in the treatment of postoperative adynamic ileus.

6553 CAUSES OF POSTCHOLECYSTECTOMY SYNDROME AND ITS PREVENTION.

(Rus.) Kravchuk, A. N.; Karaman, N. V.; Zimovsky, V. L. (Clinic Faculty and Hosp. Surgery, Medical Inst., Odessa, USSR). *Khirurgiia (Mosk.)* (3):39-43; 1977.

Postcholecystectomy syndrome in a group of 230 patients is reviewed. The patients underwent extensive clinical examination, infusion cholangiography, transparietal cholangiography, and functional testing of the liver, spleen, intestine, and kidneys. The patients could be divided into two groups. Group 1 included 103 patients in whom the pain was found to be due to previous surgery. The patients in group 1 could be further divided into two subgroups. Group B consisted of 47 patients with calculus in the common bile duct and strictures of the papilla of Vater, which were overlooked during surgery; in group A, 49 patients had commissures and stenosis of the common bile duct and duodenum, bile fistulas, and subhepatic abscesses. Only seven group A patients with chronic cholecystitis subjected to surgery without sufficient indications had "true" postcholecystectomy syndrome. Group 2 included 127 patients in whom pains were not associated with surgery and were due to chronic pancreatitis (45); concomitant lesions of the liver (32); gastritis, pericholedochal lymphadenitis, recurrent cholangitis, or ulcer disease (11); duodenostasis (7); stenocardia (2); and urolithic disease (11). Prophylaxis of postcholecystectomy syndrome should consist of surgical treatment of chronic cholecystitis.

6554 INFLUENCE OF BILIARY INFECTION ON THE POSTOPERATIVE COURSE AFTER BILIARY TRACT SURGERY.

(Eng.) Wolloch, Y.; Feigenberg, Z.; Zer, M.; Dintsman, M. (Beilinson Medical Center, Petah Tikvah, Israel). *Am. J. Gastroenterol.* 67(5):456-462; 1977.

A prospective clinicobacteriological study was
carried out in 167 patients undergoing biliary sur-
gery to assess the possible influence of endoge-
nous preoperative biliary infections on postoper-
ative morbidity. Bile cultures were positive in
33% (55 patients); in those undergoing cholecystec-
tomy alone, this finding was present in 23%, while
in those in whom a choledochotomy was also performed,
cultures were positive in 65%. The incidence of
wound infection was twice as high in those under-
going choledochotomy as in those undergoing chol-
ecystectomy alone (37.8% versus 18.5%). There was
no appreciable difference in the rate of wound
infection when a routine appendectomy was performed
during biliary tract surgery. Among the 38 patients
with wound infection, bile cultures were positive in
.6. In 13 cases, the offending organism in the
wound was identical with that recovered from the
bile culture. This result suggests an endogenous
ource for the wound infection. Wound infection
as most likely to be encountered in patients with
athogenic organisms in the bile, in the aged, and
n those whose resistance to infection had been
owered by concomitant disease.

555 GLUTATHIONE LEVEL IN THE VENOUS BLOOD IN PATIENTS WHO UNDERWENT OPERATION ON THE ILE DUCTS.

(Rus.) Sobchishin, Iu. V.; Valigura,
a. S.; Gerasimenko, A. A.; Vanat, I. M. (Terebov-
ianskaia Central Regional Hosp., Terebovlianskaia,
ernopol Oblast, USSR). *Vrach. Delo* (11):72-74;
976.

he functional state of the liver and tissue res-
iration were studied in 106 patients undergoing
urgery for various lesions of the liver and bil-
ary ducts. Thirty patients had acute cholecys-
itis, 28 had chronic calculous cholecystitis with-
ut jaundice, 34 had jaundice, and 14 had obstruc-
ive jaundice due to cancer. The level of blood
lutathione and activities of serum alanine and
spartate aminotransferase (AlAT and AsAT) were
ssessed preoperatively and on days 2-4 and 10-12
fter surgery. Surgery included cholecystectomy,
-pass anastomoses, hepaticotomy, and choledocho-
omy. Preoperatively, a majority of the patients
d tissue hypoxia; severity of hypoxia was asso-
ated with severity and duration of the inflam-
tory process. A postoperative decrease of the
utathione level was indicative of a decrease in
ssue hypoxia; the most pronounced decrease in
poxia was observed in patients with acute chole-
stitis. The functional state of the liver in
e patients with acute and chronic cholecystitis
days 2-4 after surgery showed deterioration, while in the patients with cholestasis, the liver function was significantly improved.

6556 THE CLINICAL SIGNIFICANCE OF INCREASED PLASMA LEVELS OF LIVER-SYNTHESIZED COAGULATION FACTORS IN LIVER DISEASE.

(Eng.) Arnman, R.; Iwarson, S.; Olsson, R. (Sahlgren's Hosp., S-413 45 Goteborg, Sweden). *Scand. J. Gastroenterol.* 12 (4):387-389; 1977.

Plasma coagulation factor II-VII-X levels were determined in 38 patients with common duct stones, 55 with hepatitis A, 34 with hepatitis B, 33 with bile duct obstruction due to pancreatic carcinoma, 8 with hepatocellular drug reaction, and 5 with cholestatic drug reaction. The first plasma factor II-VII-X value after admission to the hospital was higher than 90% in 29% of the common duct stone patients, in 9% of the patients with bile duct obstruction due to pancreatic carcinoma, and in 60% of the patients with cholestatic drug reaction. In contrast, the admission value was above 90% in only one of the 89 patients with acute hepatitis and in none of the patients with a hepatocellular drug reaction. Therefore, a high plasma factor II-VII-X activity in a patient with liver or biliary tract disease seems to be a reliable indicator of surgical disease. The high activity levels may be explained by an increased protein synthesis in the liver.

6557 ENZYMOLOGICAL INVESTIGATIONS IN DISEASES OF THE BILE DUCTS.

(Rus.) Avdei, L. V.; Rashchinskaia, N. T.; Vit'ko, I. M. (Second Dept. Surgery, Minsk Medical Inst., Minsk, USSR). *Vestn. Khir.* 117(12):35-40; 1976.

The efficacy of enzymologic evaluation for the differential diagnosis and prognosis of liver lesions was studied in 255 patients with various forms of cholecystitis. There were 21 patients with acute phlegmonous cholecystitis, 11 with acute gangrenous cholecystitis, 150 with chronic cholecystitis, 38 with obstructive jaundice, and 35 with chronic cholecystopancreatitis. All patients underwent surgery. Preoperatively and on days 3, 7, 10, and 12 after surgery, the patients underwent assessment of activity of the following enzymes: aspartate amino transferase (AsAT), alanine amino transferase (AlAT), fructose-1,6-diphosphate aldolase (F-1,6-dA), alkaline phosphatase (AP), lactate dehydrogenase (LDH), glucose-6-phosphate dehydrogenase (G-6-PD), 6-phosphogluconic acid dehydrogenase (6-PGD), and transketolase (TK). Preoperatively, the patients with gangrenous cholecystitis and obstructive jaundice had increased activities of F-1,6-dA; surgery resulted in normalization of F-1,6-dA activity. Preoperatively, all patients had increased activity of AsAT and AlAT, which showed further elevation on day 3 after surgery. Activity of AP was elevated in the blood sera of obstructive jaundice patients and those with acute gangrenous cholecystitis. Maximum preoperative activity of LDH was detected in the patients with obstructive jaundice; the patients with cholecystopancreatitis and chronic cholecystitis had significant elevation of LDH activity. It is concluded that observed changes in enzymes activity are indicative of involvement of the liver parenchyma into pathologic process and, thus, can not be used for differential diagnosis of bile duct lesions.

6558 CHOLEDOCHODUODENOSTOMY IN THE TREATMENT OF BENIGN BILIARY TRACT DISEASE. (Eng.)

Freund, H.; Charuzi, I.; Granit, G.; Berlatzky, Y.; Eyal, Z. (Hadassah Univ. Hosp., P.O. Box 499, Jerusalem, Israel). *Arch. Surg.* 112(9):1032-1034; 1977.

Experience with 27 patients who underwent choledochoduodenostomy (CCD) for benign obstructive lesions of the biliary tract (residual or recurrent common duct stones, 16; multiple stones, 16; hepatic duct stones, 5; roentgenographic evidence of papillary stenosis, 9; pancreatitis, 1; and a very dilated common bile duct, 25) is presented. Sixteen patients had undergone previous biliary tract surgery. Twenty-two of the patients were 70-90 yr old at the time of CCD, and the 11 patients in whom CCD was performed as a primary procedure averaged 73 yr old. There was no operative or hospital mortality, although complications occurred in 12 patients. Of 26 patients followed up for 6 months to 8 yr, 25 were free of abdominal complaints, recurrent acute cholangitis, or pancreatitis; only 1 patient developed cholangitis 6 yr after CCD. An upper gastrointestinal tract study revealed a stenosed anastomosis, with contrast material quickly filling the biliary system but emptying slowly. Stones were demonstrated in the segment between the anastomosis and the papilla. The patient responded to antibiotic therapy. These favorable results indicate that CCD is a safe, simple, and effective procedure in the management of benign biliary tract disease, particularly in high-risk patients.

6559 AGENESIS OF THE GALLBLADDER--AN INHERITED DEFECT? (Eng.)

Sterchi, J. M.; Baine, R. W.; Myers, R. T. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *South. Med. J.* 70(4):498-499; 1977.

The case of a patient with agenesis of the gallbladder is presented. The patient, a 36-yr-old woman, presented with vague epigastric pain and occasional episodes of nausea and vomiting not related to the ingestion of a fatty meal. At exploratory celiotomy, no intra-abdominal abnormalities except the absence of the gallbladder were found. The usual gallbladder fossa did not exist and there were no adhesions on the undersurface of the right lobe. There was no cystic duct. An intraoperative needle cholangiogram revealed a common duct 5-6 mm in diameter, but no evidence of an intrahepatic gallbladder. The patient's father and one of her four children (a 12-yr-old girl) were also discovered to have gallbladder agenesis. This congenital anomaly should be suspected when oral cholecystography shows a nonvisualizing gallbladder in relatives of any patient with proven agenesis of the gallbladder.

6560 PRIMARY GALLBLADDER CARCINOMA. (Ger.)

Voigtsberger, P.; Neupert, V., Pathe, H. (Chirurg. Klinik und Poliklinik, Nordhauser Strasse 74, 50 Erfurt, E. Germany). *Z. Gesamte Inn. Med.* 31(20):856-859; 1976.

Survival rate, clinical findings, and therapeutic management, including test laparotomy (51 cases), cholecystectomy (8), cholecystostomy (1), and biliodigestive anastomosis (4), are discussed for 77 patients with gallbladder carcinoma. The most frequent symptoms were pain (unspecified), vomiting, anorexia, and weight loss. Also observed was an increase in th erythrocyte sedimentation rate, hepatomegalia, jaundice, and anemia (unspecified). Radiological diagnosis, in the form of a cholecystogram, was frequently negative. Surgical intervention was performed in 64 cases, 57 of which were histologically documented as adenocarcinomas. The average survival period after laparotomy was 53 days. Thirty-four patients survived more than 1 yr. Cholecystolithiasis was documented in 54 cases by surgery or autopsy. There was false evidence of lithiasis in three cases.

6561 BILIARY CARCINOMA ASSOCIATED WITH BILIARY CYSTS. (Eng.)

Flanigan, D. P. (St. Joseph Mercy Hosp., P.O. Box 995, Ann Arbor, MI 48106). *Cancer* 40(2):880-883; 1977.

The case of a patient with biliary carcinoma associated with biliary cyst is presented, and 23 similar cases are reviewed. The patient underwent cholecystectomy at 26 yr of age and 3 yr later, presented with obstructive jaundice. A 6-cm fusiform biliary cyst involving the common bile duct and distal common hepatic duct was discovered. Three stones were found within the cyst and removed. Biopsy of the cyst wall revealed chronic inflammation, but no neoplasm. A choledochocystduodenostomy was performed. Five years later, a common bile duct stricture proximal to the cyst was found, but it was not biopsied. A Roux-en-y choledochojejunostomy was performed proximal to the stricture. Recurrent symptoms of obstructive jaundice led to the discovery of a well-differentiated adenocarcinoma in the area of a 2-cm-long stricture of the common bile duct proximal to the choledochojejunostomy. Of all 24 reported cases in which carcinoma developed, stones were present in the cyst in 6. The most common cell type was adenocarcinoma (70%), and the most common tumor site was in the posterior cyst wall (57%). Twelve patients developed carcinoma in a mean period of 4 yr following an internal drainage procedure for biliary cystic disease. Of the cases of biliary cysts associated with cystlithiasis, one-third had associated biliary carcinoma. Excisional therapy should be carried out where possible in all patients with biliary cystic disease, particularly, those with associated cystlithiasis.

6562 PRIMARY SCLEROSING CHOLANGITIS. (Eng.) Ford, J. R. (2534 Imperial Ave., San Diego, CA 92102). *Int. Surg.* 62(6/7):332-333; 1977.

The case of a 44-yr-old man with sclerosing cholangitis is presented. The patient presented with jaundice and elevated serum bilirubin (12 mg/100 ml, direct), SGPT (151), LDH (520), and alkaline phosphatase (10.8). Surgery revealed a very hard mass that involved the right hepatic duct, the left hepatic duct, common hepatic duct, hepatic artery, portal vein, and cystic artery. The cystic duct and common hepatic duct were like hard cords with no cannulation possible. The gallbladder was atrophic and contained no stones. The blood supply to the area was increased, and many of the vessels going to the portal vein were thrombosed, as well as a portion of the common duct. At intraoperative cholangiography, there was no filling of the common duct or the bifurcation of the common hepatic duct. As much of the diseased liver and biliary tree as possible was resected. A T-tube could not be used because of extensive involvement of the duct; individual cannulizations of the hepatic ducts proved very successful. The patient developed two further episodes of cholangitis after this operation and responded to treatment with antibiotics and steroids. He is well 9 yr after surgery.

563 EFFICACY OF THERMOGRAPHY IN THE DIAGNOSIS OF CHRONIC CHOLECYSTITIS. (Rus.) Zhuk,
. A. (Ukrainian Inst. Advanced Training for Physi-
ians, Kharkov, USSR). *Vrach. Delo* (6):94-98; 1977.

he diagnostic value of thermography was studied in
1 patients with clinically confirmed relapse of
hronic cholecystitis; the duration of cholecystitis
anged from 2 yr to 14 yr. Temperature asymmetry
"hot" spot in the right hypochondrium) was detected
n 42 patients; the size and the intensity of the
pot were associated with the intensity of the in-
lammatory process. Negative thermographic findings
n nine patients may have been due to an excessive
at layer.

64 CHOLELITHIASIS IN SUBJECTS WITH HYPER-CALCAEMIA AND PRIMARY HYPERPARATHYROIDISM
TECTED IN A HEALTH SCREENING. (Eng.) Christens-
n, T.; Einarsson, K. (Dept. Medicine, Karolinska
st., Serafimerlasarettet, Stockholm, Sweden).
t 18(7):543-546; 1977.

e frequency of gallstone disease was studied in
subjects (69 women and 13 men; mean ages
.0 and 52.3 yr, resp.) with verified hyper-
lcemia (VHC) detected in a health screening in
e Stockholm area. Peroral cholecystography was
rried out in all noncholecystectomized subjects.
uses of hypercalcemia other than primary hyper-
rathyroidism (PHPT) had been excluded as far as possible. Sixty-two patients had been operated upon, and all but two men were found to have parathyroid adenomas. The patients were compared with a series of 82 normocalcemic age- and sex-matched subjects selected from the health screening register. The frequencies of gallstone disease in VHC and controls were 12% and 13%, resp., and the frequencies of gallstone disease in PHPT and controls were 12% and 14%, resp. The results are at variance with those of other investigators who have reported that PHPT is associated with an abnormally high frequency of gallstone disease.

6565 SERUM BILE ACIDS IN CHOLESTASIS OF PREGNANCY. (Eng.) Laatikainen, T.; Ikonen, E. (Univ. Central Hosp., Haartmaninkatu 2, SF-00290 Helsinki 29, Finland). *Obstet. Gynecol.* 50(3):313-318; 1977.

Determinations of maternal serum bile acid levels were compared with the results of routine liver function tests in patients with cholestasis of pregnancy; in addition, the occurrence of signs of fetal distress in these pregnancies was related to the severity of cholestasis as assessed by maternal serum bile acid levels. Using routine liver function tests, cholestasis of pregnancy was diagnosed in 86 pregnant women with pruritus. Serum aminotransferase levels were elevated in all patients, SGOT in 99%, and SGPT in 100%. In these patients, serum concentrations of cholic, chenodeoxycholic, and deoxycholic acids were determined using gas chromatography and were compared with those in a group of 40 uncomplicated pregnancies. Of these bile acids, cholic acid levels were elevated in 92% of the patients. The frequency of elevation of serum alkaline phosphatase was 49%, and total and conjugated bilirubin were elevated in 22% and 61%, resp. It appears that in addition to serum aminotransferase levels, the serum cholic acid concentration is a sensitive indicator of cholestasis of pregnancy. The cholestasis series was divided into three subgroups of increasing severity of cholestasis as assessed by maternal serum cholic acid levels, and the occurrence of signs of fetal distress was compared among these subgroups. The only intrauterine fetal loss occurred in the severe cholestasis group. The incidence of meconium-stained amniotic fluid also increased significantly in this latter group, and 21 of the 24 patients with other signs of fetal distress were in the groups of moderate and severe cholestasis.

6566 LIPOPROTEIN-X AND OTHER CLINICAL CHEMICAL PARAMETERS OF CHOLESTASIS. (Ger.) Mayr, K. (Allgemeines Krankenhaus, Grieskirchner Strasse 42, A-4600 Wels, Austria). *Wien. Med. Wochenschr.* 126(25/26/27):378-380; 1976.

The question of which clinical biochemical parameter is the most reliable indicator of the presence of cholestasis was investigated in 100 patients with intra- and extrahepatic cholestasis and 100 patients with hepatobiliary diseases other than cholestasis.

The serum transaminase and alkaline phosphatase activities, the serum bilirubin concentration, and the presence of lipoprotein X were the parameters studied. The presence of large amounts of lipoprotein X correlated with the presence of cholestasis. There was no other parameter, and no combination of parameters, that excluded or indicated the existence of cholestasis with greater reliability than did the presence of lipoprotein X. However, the presence of this substance did not permit any conclusion as to the etiology of cholestasis.

6567 DISSOLUTION OF CHOLESTEROL GALLSTONES BY URSODEOXYCHOLIC ACID. (Eng.) Nakagawa, S.; Makino, I.; Ishizaki, T.; Dohi, I. (Hokkaido Univ. Sch. Medicine, Sapporo, Japan). *Lancet* 2(8034):367-369; 1977.

A double blind clinical trial of p.o. ursodeoxycholic acid (UDCA) was carried out in 44 patients with radiolucent gallstones in gallbladders visible on cholecystography. The patients were randomly allotted to three treatment groups: 150 mg/day or 600 mg/day urosodeoxycholic acid or a placebo. At the end of 6 months' treatment, cholecystograms of all the patients were interpreted by radiologists who were not aware of the treatment. Dissolution of gallstones occurred in 8 (26%) of the 31 patients treated with ursodeoxycholic acid (6/16 treated with 150 mg, 2/15 treated with 600 mg), but not in the placebo group. Ursodeoxycholic acid had no hepatotoxicity, as assessed by standard liver function tests. These results indicate that ursodeoxycholic acid is effective in the dissolution of cholesterol gallstones.

6568 DISSOLUTION OF RETAINED COMMON DUCT STONES. (Eng.) Way, L. W.; Motson, R. W. (Univ. California Sch. Medicine, San Francisco, CA). *Adv. Surg.* 10:99-119; 1976.

Nonoperative methods to eliminate retained common duct stones via T-tube access after choledochotomy are reviewed, with particular emphasis on the use of cholate for the dissolution of cholesterol stones. The methods reviewed include dissolution, flushing, and pharmacologic relaxation of the sphincter of Oddi, usually as an adjunct to flushing. After initial attempts at the management of retained stones with mechanical extraction have failed, irrigation is recommended. The retained stone is usually discovered on cholangiograms performed a week or so after surgery. However, the T-tube tract should be allowed to mature and the patient to recover fully from choledochotomy before irrigation or other treatment options are instituted for stone removal. Solutions should not be instilled until any possibility that thay may leak from the choledochotomy into the paraductal planes has passed. Efforts at stone dissolution can only be expected to affect cholesterol stones, and therefore dissolution should probably not be tried in patients with retained radiopaque stones or in those whose gallbladder stones appear to be of the pigment variety. The treatment program for cholesterol stone dissolution involves the continuous infusion of a prefiltered sodium cholate solution (200 mM in 0.15 N NaCl buffered at pH 7.5) at a rate of 30 ml/hr for a period not exceeding 14 days. The patient must be given cholestyramine to prevent diarrhea.

6569 NONOPERATIVE EXTRACTION OF RETAINED COMMON DUCT STONES. (Eng.) Burhenne, H. J. (Children's Hosp., San Francisco, CA). *Adv. Surg.* 10:121-136; 1976.

Nonoperative techniques for the extraction of retained common duct stones are discussed. Nonoperative extraction is performed about 5 weeks after surgery to establish a better fibrous tract around the T-tube. The T-tube is extracted as the first step in the procedure. After the introduction of a steerable catheter into the sinus tract, cholangiograms are obtained to ascertain the exact number and location of retained stones. The steerable catheter is manipulated so that its tip is just beyond the location of the retained stone. A stone retrieval basket is introduced through the catheter and is opened distal to the stone. The steerable catheter is partially retracted, and the open basket is slowly withdrawn in an attempt to engage the stone. Several passes with the basket may be required before the stone is engaged. Large stones of 1 cm or more in diameter almost always require fragmentation. Only readily visible, major fragments are extracted on the first attempt; a straight catheter is then inserted, and the patient returns for a second session a few days later. For partially impacted distal common duct stones, special maneuvers to move the stone more proximally in the duct system may be required before stone extraction can be performed. One maneuver for mobilizing and engaging distal common duct stones employs the Fogarty balloon catheter. The Fogarty catheter is placed distal to the stone, and gentle traction is applied to cause upward displacement of the stone for basket engagement. Dilatation techniques with cylindrical balloons have been successfully employed in a few cases to permit subsequent stone extraction in patients with stones impacted in intrahepatic locations. Of 223 patients who underwent nonoperative stone extraction between 1971 and 1975, the removal of all stones was achieved in 95% of the cases. Failures occurred primarily in patients who had indwelling T-tubes of a number 12 F or less caliber. Two failures also involved cases where the T-tube had been placed through a midline incision.

6570 THE "JACK STONE" OR "MERCEDES BENZ" SIGN--A NEW THEORY TO EXPLAIN THE PRESENCE OF GAS WITHIN FISSURES IN GALLSTONES. (Eng.) Wright, F. W. (Churchill Hosp., Oxford, OX3 7LJ, England). *Clin. Radiol.* 28(4):469-473; 1977.

The occurrence of gas within clefts of fissures in gallstones is reviewed and speculation about its origin is presented. Three cases are discussed and radiographs of two of these patients published. The gallstones possessed crevices that contained gas and exhibited an appearance called the "Mercedes Benz" or "Jack Stone" sign. It is proposed that internal fissuring of the gallstones due to their crystalline structure produces a negative pressure that causes gases to come out of solution from the fluid in the stones. Then the outer layers of the stone seal off, preventing ingress of further fluid so that the negative pressure is maintained and the gas cannot redissolve. The finding of gas in x-rays of degenerate vertebral discs, degenerate symphysis pubis, and even manipulated joints is offered as supportive evidence for this model.

571 POSTOPERATIVE CHOLEDOCHOFIBERSCOPIC REMOVAL OF INTRAHEPATIC STONES. (Eng.)

Gocho, K.; Hiratsuka, H. (Hiratsuka Gastroenterolog-
ical Hosp., Tokyo, Japan). *Jpn. J. Surg.* 7(1):18-
27; 1977.

n endoscopic approach to the diagnosis and treat-
ent of intrahepatic stones is presented, based on
xperience with four cases in which complete removal
f intrahepatic stones was done by postoperative
holedochoscopy. The removal of stones was done
ith a two-channel choledochofiberscope containing
forceps outlet for the removal of stones in the
iliary tree and a saline outlet for irrigation so
hat the bile duct can be distended adequately for
irect observation. The choledochofiberscope also
ncorporated a light guide for illumination and an
bjective lens for visualization. The choledocho-
iberscope was inserted into the bile duct via the
holedochal fistula 3 weeks after surgery for the
emoval of stones. Stones not detected and removed
uring surgery were crushed or grasped with for-
eps under direct vision. In some cases, the
tricture in the intrahepatic biliary tree was
ilated with the use of a high-frequency, wave-
utting knife to facilitate stone removal. Com-
lete intrahepatic stone removal was accomplished
n two patients after the performance of 28 and
postoperative choledochoscopies, resp.; in these
ases, multiple stones were held back behind the
tricture in the biliary tree. In two other pa-
ients, only two and four postoperative choledo-
oscopies, resp., were necessary; in these cases,
tricture in the biliary tree was not seen. In
ly two of these four cases was a correct diagnosis
intrahepatic stones made by endoscopic retro-
ade cholangiopancreatography preoperatively. In
e remaining two cases, the dilated intrahepatic
cts were impacted with multiple stones, and pre-
erative examination failed to disclose the
sion because of incomplete filling of the contrast
dium. In these cases, a correct diagnosis was
de by postoperative endoscopic cholangiography.

72 THE SYSTEMIC TREATMENT OF GALLSTONES.

(Eng.) Tompkins, R. K. (Univ. California
Los Angeles Sch. Medicine, Los Angeles, CA).
. *Surg.* 10:87-98; 1976.

A review of systemic treatment approaches for the dissolution of gallstones is presented. At present, cholecystectomy remains the only proven cure for gallstones, and systemic approaches that aim at reducing the proportion of cholesterol in bile relative to that of bile acids and phospholipids are experimental. Chenodeoxycholic acid, a primary bile acid, has been shown to produce gallstone dissolution in man, but reported side-effects (diarrhea, cramps, nausea, and transient and persistent serum transaminase elevations) and potential toxicities (liver damage and increased body cholesterol pools) have restricted the drug to investigative use. The administration of the phospholipid lecithin has also been shown to be effective in solubilizing human bile cholesterol. In a prospective, nonrandomized trial in which patients with radiolucent gallstones were fed 48 g commercial soybean lecithin daily for 2 yr while being maintained on a low-fat diet, the bile was less lithogenic, and cholesterol crystals that had been present before treatment disappeared from the duodenal bile of all patients after 8 months of lecithin administration. No symptoms developed in patients on this protocol, but the gallstones were unchanged in size at the end of 2 yr. No data pertaining to trials with a combination of chenodeoxycholic acid and lecithin have been reported. Phenobarbital, although ineffective when used alone, has been shown to aid gallstone dissolution in some patients on chenodeoxycholic acid therapy. Florantyrone (Zanchol), a synthetic hydrocholeretic that does not have the usual gastrointestinal side-effects of bile salts, may also be capable of reducing cholesterol saturation in human bile, according to a recent report.

6573 THE ETIOLOGY AND PATHOGENESIS OF GALLSTONES.

(Eng.) Small, D. M. (Dept. Medicine and Biophysics, Boston Univ. Sch. Medicine, Boston, MA). *Adv. Surg.* 10:63-85; 1976.

The etiology and pathogenesis of gallstones are reviewed. Human gallstones fall into two chemical categories: those composed of bile pigments or their derivatives and those composed primarily of cholesterol. Pigment stones form when excess unconjugated bile pigments or their derivatives are present in bile and precipitate to form insoluble polymer-like complexes with calcium and copper. Although little is known of the etiology of pigment stones, it is suggested that patients with increased pigment production, such as those with severe chronic hemolytic anemia, will tend to get pigment stones. Patients with cholesterol gallstones generally have a bile containing excess cholesterol. Surgical gallstone disease is the end stage of a long process, starting with a genetic or metabolic defect and progressing through the stages of bile supersaturation, cholesterol precipitation, stone growth, and finally symptoms of gallstone disease. Possible etiologic mechanisms of cholesterol gallstone formation include: excessive cholesterol bile salt loss; oversensitive bile acid feedback mechanisms in which low rates of hepatic return of bile salts are adequate to depress bile acid synthesis; excessive cholesterol secretion;

mixed defects involving decreased bile salt secretion rate and a high cholesterol secretion rate; rapid bile salt circulation with decreased bile salt pool size; and primacy disorders of the gallbladder, bile ducts, or sphincter of Oddi. Certain drugs also affect bile secretion and saturation. Chemical gallstone disease in estrogen users is reflected in a 2-2.5 times greater risk of surgically documented gallstone disease in women taking birth control pills or in women taking estrogens in the postmenopausal period.

6574 GREY-SCALE ULTRASONOGRAPHY IN THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE.

(Eng.) Taylor, K. J. W.; Rosenfield, A. T. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Arch. Surg.* 112(7):820-825; 1977.

The accuracy of grey-scale ultrasonography was assessed in 150 patients with cholestatic jaundice, studied prospectively. All patients had a diagnosis established by subsequent biopsy, autopsy, or surgery. Using the presence or absence of a dilated biliary tree as the criterion, the intrahepatic or extrahepatic nature of the jaundice was correctly differentiated in 145 patients, an accuracy of 97%. All 64 patients with intrahepatic jaundice were correctly identified. Five of the 86 remaining patients, each of whom had gallstones, were misdiagnosed. In 82 patients (54.7%), the specific etiology was diagnosed. Ultrasound is an accurate method for the evaluation of jaundice and appears to have a definite value as a screening procedure before proceeding to more invasive studies.

6575 THE VALUE OF ULTRASONIC B-MODE SCANNING IN THE DIAGNOSIS OF PERSISTENT JAUNDICE.

(Eng.) Armitstead, P. R.; Addison, N. V.; Follows, O. J. (Bradford Royal Infirmary, England). *Br. J. Surg.* 64(9):630-632; 1977.

The value of ultrasonic B-mode scanning in differentiating obstructive from nonobstructive jaundice and in providing information as to the site and nature of any obstructive lesion was investigated in 67 patients with persistent jaundice. The gallbladder was identified on scanning in 92.5% of the patients; in four of five patients in whom the gallbladder was not seen, previous cholecystectomy had been carried out. The gallbladder was enlarged in 31 of the 67 patients, and this was confirmed at laparotomy in 28. Gallstones were visualized in 27 patients, but these were confirmed in only 19; six cases were definite false-positives. Thirty-eight patients appeared to have dilated extra- and/or intrahepatic bile ducts on the sonar scan; this condition was confirmed surgically in 36. Calculi were identified in the gallbladder and/or the bile ducts of 15 of the 29 patients without dilated bile ducts. In a further two patients, filling defects of the liver were found, and both patients were later shown to have hepatic metastatic malignant disease. A correct diagnosis was obtained using ultrasonic B-mode scanning in 66% of the cases, and useful information was gained in 26%. The information obtained from scanning was misleading or of no diagnostic value in only 8% of cases. This simple and noninvasive technique is valuable in the definitive diagnosis of persistent jaundice and should allow earlier surgery in the obstructive cases.

6576 ERRORS IN THE DIAGNOSIS OF OBSTRUCTIVE JAUNDICE IN CHILDREN.

(Rus.) Khristich, A. D.; Antoshkina, E. P. (Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Pediatriia (Mosk.)* (8):81-83; 1976.

In children, surgical diseases with concomitant jaundice are often misdiagnosed as infectious hepatitis. The first patient, an 8-yr-old girl, had an almost 6-yr history of paroxysmal abdominal pains. She was unsuccessfully treated for infectious hepatitis and later for lamblious cholecystitis. Laparotomy showed a cyst of the common bile duct. The patient underwent choledochoduodenostomy; at the time of follow-up examination (3.5 yr later) she was in good health. The second patient, a 3-yr-old boy, had a history of abdominal trauma. Two months after contusion of the abdomen, he developed jaundice, which was diagnosed as infectious hepatitis. Conservative treatment gave temporary and nonsignificant improvement (he had several recurrences) and he underwent surgery. Laparotomy showed enlarged (10 x 3 cm in size) gallbladder and commissures in the external bile ducts. The patient underwent dissection of the common bile duct and end-to-side choledochoduodenostomy; 2.5 yr later, he was in good health. The third patient, a 4-yr-old girl, was seen with enlarged liver, skin itch, jaundice, and colorless stool; the disease was diagnosed as infectious hepatitis. In spite of the treatment, her condition progressively deteriorated, and with provisional diagnosis of biliary peritonitis, she was subjected to surgery. Laparotomy showed a 6 x 6 cm tumor arising from the right liver lobe. She underwent removal of the tumor and fistula of the gallbladder.

6577 EVALUATION OF JAUNDICE: FINE-NEEDLE ASPIRATION LIVER CYTOLOGY AS A DISCRIMINATING TOOL.

(Eng.) Henriques, U. V.; Hasselstrom, K. (County Central Hosp., DK-4200 Slagelse, Denmark). *Dan. Med. Bull.* 24(3):104-108; 1977.

The pathogenesis of jaundice was evaluated by fine-needle aspiration liver biopsy in 35 patients. The cytological criteria for obstructive jaundice were: (a) cholestasis; (b) virtually undamaged liver cells intermingled with increased number of granulocytes; and, (c) increased amounts of proliferating biliary epithelium. In the 35 jaundiced patients, fine-needle aspiration of the liver disclosed 13 cases of obstructive jaundice, all of which were later verified by laparotomy or by autopsy. Among the 22 cases with the cytological diagnosis of nonobstructive jaundice, 2 were subsequently found to be obstructive jaundice. The predictive value of obstructive jaundice was 1.00. The predictive value of nonobstructive jaundice was 0.91. The sensitivity with respect to obstructive jaundice was 0.87, and the specificity was 1.00. Fine-needle aspiration liver cytology is reliable in the diagnosis of obstructive jaundice.

6578 VALUE AND SAFETY OF PERCUTANEOUS LIVER BIOPSY IN OBSTRUCTIVE JAUNDICE.

(Eng.) Spellberg, M. A.; Bermudez, F. (Michael Reese Hosp. and Medical Center, Chicago, IL). *Am. J. Gastroenterol.* 67(5):444-448; 1977.

Seven cases are presented to illustrate the usefulness of percutaneous liver biopsy as an adjunct to simple, inexpensive, and noninvasive laboratory tests in the differential diagnosis of jaundice. Liver biopsy had been considered dangerous to use because of possible leakage of bile in patients with jaundice secondary to extrahepatic blockage, and its usefulness was doubted. The authors note that, after careful clinical and biochemical examination, some cases still difficult to diagnose were candidates for biopsy. Good technique and patient selection were recommended, and histologic criteria to differentiate hepatitis from extrahepatic obstruction are presented. In over 100 percutaneous liver biopsies, no serious difficulties such as bile peritonitis, transpired. Percutaneous liver biopsy represents a middle ground between noninvasive techniques and techniques such as transhepatic retrograde cholangiography that may be employed in the differential diagnosis of jaundice.

6579 CONVERSION OF PERCUTANEOUS TRANSHEPATIC CHOLANGIODRAINAGE TO INTERNAL DRAINAGE IN OBSTRUCTIVE JAUNDICE.

(Eng.) Takada, T.; Uchida, Y.; Yasuda, H.; Kobayashi, S.; Sakakibara, N.; Hanyu, F. (Inst. Gastroenterology, Tokyo Women's Medical Coll., Tokyo, Japan). *Jpn. J. Surg.* 7(1): 10-17; 1977.

The conversion of percutaneous transhepatic cholangiodrainage (PTCD) to internal drainage for the purpose of rerouting bile back to the intestinal tract in obstructive jaundice is described. Usually, a guide wire is inserted into the bile duct through the PTCD tube and is allowed to pass through the bile duct stricture until its tip enters the duodenum. Thereafter, a polyethylene tube having several side holes is inserted over the guide wire until its tip reaches a point 10 cm or more into the duodenum. The tube is positioned so that the side holes are located both in the intrahepatic bile ducts above the stricture and in the duodenum. Usually the method can be performed safely about 1 week after PTCD, when the edema of the bile duct wall has subsided and when its resistance is restored to normal. The conversion of PTCD to internal drainage was successfully performed in 10 of 13 cases. Failures involved incorrect positioning of the side hole portion of the tube and excess bile discharge. In two cases in which bile discharge before the conversion to internal drainage was over 2,000 ml daily and in which internal drainage by a single lumen tube resulted in bile stagnation, the tubes were replaced with double lumen tubes, and no signs of bile stagnation appeared thereafter. Failures associated with incorrect tube positioning are likely to occur in cases in which the stricture is located in the upper part of the bile duct near the bifurcation. Possible complications of the procedure include perforation of the ductal wall with the guide wire and the obstruction of the pancreatic duct orifice by the inserted tube, which may lead to acute pancreatitis.

6580 EXTERNAL TRANSHEPATIC DRAINAGE IN OBSTRUCTION OF THE UPPER SEGMENT OF THE BILE DUCTS.

(Rus.) Gredzhev, A. F.; Mukhin, I. V.; Popandopulo, G. P.; Konoplia, P. P.; Mysnik, G. G. (Donetsk Medical Inst., Donetsk, USSR). *Khirurgiia (Mosk.)* (12):70-72; 1976.

From 1953, 2,230 patients underwent surgery for inflammatory lesions of the bile ducts. Of 305 patients subjected to repeated surgery, 42 underwent hepatico-enterostomy anastomosis, and 16 of these underwent transhepatic drainage. Indications for drainage were estenosis of previously performed anastomosis (12), complete external bile fistula (3), and extensive decubitus of the posterior wall of the common bile duct due to the concrement (1). All patients had a history of two-three reconstructive surgeries, and all of them had marked symptoms of cholangitis and obstructive jaundice. The authors emphasize that drainage of anastomosis should continue for at least 6 months; accidental removal of the drain on day 17 after surgery resulted in estenosis of hepaticoduodenostomy in one patient. Postoperatively, all patients were free from complications due to the drainage: two patients died of causes other than surgery, and one patient died of cholangitis 45 days later.

6581 DIAGNOSIS AND MANAGEMENT OF ABSTRUSE ABDOMINAL PAIN.

(Eng.) Freeman, J. B. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Chir. Gastroenterol.* 10(4):409-415; 1976.

The hypothesis that cholecystokinin cholangiography combined with duodenal bile analysis may be useful in preselecting patients with obscure right upper quadrant pain and normal oral cholecystograms who might benefit from cholecystectomy was tested. Sixty-one women and nine men were studied. The oral cholecystogram was repeated without fat stimulation, and 75 U of cholecystokinin were infused over 2 min. The gallbladder was observed fluoroscopically for quality and degree of contractions. Duodenal bile, collected by suction on a duodenal tube, was cultured and examined microscopically under polarized light. Abnormal results were obtained in 54 of the 70 patients as evidenced by reproduction of the clinical symptoms (21), less than 50% gallbladder emptying (22), or the presence of crystals, bacteria, or inflammatory cells in the duodenal bile (11).

Fifty-one patients had cholecystectomy. The results during a 3- to 48-month follow-up period (mean, 17 months) were excellent in 48, good in 2, and no improvement in 1 patient. It is concluded that cholecystokinin cholangiography is a useful technique for predicting the presence of two distinct forms of neuromuscular gallbladder disease not detectable by routine cholangiography. The duodenal bile must also be examined or a significant number of patients with occult cholecystitis, gallstones, or cholesterolosis will be overlooked.

6582 HEMOBILIA AS COMPLICATION OF BILIARY TRACT SURGERY. (Rus.) Danilov, M. V.; Togonidze, N. A. (A. V. Vishnevsky Surgical Inst., Moscow, USSR). *Khirurgiia* (7):82-85; 1977.

6583 THE DIAGNOSIS OF CHRONIC CHOLECYSTITIS IN CHILDREN. (Ukr.) Diakova, R. M.; Tverskaya, S. S. (Inst. Advanced Training for Physicians, Zaporozhye, USSR). *Pediatr. Akush. Ginekol.* (3):4-5; 1977.

6584 OBSERVATION OF GANGRENOUS CHOLECYSTITIS IN A 6-YEAR-OLD CHILD. (Rus.) Bolgov, D. F.; Soldatov, B. S.; Matveev, Yu. E. (Blagoveshchensk Medical Inst., USSR). *Klin. Khir.* (6):81; 1977.

See also, 6084, 6098, 6152, 6160, 6169, 6179, 6185, 6186, 6187, 6188, 6189, 6190, 6191, 6193, 6268, 6292, 6412, 6425, 6426, 6430, 6445, 6460, 6590, 6659.

GENERAL

6585 EOSINOPHILIC GRANULOMAS OF THE GASTROINTESTINAL TRACT. (Eng.) Hans, S. S.; Hans, B.; Lee, P. T.; Knights, E. M. (Detroit-Macomb Hosp. Assoc., Detroit, MI). *Am. Surg.* 43(8):512-516; 1977.

The cases of four patients with eosinophilic granulomas of the gastrointestinal tract are reported. The first three patients, a 42-yr-old man, a 55-yr-old woman, and a 44-yr-old woman, had eosinophilic infiltration of the stomach. The symptoms included epigastric pain and bleeding. Peripheral eosinophilia was present in two of these three patients. In all three patients, the submucosa was diffusely infiltrated, predominantly by eosinophils and sometimes by histiocytes, lymphocytes, plasma cells, endothelial cells, and fibroblasts. The fourth patient, a 30-yr-old man, had an eosinophilic granulomatous polyp of the ileum. He had a 3-yr history of intermittent abdominal pain and a 2-week history of melena. At laparotomy, a 4-cm diameter polyp was found in the terminal ileum. The appendix was adherent to the intussusception mass and was involved in an inflammatory process. The polyp was composed of highly vascular granulation tissue diffusely infiltrated by WBC, about half of which were eosinophils. The authors believe that eosinophilic granulomatous lesions of the gastrointestinal tract comprise a distinct clinical and pathologic entity that should be considered in the differential diagnosis of obstructing or ulcerating lesions.

6586 HYPEROXALURIA AS COMPLICATION OF INTESTINAL DISEASES. (Ger.) Ruge, W.; Kohler, J.; Fromm, H. (Medizinische Klinik, Podbielskistrasse 380, D-3000 Hannover, W. Germany). *Med. Klin.* 71(46):2028-2032; 1976.

Urinary oxalate excretion was measured in 75 patients with Crohn's disease, ulcerative colitis, chronic disease of the pancreas with exocrine pancreatic insufficiency, sprue syndrome, other malabsorption syndrome or after partial resection of the small intestine by the Hodgkinson and William's method. An increase in urinary oxalate excretion was found in patients with resected parts of the small intestine (43.7 mg oxalic acid/g creatinine), sprue, and other malabsorption syndromes. Patients who underwent resection of the colon showed a lesser increase in urinary oxalate excretion (24.1 mg/g). Of the 75 patients, 4 had urolithiasis and exhibited increased values of urinary oxalate excretion (27-36 mg/g creatinine). There was a significant correlation between urinary oxalate excretion and steatorrhea, as well as between urinary oxalate excretion and the length of the resected small intestine. A weak correlation was established between urinary oxalate excretion and the extent of vitamin B_{12} malabsorption. Malabsorption, especially as an increased resorption of urinary oxalate in the colon or small intestine, is an important cause of hyperoxaluria. A suggested therapy to prevent urolithiasis in cases of hyperoxaluria included: a special diet with reduced amounts of oxalic acid; a reduction in the amount of fat in the diet; and the administration of cholestyramine (4 g, q.i.d.).

6587 MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE MUCOSA OF THE SMALL INTESTINE IN PATIENTS WITH KIDNEY DISEASES OF DIFFERENT INSUFFICIENCY LEVELS AND IN HEMODIALYSIS PATENTS. II. COMMUNICATION: FUNCTIONAL DISORDERS OF THE SMALL INTESTINE. (Ger.) Sperschneider, H.; Stein, G.; Kunath, H. (Medizinische Klinik des Bereichs Medizin, Friedrich-Schiller-Universitat, Bachstr. 18, 69 Jena, E. Germany). *Dtsch. Gesundheitsw.* 32(1):17-22; 1977.

A direct correlation was established between renal insufficiency and pathological changes in the small intestine by lactose tolerance, fat, and iron resorption tests in 115 patients with chronic pyelonephritis and glomerulonephritis. Of the 110 patients who underwent lactose resorption tests, 80 had normal blood sugar values, while 30 patients demonstrated a low blood sugar level. With an increase in renal dysfunction, there was a significant increase in the number of patients showing low blood sugar levels. Long-term dialysis (3 times per week) significantly decreased the number of patients showing low blood sugar levels. Of the 112 patients who underwent fat resorption tests, 24% receiving dialysis treatment, and 67% receiving no dialysis treatment showed a continuous decrease in fat resorption. Of the 100 patients who underwent the iron resorption tests, 5 indicated elevated iron resorption activity, while all the rest had decreased iron resorption activity, depending on the stage of renal insufficiency. No change in iron resorption activity was evident when dialysis was applied. Histological examination of the mucose membrane of the small intestine showed fusion and atrophy of the fimbria and villi, as well as inflammatory changes of the mucose membrane associated with an increase in renal dysfunction.

6588 INTESTINAL TUBERCULOSIS (A REVIEW OF 31 CASES FROM NEW YORK CITY). (Eng.) Homan, W. P.; Grafe, W. R.; Dineen, P. (New York Hosp.-Cornell Medical Center, New York, NY). *Chir. Gastroenterol.* 11(1):91-94; 1977.

Experience with 31 cases of intestinal tuberculosis at one hospital during the past 44 yr was reviewed. Twelve cases were seen prior to the availability of streptomycin in 1946, and 19 cases were seen thereafter. The most frequent site of involvement was the ileum (84% of patients), followed by the cecum (52%), jejunum (19%), and ascending colon (16%). Twenty-eight patients (90%) had evidence of pulmonary involvement, and no other site of tuberculosis was demonstrable in only two (6%). The most common symptoms were gastrointestinal upset (83% of patients), abdominal pain (77%), weight loss (74%), change in bowel habits (58%), and fever (52%). The difficulty in establishing diagnosis was reflected by duration of symptoms for longer than 1 month prior to diagnosis in 77% of patients. Gastrointestinal x-ray studies may not be diagnostic, but strongly suggestive, of intestinal myobacterial disease in the presence of pulmonary tuberculosis. Other diagnostic possibilities include Crohn's disease and neoplastic processes. The importance of instituting immediate antituberculous chemotherapy was emphasized by the 67% mortality rate in the patients presenting before the availability of streptomycin and the 21% mortality rate in patients receiving appropriate drug therapy. Ileocecal disease in the presence of pulmonary tuberculosis suggests the presence of intestinal tuberculosis. In the United States, ileocecal disease without the demonstrable presence of another site of tuberculosis makes intestinal tuberculosis unlikely. Antituberculous chemotherapy is the treatment of choice and surgery should be reserved for patients in whom the diagnosis is in question or in whom intestinal complications may occur.

6589 THE EFFECT OF DIET ON INTESTINAL *Escherichia coli*. (Eng.) Bettelheim, K. A.; Cooke, E. M.; O'Farrell, S.; Shooter, R. A. (St. Bartholomew's Hosp., West Smithfield, London EC1A 7BE, England). *J. Hyg. (Camb.)* 79(1):43-45; 1977.

To assess the role of food as a source of fecal *Escherichia coli*, the feces of six healthy subjects were examined and serotyped. All stools were collected during a 4-week period in which the subjects ate only a sterile diet and during two 2-week periods before and after the sterile diet period, in which the subjects ate a normal diet. The 279 specimens yielded 2,659 isolations of *E. coli*; 142 different *E. coli* serotypes were found, which included 60 O antigens and 34 H antigens. A large number of the serotypes (109/142) was isolated only once from each subject. The number of serotypes per specimen was less during the sterile diet period and rose after this period to levels higher than previously; before the sterile diet the number of serotypes ranged between 0.82 and 1.71; during the sterile diet the number ranged between 0.22 and 0.91, and after the sterile diet the number ranged between 1.00 and 3.00. However, a number of serotypes were isolated for the first time during the period of sterile diet. The results support the view that normal food is a source of *E. coli* strains present in the bowel. The serotypes acquired during the sterile diet may have arisen as a result of antigenic variation.

6590 AN IMMUNOFLUORESCENT STUDY OF α-FETOPROTEIN. II. ITS SIGNIFICANCE IN SOME NONHEPATOMA PATIENTS. (Eng.) Saitoh, K.; Harada, H.; Harada, K.; Inoue, K. (Second Dept. Surgery, Tokushima Univ., Tokushima, Japan). *Eur. Surg. Res.* 9(2):113-121; 1977.

Alpha-fetoprotein (AFP) was investigated to elucidate its site of synthesis in six nonhepatoma patients (5 with various tumors and 1 with congenital biliary atresia). AFP levels fell temporarily after surgery and chemotherapy in two patients (ages 12 and 14 months). However, the AFP levels increased again in spite of further treatment and the patients died. Two other patients (ages 17 months and 43 yr) were asymptomatic after removal of primary tumors and were treated for metastatic lesions. One of the patients maintained normal AFP levels and is still alive; the other showed increased AFP levels after surgery and chemotherapy and died of massive mediastinal and retroperitoneal recurrence. A common papillary projection in primary tumors was seen in five patients. Esophagogastrectomy resulted in a fall in AFP levels to within normal range, suggesting the gastric lesion as the main AFP producer in the adenocarcinoma patient (age 64 yr and still alive). The tumor cells from this patient showed prominent cellular and nuclear pleomorphism, and AFP was localized in their cytoplasm. Two operations of anastomosis between the liver and intestine caused AFP to fall in the patient with biliary atresia (age 1.7 months, died) but did not correlate with clinical features. A regenerative process of hepatocytes that were occasionally binucleated and that increased the thickness of liver plates was reported in this latter patient. AFP was of value in gauging the response to treatment or in predicting the outcome in tumor cases.

6591 SERUM GASTRIN RESPONSE TO ACUTE AND CHRONIC HYPERCALCAEMIA IN MAN: STUDIES ON THE VALUE OF CALCIUM STIMULATED SERUM GASTRIN LEVELS IN THE DIAGNOSIS OF ZOLLINGER-ELLISON SYNDROME. (Eng.) Lamers, C. B. H.; Van Tongeren, J. H. M. (St. Radboud Hosp., Univ. Nijmegen, Nijmegen, Netherlands). *Eur. J. Clin. Invest.* 7(4):315-317; 1977.

The effect on serum gastrin of calcium infusion over a 3-hr period without gastric aspiration was determined by radioimmunoassay in 15 normal subjects, 10 patients with duodenal ulcer, 9 with stomal ulcer, 5 with total gastrectomy, 6 with achlorhydria, and 16 with proved or presumed Zollinger-Ellison (ZE) syndrome. Serum gastrin rose significantly only in patients with ZE-syndrome or achlorhydria. An increase of above or below 50% of basal value seemed to be a useful criterion by which to differentiate between patients with and without ZE syndrome. In 44 patients with chronic hypercalcemia, serum gastrin levels (72 ± 24 pg/ml) were not significantly different from the levels in 100 normal subjects (66 ± 18 pg/ml, $p>0.10$). However, serum gastrin values were markedly higher during chronic hypercalcemia than during normocalcemia in one patient with ZE syndrome and in two patients with achlorhydria. It is concluded that acute or chronic hypercalcemia without gastric aspiration does not lead to hypergastrinemia in the absence of achlorhydria, or ZE syndrome.

6592 A CASE OF NON-AGGLUTINABLE VIBRIO GASTROENTERITIS WITH ANURIA. (Eng.) Harris, A. R. C. (Royal Perth Hosp., Box X2213 G.P.O. Perth, Western Australia 6001). *Med. J. Aust.* 1(12):405-406; 1977.

6593 GASTRO-INTESTINAL BLOOD LOSS DURING ADMINISTRATION OF INDOPROFEN, ASPIRIN AND IBUPROFEN. (Eng.) Bianchi Porro, G.; Corvi, G.; Fuccella, L. M.; Goldaniga, G. C.; Valzelli, G. (Ospedale L. Sacco, Milan, Italy). *J. Int. Med. Res.* 5(3):155-160; 1977.

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NY 10032). *Cancer* 39(5):2209-2230; 1977.

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6598 SCLERODERMA WITH INTESTINAL INVOLVEMENT: FATAL IN TWO OF A KINDRED. (Eng.) Strosberg, J. M.; Peck, B.; Harris, E. D., Jr. (Sunnyview Hosp. and Rehabilitation Center, 1270 Belmont Ave., Schenectady, NY 12308). *J. Rheumatol.* 4(1):46-52; 1977.

6599 NUTRITIONAL CONSEQUENCES OF RADIOTHERAPY. (Eng.) Donaldson, S. S. (Stanford Univ. Medical Center, Stanford, CA 94305). *Cancer Res.* 37(7, Part 2):2407-2413; 1977.

6600 PAROTID GLAND TUMORS IN INFANTS AND CHILDREN. (Eng.) Catania, V. C.; Bozzetti, F.; Santangelo, A.; Salvadori, B. (Istituto Nazionale per lo Studio e la Cura dei Tumori, Milan, Italy). *Tumori* 63(2):195-198; 1977.

6601 FOODS AND DISEASES. (Eng.) Knox, E. G. (Medical Sch., Edgbaston, Birmingham B15 2TJ, England). *Br. J. Prev. Soc. Med.* 31(2):71-80; 1977.

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6605 Shigella dysenteriae I: A FORGOTTEN CAUSE OF PSEUDOMEMBRANOUS COLITIS. (Eng.) Kelber, M.; Ament, M. E. (Univ. California at Los Angeles, Center for Health Sciences, Los Angeles, CA 90024). *J. Pediatr.* 89(4):595-596; 1976.

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6608 ABDOMINAL TUBERCULOSIS IN BRITAIN. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 1(6076):1557; 1977.

6609 DETERMINATION OF ^{58}Co-VITAMIN B_{12} ABSORPTION IN PERNICIOUS ANEMIA BY USE OF WHOLE-BODY COUNTING: REPRODUCIBILITY AND CONTROL OF GUT TRANSIT TIME. (Eng.) Hjelt, K.; Rasmussen, P. A.; Munck, O. (Glostrup Hosp., Glostrup, Denmark). *Acta Med. Scand.* 201(3):167-171; 1977.

6610 HYPOMAGNESAEMIA AND MUSCLE ELECTROLYTES AND METABOLITES. (Eng.) Stendig-Lindberg, G.; Bergstrom, J.; Hultman, E. (Dept. Theoretical Alcohol Res., Karolinska Inst., Stockholm, Sweden). *Acta Med. Scand.* 201(4):273-280; 1977.

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6614 THE MODERN ENIGMA OF RADIATION ENTEROPATHY: SEQUELAE AND SOLUTIONS. (Eng.) Morgenstern, L.; Thompson, R.; Friedman, N. B. (Cedars-Sinai Medical Center, P.O. Box 48750, Los Angeles, CA 90048). *Am. J. Surg.* 134(1):166-172; 1977.

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Inst., USSR). *Pediatr. Akush. Ginekol.* (3):17-18; 1977.

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6623 CLINICAL EVALUATION OF THE RELATIONSHIP BETWEEN ACETYLATION PHENOTYPE AND DEGREE OF TUMOR DISSEMINATION IN THE PATIENTS WITH MALIGNANT TUMORS OF GASTROINTESTINAL TRACT. (Rus.) Simonov, N. N.; Bulovskaya, L. N.; Kolosov, A. I.; Krupkin, R. G. (N. N. Petrov Cancer Inst., Leningrad, USSR). *Vopr. Onkol.* 23(6):122-123; 1977.

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6626 ACIDOPHILIC-YEAST MILK IN AN OVERALL MEASURE TO STIMULATE SECRETION AND ACID FORMATION IN PATIENTS WITH TUBERCULOSIS. (Rus.) Evenshtein, Z. M. ("Pine Forest" Antituberculous Sanatorium, USSR). *Vopr. Pitan. (Mosk.)* (3):91-92; 1977.

6627 PARENTERAL FEEDING IN ABDOMINAL SURGERY (LITERATURE REVIEW). (Rus.) Alekseeva, M. E.; Shulutko, A. M. (I. M. Sechenov First Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (8): 130-134; 1977.

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6629 ELECTROLYTE LOSS THROUGH DEFECATION IN TOXIC INFECTIONS OF THE ALIMENTARY TRACT. (Rus.) Koroteev, A. V.; Orazgaliev, B. D. (Central Inst. Advanced Training for Physicians, Moscow, USSR). *Sov. Med.* (5):143-144; 1977.

6630 USE OF INDIRECT HEMAGGLUTINATION FOR SEROLOGIC DIAGNOSIS OF TOXIC INFECTIONS OF Salmonella ETIOLOGY IN PATIENTS WITH INTESTINAL INFECTIONS. (Rus.) Perevalov, A. Ya. (Leningrad Sanitary-Hygienic Inst., USSR). *Lab. Delo* (6):367-368; 1977.

6631 CLINICAL AND LABORATORY METHODS FOR THE ASSESSMENT OF ENDOGENOUS CHOLECYSTOKININ-PANCREOZYMIN INSUFFICIENCY. (Rus.) Darmostuk, V. Yu. (Dept. Liver and Pancreas Diseases, Dnepropetrovsk Scientific Res. Inst. Gastroenterology, USSR). *Lab. Delo* (6):339-341; 1977.

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6633 TYPHOID PERFORATION. (Eng.) Khosla, S. N. (Medical Coll. and Hosp., Rohtak [Haryana], India). *J. Trop. Med. Hyg.* 80(4):83-87; 1977.

6634 SEVERE PROTEIN-ENERGY MALNUTRITION IN IRAQ, AND ITS EFFECT ON IMMUNITY REACTIONS. (Eng.) Nagi, N. A.; Al-Duboni, H. M. (Coll. Medicine Univ. Mosul, Iraq). *J. Trop. Med. Hyg.* 80(4):78-82; 1977.

6635 ULTRASONIC EVALUATION OF SALIVARY GLANDS. (Eng.) Baker, S.; Ossoinig, K. C. (Dept. Otolaryngology, Univ. Michigan, Ann Arbor, MI). *Trans. Am. Acad. Ophthalmol. Otolaryngol.* 84(4):750-762; 1977.

6636 MAJOR GASTROINTESTINAL PROBLEMS AFTER RADIOTHERAPY: MANAGEMENT AND NUTRITIONAL CONSIDERATIONS. (Eng.) Deitel, M.; Degani, C.; Alexander, M. A. (St. Joseph's Hosp., 30 The Queensway, Toronto M6R 1B5, Canada). *Int. Surg.* 62(6/7): 334-337; 1977.

6637 GASTROENTERITIS IN CHILDREN: A TWO-YEAR REVIEW IN MANITOBA. I. ETIOLOGY. (Eng.) Gurwith, M. J.; Williams, T. W. (Health Sciences Ce ter, Basic Sciences Building, 730 William Ave., Winnipeg, Manitoba R3E 0Z3, Canada). *J. Infect. Dis.* 136(2):239-247; 1977.

6638 ADVANTAGES AND DISADVANTAGES OF INTRAVENOUS FEEDING IN INFANTS; ITS PLACE IN DEVELOPING COUNTRIES. (Eng.) Regusci, A. (Av. Sarmiento, 2233, ap. 6 Montevideo, Uruguay). *Arq. Gastroenterol. Sao Paulo* 14(2):99-101; 1977.

6639 CLINICAL AND PATHOLOGICAL STUDY OF PAROTID GLAND TUMOR. (Jpn.) Nagao, K.; Matsuzaki, M.; Idehara, S.; Kitamura, T.; Kaneko, T.; Naito, J. (Chiba Univ. Sch. Medicine, Chiba, Japan). *Jpn. J. Cancer Clin.* 23(6):519-526; 1977.

See also, 5996, 6008, 6036, 6154, 6155, 6156, 6158, 6159, 6167, 6194, 6215, 6224, 6241, 6291, 6300, 6317, 6335, 6338, 6375, 6503, 6507, 6657.

GENERAL

Parasitology

6640 ELIEDA (ENZYME-LINKED-IMMUNO-ELECTRO-DIFFUSION-ASSAY): APPLICATION OF A COMBINED IMMUNOELECTRODIFFUSION AND IMMUNOENZYME METHOD TO THE STUDY OF IMMUNE RESPONSE IN PARASITIC INFECTIONS. (Eng.) Pinon, J. M.; Dropsy, G. (Hopital Maison Blanche, Reims, 51100 France). *J. Immunol. Methods* 16(1):15-22; 1977.

The technique of immunoelectrodiffusion (IED) has been combined with an enzyme method to enhance its sensitivity in determining immunoglobulins involved in antigen-antibody reactions. This combination constitutes the ELIEDA procedure (enzyme-linked-immuno-electro-diffusion-assay). ELIEDA is performed in three steps: (1) rapid formation of insoluble immune complexes by IED, (2) treatment of complexes with anti-heavy chain peroxidase-labeled antibodies, and (3) enzyme reaction to reveal sites of binding. The sensitivity of the method is equal or superior to that obtained by staining the proteins with Coomassie blue or amidoschwarz. In comparative tests on individual sera, as many as eight additional precipitating systems were revealed by ELIEDA that were not detectable by simple protein staining. The method was employed in studies of the immunology of parasitic infections, e.g., amebiasis, aspergillosis, schistosomiasis, filariasis, and hydatidosis. ELIEDA provides a valuable tool (sensitive and specific) for analyzing an organism's responses to complex immunogens.

6641 AMEBIASIS: AN INCREASING PROBLEM AMONG HOMOSEXUALS IN NEW YORK CITY. (Eng.) Schmerin, M. J.; Gelston, A.; Jones, T. C. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *JAMA* 238(13):1386-1387; 1977.

Two cases of amebiasis occurring in male homosexuals who had not traveled outside the New York area are presented, and the literature is reviewed. Both patients presented with nonbloody diarrhea with abdominal cramps. The stool cultures of both patients were positive for *Shigella flexneri*, as well as for *Entameba histolytica*. During a 5-yr period at one New York hospital, *E. histolytica* was identified in the stools of 20 men who had not traveled outside the New York area. All of these patients were homosexual. During this same period, amebiasis was diagnosed in 30 men who had traveled, and only 2 of these were homosexual. Of 10 patients with *E. histolytica* seen during the first year of this study, none were homosexual, whereas 8 of 11 patients in the fifth year were homosexual. This suggests the existence of a gradual increase of this disease among homosexuals.

6642 RADIOLOGY OF INVASIVE AMEBIASIS OF THE COLON. (Eng.) Cardoso, J. M.; Kimura, K.; Stoopen, M.; Cervantes, L. F.; Elizondo, L.; Churchill, R.; *et al.* (Dept. Radiology, Hosp. General Centro Medico Nacional, Mexico City, Mexico). *Am. J. Roentgenol.* 128(6):935-941; 1977.

The radiologic manifestations of invasive amebiasis of the colon caused by *Entamoeba histolytica* are described. The clinicopathologic forms, seen at the Hospital General Center Medico Nacional, Mexico, of this condition were ulcerative rectocolitis (95%), typhloappendicitis (3%), ameboma (1.5%), and fulminating colitis and toxic megacolon (0.5%). The barium enema was most informative, showing edema of the mucosa and mucosal irregularities in ulcerative rectocolitis and perforation and lateral pericecal compression from abscess in typhloappendicitis. The ameboma (segmental lesion) was characterized by a marked thickening of the bowel wall producing an excrescent mass that narrowed the intestinal lumen. The most reliable features of ameboma were multiplicity of the lesions, lack of shelving deformity, and rapid improvement with antiamebic therapy. The fulminating colitis followed a rapid, acute, toxic course and had a mortality rate of 90%. Various radiographic patterns were reported for this disease, e.g., nonspecific patterns, thumbprinting, toxic megacolon, perforation (in 60-87% of patients), fistula formation, and stenosis. It is suggested that this disease be included in the differential diagnosis of large bowel pathology even in nonendemic areas, since rapid progression and deterioration can occur if the diagnosis is delayed.

6643 AN EVOLVING PATTERN OF HUMAN HYDATID DISEASE TRANSMISSION IN THE UNITED STATES.

(Eng.) Pappaioanou, M.; Schwabe, C. W.; Sard, D. M. (Sch. Veterinary Medicine, Univ. California, Davis, CA 95616). *Am. J. Trop. Med. Hyg.* 26(4): 732-742; 1977.

The apparent association of human risk of infection with *Echinococcus granulosus* in the U.S. with particular population groups (Negroes in the southeast, Basques and Mormons in parts of the west) and occupations (backyard swine raising, transhumant sheep ranching) is reviewed. The 123 cases were analyzed by decade diagnosed, probable geographical origin of infection, sex, race, and age at diagnosis of the patients and organ site of cysts. Four percent of infections originated in the northeast, 24% in the southeast, and 53% in the west with the remainder unclassified by region. In the west, infection predominated in men, and in the southeast and northeast, it predominated in women ($p<0.05$). Fifty-one patients were reported to have had contact with dogs, 34 patients with sheep, and 3 patients with swine. Human populations now at risk in the western U.S. are transhumant sheep ranchers, including Basque-Americans in California, Mormons in Central Utah, and Navajo and Zuni Indians in New Mexico and Arizona. Highly favorable conditions to *E. granulosus* transmission, intensification, and spread exist in large areas of the western U.S. It is suggested that systematic surveillance and focal control programs for uniloculor hydatid disease be established in the U.S.

6644 COMPARATIVE SINGLE/DOSE TREATMENT OF HOOKWORM AND ROUNDWORM INFECTIONS WITH LEVAMISOLE, PYRANTEL AND BEPHENIUM.

(Eng.) Farid, Z.; Bassily, S.; Miner, W. F.; Hassan, A.; Laughlin, L. W. (U.S. Naval Medical Res. Unit No. 3, Cairo, Egypt). *J. Trop. Med. Hyg.* 80(5):107-108; 1977.

Levamisole, pyrantel, and bephenium were compared for their effectiveness in the treatment of hookworm and roundworm in 145 men (aged 7-45 yr) with *Ancylostoma duodenale* and or *Ascaris lumbricoides*. Fifty-one patients received a single 150-mg dose of levamisole, 47 received one 750-mg dose of pyrantel, and the remaining patients received one 5-g dose of bephenium. The percentage cure rates were 100% for ascaris and 93% for hookworm with levamisole, 90% for ascaris and 78% for hookworm with pyrantel, and 73% for ascaris and 81% for hookworm with bephenium. All drugs were well tolerated, but nausea and dizziness occurred in a few patients who received bephenium. The results show that the effectiveness of levamisole compares favorably with pyrantel and is superior to bephenium in the treatment of mixed hookworm and roundworm infections.

6645 IMMUNOLOGICAL STUDIES IN HUMAN SCHISTOSOMIASIS. III. IMMUNOGLOBULIN LEVELS, ANTIBODIES, AND DELAYED HYPERSENSITIVITY.

(Eng.) Camus, D.; Carlier, Y.; Capron, M.; Bina, J. C.; Figueiredo, J. F. M.; Prata, A.; *et al.* (Faculte de Medecine, Place de Verdun, 59000 Lille, France). *Am. J. Trop. Med. Hyg.* 26(3):482-490; 1977.

The present study was undertaken to establish a possible correlation between immunoglobulin levels, specific antibody titers, or delayed hypersensitivity (DHS) responses, and other biological or clinical parameters of infection by *Schistosoma mansoni* in a Brazilian population. Three groups of patients were studied: 1) untreated subjects (73) living in similar epidemiological conditions and regularly exposed to reinfection, 2) subjects not exposed to reinfection (34), and 3) surgically treated patients (26). Levels of IgG, IgE, IgM, and IgA were determined, specific antibodies were detected by the fluorescent antibody test, and hemagglutination tests, complement fixation tests, immunoelectrophoresis, and intradermal tests for DHS to *S. mansoni* antigens were done. The results were compared according to the clinical forms of the disease. IgG levels and antibody titers increased progressively in the subclinical, hepatomegalic, and hepatosplenic forms, and there was a statistical relationship between IgG levels and the intensity of responses to the four serological tests. DHS was found more frequently in hepatosplenic patients and more particularly in those with splenomegaly. DHS also correlated with age, but not with sex or skin color. The strongest DHS reactions were observed in patients 20-34 yr old, and in those having the highest fecal egg output. IgG levels, antibody titers, and DHS responses decreased after splenectomy and portal filtration of the worms. No significant variation in frequency of DHS was observed between untreated subjects, patients who were splenectomized, and a group not subject to reinfection for 4 yr.

6646 IgG DEPOSITS AND DISSE'S SPACE PATHOLOGY IN HUMAN SCHISTOSOMAL LIVER.

(Eng.) Grimaud, J. A.; Borojevic, R.; El Badrawy, N. (Centre de Microscopie Electronique, Institut Pasteur, 77, rue Pasteur, F-69365 Lyon Cedex 2, France) *Experientia* 33(8):1078-1079; 1977.

The mechanism responsible for the deposition of collagen in the space of Disse was investigated in liver biopsy specimens from patients with advanced Symmers' fibrosis associated with schistosomiasis. Electron dense deposits corresponding to peroxidase-labeled anti-IgG serum was observed in membranes of the vascular pole of the hepatocytes, inside the affected Disse's spaces, on both sides of the endothelial cells, and on the flocular deposits of the sinusoidal side of the endothelium. The demonstration of IgG deposits in the abnormal Disse's space demonstrates that immunological reactions are involved in the filling of these spaces in schistosomiasis.

6647 CLINICAL MANIFESTATIONS AND EPIDEMIOLOGY OF DISEASES CAUSED BY Yersinia enterocolitica IN MAN. (Rus.) Shoshiev, L. N.; Gurleva, G. G.; Grigoryan, E. G. (Rostov-on-Don Scientific Res. Antiplague Inst., USSR). *Sov. Med.* (5):119-121; 1977.

6648 ACUTE SURGICAL LESION OF ABDOMINAL ORGANS DUE TO Yersinia. (Rus.) Strelnikov, B. E.; Rolshchikov, I. M.; Antonov, V. I.; Antonenko, F. F.; Vishnyakov, A. K. (Vladivostok Medical Inst., USSR). *Klin. Med.* 55(4):86-89; 1977.

6649 CASE OF LATENT AMEBIASIS COMPLICATED BY MULTIPLE LIVER ABSCESSES. (Rus.) Shugailo, V. T.; Medvid, M. V. (Ivano-Frankovsk Medical Inst., USSR). *Vrach. Delo* (5):40-41; 1977.

6650 PHASE 1 TOLERABILITY AND SEARCHING DOSE STUDIES WITH 4-ISOTHIOCYANATO-4'-NITRODIPHENYLAMINE (C.9333-Go/CGP 4540), A NEW ANTHELMINTIC. (Eng.) Vaidya, A. B.; Sen, H. G.; Mankodi, N. A.; Paul, T.; Sheth, U. K. (Ciba-Geigy Res. Center, Aarey Rd., Goregaon [E], Bombay 400 063, India). *Br. J. Clin. Pharmacol.* 4(4):463-467; 1977.

6651 ENDEMIC AMEBIASIS IN AN EXTENDED FAMILY. (Eng.) Spencer, H. C.; Muchnick, C.; Sexton, D. J.; Dodson, P.; Walls, K. W. (Center Disease Control, Dept. Health, Education, Welfare, Atlanta, GA 30333). *Am. J. Trop. Med. Hyg.* 26(4): 628-635; 1977.

6652 CLINICAL TRIALS OF A NEW ANTHELMINTIC, 4-ISOTHIOCYANATO-4'-NITRODIPHENYLAMINE (C.9333-Go/CGP 4540), FOR THE CURE OF HOOKWORM INFECTION. (Eng.) Doshi, J. C.; Vaidya, A. B.; Sen, H. G.; Mankodi, N. A.; Nair, C. N.; Grewal, R. S. (Dr. R. N. Cooper Municipal General Hosp., Bombay, India). *Am. J. Trop. Med. Hyg.* 26(4): 636-639; 1977.

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6658 DUODENAL INTUBATION WITH SECRETIN STIMULUS FOR DIAGNOSIS OF GIARDIASIS. (Eng.) Sagaro, E.; Blanco, E.; Fragoso, T.; Castaneda, C. (Inst. Gastroenterology, Dept. Public Health, Havana, Cuba). *Arch. Dis. Child.* 52(6):505-507; 1977.

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Medicine, Univ. Malaya, Kuala Lumpur, Malaysia). *Trans. R. Soc. Trop. Med. Hyg.* 71(3):271; 1977.

6663 CLINICAL EVALUATION OF A NEW ANTHELMINTIC--C.9333 Go./CGP 4540 IN HUMAN HOOKWORM INFECTION. (Eng.) Vakil, B. J.; Dalal, N. J.; Shah, P. N.; Koti, S. T.; Mankodi, N. A.; Sen, H. G.; *et al.* (Grant Medical Coll., Bombay 400 008, India). *Trans. R. Soc. Trop. Med. Hyg.* 71(3):247-250; 1977.

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6665 THE INCIDENCE OF INTESTINAL PARASITES IN SOME HILO HOSPITAL PATIENTS. (Eng.) Andrade, N.; Noda, K. (Univ. Hawaii at Hilo, Hilo, HI 96720). *Hawaii Med. J.* 36(6):172-173; 1977.

6666 LIVER ABSCESS: Eikenella corrodens AND STREPTOCOCCI. (Eng.) Nagesh, K. G.; Poulose, K. P.; Rao, G. M. (Veterans Admin. Center, Leavenworth, KS 66048). *J. Kansas Med. Sci.* 78(7):340-342; 1977.

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6668 Enterobius vermicularis IN ECTOPIC SITES. (Eng.) Chandrasoma, P. T.; Mendis, K. N. (Faculty Medicine, Univ. Sri Lanka, Colombo, Sri Lanka). *Am. J. Trop. Med. Hyg.* 26(4):644-649; 1977.

6669 A 13-YEAR FOLLOW-UP OF ANTIMONY-TREATED Schistosoma mansoni-INFECTED PATIENTS. (Eng.) Hedman, P.; Bengtsson, E. (Roslagstulls Sjukhus, Box 5901, S-114-89 Stockholm, Sweden). *Am. J. Trop. Med. Hyg.* 26(4):693-695; 1977.

6670 ELUTION OF RENAL ANTISCHISTOSOME ANTIBODIES IN HUMAN SCHISTOSOMIASIS MANSONI. (Eng.) Moriearty, P. L.; Brito, E. (Univ. Maryland Sch. Medicine, 660 W. Redwood St., Baltimore, MD 21201). *Am. J. Trop. Med. Hyg.* 26(4):717-722; 1977.

See also, 6145, 6150, 6628.

GENERAL

Regional Enteritis

6671 LEVAMISOLE IN THE TREATMENT OF CROHN'S DISEASE. (Eng.) Segal, A. W.; Levi, A. J.; Loewi, G. (Clinical Res. Center, Watford Rd., Harrow, Middlesex HA1 3UJ, England). *Lancet* 2(8034):382-384; 1977.

The value of an elemental diet and levamisole in inducing and maintaining, resp., remission in Crohn's disease was studied in eight patients with active uncomplicated Crohn's disease. Clinical remission was induced in all patients with an elemental, protein-free diet. Improvement started 3-10 days after beginning the diet, and the patients generally became apyrexial during this period. Fourteen days after the start of the elemental diet, levamisole (50 mg, except for one patient in whom the dose was 25 mg) was administered every 8 hr for 3 consecutive days every 2 weeks. After the second course of levamisole treatment, the elemental diet was stopped and a normal diet resumed. The duration of this therapy has been 3-12 months. All patients responded, and seven are asymptomatic and leading normal lives. Arthritis was a side-effect in two patients, and this resolved when levamisole was withdrawn; one patient remains asymptomatic. Neutrophil migration into skin windows reverted to normal after treatment. The number of cells that entered the skin windows was significantly different from that in untreated patients with Crohn's disease ($p<0.001$) but similar to that in normal controls. Levamisole appears to be a useful drug in maintaining a clinical remission in Crohn's disease.

6672 CROHN'S DISEASE: RECURRENCE AFTER SURGICAL TREATMENT. (Eng.) Nygaard, K.; Fausa, O.

(Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(5):577-584; 1977.

Recurrence and reoperation rates are reported for a series of 76 patients who underwent surgery for Crohn's disease. In 14 patients, surgery was performed for recurrence after previous resection. A total of 93 surgical procedures were performed, with the most common being ileocolic resection (55 cases). The most frequent site of the disease was the terminal ileum or the terminal ileum plus the right colon (42 cases). There were four postoperative mortalities (5.3%) and four late deaths (1-6 yr after surgery). A statistical analysis of 66 patients who had undergone excisional surgery and had been followed up for a median period of 4.0 yr (range, 2-11 yr) revealed a yearly recurrence rate of 15.2% and a cumulative recurrence rate of 77% after 9 yr. The average yearly recurrence rate during the first 9 yr after surgery was 15.8% after primary operations and 13.8% after operations for recurrence; this difference was not statistically significant. The average yearly reoperation rate was 5.5%, and the cumulative reoperation rate after 9 yr was 45%. The rate of recurrence during the 1st postoperative yr was significantly ($p<0.01$) lower after radical resections (6/65) than after nonradical resections (8/15). These results corroborate those of other studies indicating that Crohn's disease has a great natural propensity to recur after surgical treatment. However, surgery does offer good palliation to many patients with serious symptoms.

6673 ISOLATION OF REOVIRUS-LIKE AGENTS FROM PATIENTS WITH CROHN'S DISEASE. (Eng.)

Whorwell, P. J.; Beeken, W. L.; Phillips, C. A.; Little, P. K.; Roessner, K. D. (Dept. Medicine, Univ. Vermont, Burlington, VT 05401). *Lancet* 1(8023):1169-1171; 1977.

Intestinal resection specimens from 10 patients with Crohn's disease and from 9 control specimens were examined for the presence of virus-like agents. Tissue homogenates were centrifuged at 10,000 x *g* for 1 hr, and passed sequentially through 1,200, 450, and 220 nm filters and cultured in WI-38 monolayers. Of the 10 Crohn's disease patients, 6 yielded an agent that produced a cytopathic effect in the WI-38 cells; none of the control specimens showed a positive reaction. Three of the six positive isolates were characterized. By filtration the virus was less than 220 nm and greater than 50 nm in diameter. Its growth was not inhibited by iododeoxyuridine, and it was heat-, ether-, and acid-stable. Electron microscopy revealed cored viral particles ranging in diameter from 55 to 60 nm. Aggregates of virus usually consisted of only a few particles. A 1/8 dilution of antiserum to Nebraska calf-diarrhea virus completely inhibited the development of a cytopathic effect by each of the three Crohn's disease isolates tested. The results suggest that this isolate belongs to the Reoviridae family.

6674 VARIABILITY OF SPLENOMEGALY IN CROHN'S DISEASE. (Eng.)

Rozen, P.; Flatau, E.; Schujman, E.; Gefel, A. (Ichilov Hosp., Weizmann St., Tel Aviv, Israel). *Am. J. Gastroenterol.* 67 (5):489-493; 1977.

The cases of five patients with Crohn's disease in whom splenomegaly was present are reported. The patients ranged in age from 14-67 yr, all men, and all were Ashkenazi Jews. In three febrile patients, splenomegaly was so prominent that the diagnosis of lymphoma was considered. Splenomegaly was an incidental finding in two patients and transient in one patient. Three patients also had hepatomegaly at some time during their course, although none had laboratory or biopsy evidence of significant liver damage. Splenomegaly is rare in Crohn's disease. Its presence may reflect the diffuse influence of this disease on the reticuloendothelial system, as manifested by the mesenteric lymphadenopathy commonly found in regional enteritis.

6675 FREE PERFORATION OF THE SMALL BOWEL IN CROHN'S DISEASE. (Eng.)

Croft, R. J. (Middlesex Hosp., Mortimer St., London W1, England). *Postgrad. Med. J.* 53(620):344-346; 1977.

A rare case of free double ileal perforation in previously asymptomatic and undiagnosed Crohn's disease of the terminal ileum is described. The patient, a 44-yr-old woman, presented with a 1-week history of generalized, intermittent, colicky abdominal pain associated with vomiting and constipation for the past 4 days. The abdominal examination revealed signs of generalized peritonitis. At operation, the terminal 32 cm of ileum showed typical features of chronic Crohn's disease, but without adhesions to other loops of bowel or abscess formation. On the antimesenteric border of the ileum, two free perforations were found 7 and 8.5 cm, resp., from the ileocecal valve. The remainder of the small bowel and the large bowel were normal. Primary resection of the terminal 42 cm of ileum, cecum, and proximal 10 cm of ascending colon was performed with end-to-end anastomosis. The patient remains well with no further evidence of Crohn's disease 19 months postoperatively. The absence of steroids in a previously undiagnosed case of Crohn's disease may favor primary resection and anastomosis.

6676 OBSTRUCTIVE UROPATHY IN CHRONIC INFLAMMATORY BOWEL DISEASE. (Eng.)

Fleckenstein, P.; Knudsen, L.; Pedersen, E. B.; Marcussen, H.; Jarnum, S. (Rigshospitalet, Blegdamsvej 9, DK 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12 (5):519-523; 1977.

A retrospective assessment of the frequency of ureteral obstruction in 140 patients with Crohn's disease and 88 patients with ulcerative colitis was performed on the basis of i.v. pyelography. The findings were related to x-ray examination of the gastrointestinal tract and to the clinical condition at the time of examination. The frequency of obstructive uropathy was 19% in patients with

Crohn's disease. Radiography of the gastrointestinal tract revealed a close topographic relationship between diseased areas of the bowel and the ureteral changes. Of 25 patients with right-sided hydroureter, all had radiological changes of the terminal ileum. Clinically, a mass in the iliac fossa was far more common ($p<0.01$) in patients with ureteral dilatation (24 of 26) than in patients without ureteral dilatation (34 of 114). A urinary-intestinal fistula was found in six patients, all of whom also had obstructive uropathy. Intestinal resection had been performed in 12 of the patients with ureteropathy, but the ureteral obstruction did not appear to be due to the operation. Among 88 patients with ulcerative colitis, 12 had ureteral obstruction. Colectomy had been performed in eight of these patients, and it seemed likely that six cases of ureteral obstruction were due to the colectomy. Patients with ureteral obstruction did not differ from other patients with ulcerative colitis with respect to clinical symptoms, urinary tract infection, or palpable mass. The use of i.v. pyelography is recommended before and after intestinal resection in chronic inflammatory bowel disease to demonstrate the relatively common and often fairly silent urinary tract complications.

6677 UROLOGICAL COMPLICATIONS OF REGIONAL ENTERITIS. (Eng.) Kruglik, G. D.; Neiman, H. L.; Sparberg, M.; Nudelman, E.; Mintzer, R. A.; Rogers, L. F. (Northwestern Memorial Hosp., Superior St. and Fairbanks Ct., Chicago, IL 60611). *Gastrointest. Radiol.* 1(4):375-378; 1977.

The cases of 37 patients with regional enteritis in whom excretory urograms were performed were reviewed to study the spectrum of radiographic findings and pathogenesis of urological complications in this disease. Urographic findings secondary to regional enteritis were observed in 21 cases; these included ureteral calculi (7 cases), retroperitoneal abscess (2), ureteral stenosis (5), panvesiculitis (4), and enterovesical fistula (5). Two major types of pathological processes may complicate regional enteritis and relate to the urinary tract. Metabolic derangements include the formation of renal calculi and the development of amyloidosis. Secondly, direct extension of the inflammatory process into the mesentery can result in retroperitoneal abscess formation, periureteral fibrosis with obstruction, or panvesiculitis with or without enterovesical fistula. In two of the four patients with panvesiculitis, a history of gastrointestinal symptoms was lacking, the urological abnormality thus revealing the extravesical disease prior to its clinical presentation. Routine and periodic excretory urograms should be a central part of the evaluation of patients with regional enteritis.

6678 POLYARTHRITIS AND CROHN'S DISEASE. REPORT OF ONE CASE. (Fre.) May, V. (Centre Hospitalier, 25, rue Pierre de Theilley, F 95500 Gonesse, France). *Rev. Rhum. Mal. Osteoartic.* 43(10):553-554; 1976.

See also, 6348, 6350, 6353, 6355, 6356, 6357, 6608.

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AASE, S.
6262*
ABADI, P.
6309*
ABBA, B.C.
6324*
ABDULLAEV, A.K.
6422*
ABOUZHABBAROV, A.
6231
ABE, H.
6147
ABOLIMOV, E.V.
6004*
ABRAHAM, R.
6023
ABRAMS, J.
6088*
ADACHI, J.
6177
ADAMSONS, R.J.
6200*
ADDISON, N.V.
6575*
ADIBI, S.A.
6008
AFARI, G.
6034
AGARWAL, M.K.
6123
AGENANT, D.
6312*
AHMAD, M.
6514*
AKCAL, T.
6203
AKDAMAR, K.
6335*
AKHMETKALIEV, S.G.
6110
AKIBA, H.
6370
AL-DUBONI, H.M.
6634
ALAVI, A.
6392
ALEKSEEVA, M.E.
6627
ALEXANDER, M.A.
6636
ALHAVA, E.M.
6254
ALIMOVA, M.M.
6163
ALLEN, A.M.
6472*
ALLEN, R.G.
6472*
ALLGOWER, M.
6247
ALSTON, W.C.
6405*
ALWASIAK, Z.
6103
AMDRUP, E.
6281
AMENT, M.E.
6605
AMERY, A.H.
6405*
AMIRKHAN, A.C.
6209
ANABITARTE, M.
6116
ANDRADE, N.
6665
ANEHA, Y.
6249
ANGI, E.
6102
ANICHINI, P.
6526*
ANSLEY, J.D.
6522*
ANTONENKO, F.F.
6306, 6648
ANTONOV, V.I.
6648
ANTOSHKINA, E.P.
6576*
ANTROPOVA, G.V.
5999
ANURAS, S.
6441*
AOE, H.
6104
APROSINA, Z.G.
6462*
ARCHIMANDRITIS, A.
6284
ARIANOFF, A.A.
6185
ARIMA, T.
6525*
ARIMIZU, N.
6538*
ARIYAMA, J.
6362*
ARMITSTEAD, P.R.
6575*
ARNMAN, R.
6556*
ARORA, K.L.
6654
ARROYO, V.
6532*
ARVAN, C.
6047
ASAISHI, K.
6657
ASANO, M.
6122
ASNAES, S.
6457*
ATKINSON, M.
6198*, 6217
ATKINSON, P.
6517*
AUFSES, A.H., JR.
6067
AUKEE, S.
6254, 6263*
AUNE, S.
6226*
AUSLANDER, M.C.
6458*
AVDEI, L.V.
6557*
AXELSSON, C.K.
6045
AXELSSON, H.
5991*
AYMES, C.
6320
BABITSKY, E.L.
6232
BAELE, G.
6524*
BAENKLER, H.W.
6420*
BAERT, A.L.
6382
BAGGENSTOSS, A.H.
6536*
BAINE, R.W.
6559*
BAKER, D.A.
6550*
BAKER, J.P.
6139
BAKER, S.
6635
BAKUEV, M.M.
6469*
BALE, G.F.
6477*
BALLAN, K.
6204
BALLARD, J.
6288*
BALLINGER, W.F., II
6225*
BALTHAZAR, E.J.
6244
BAMBA, T.
6162
BANK, S.
6146*
BARANY, F.R.
6379*
BARBIER, F.
6524*
BARBOLT, T.
6023
BARCLAY, A.J.
6051
BARGUTINA, T.G.
6235
BARKER, J.C., JR.
6441*
BARNARDO, C.E.
6227*
BARON, N.
6135
BARTH, C.
6101
BASHKIROVA, V.B.
6346
BASKARAN, G.
6662
BASS, E.M.
6410*
BASSE-CATHALINAT, B.
6183

BASSILY, S.
6644*
BAUDON, J.J.
6319
BAULIEUX, J.
6188
BAULIN, N.A.
6304
BAUMGARTEN, R.
6184
BAUMGARTNER, R.
6158
BAUR, H.
6007*
BAXTER, H.K.
6243
BAYLIS, S.M.
6246
BEAMAN, J.
6074*
BEARD, T.C.
6656
BECK, C.
6183
BECKER, C.
6189
BECKER, H.W.
6189
BECKER, M.
6038*
BEEKEN, W.L.
6673*
BEIN, N.N.
6409*
BELOV, I.N.
6223
BELOV, V.N.
6307
BELYAEVA, N.Y.
5999
BENGTSSON, E.
6669
BENOZIO, M.
6315
BEREZHNOY, V.I.
6298
BERG, G.R.
6386
BERG, N.O.
6308*
BERGSTROM, J.
6610
BERLATZKY, Y.
6558*
BERMUDEZ, F.
6578*
BERNIER, J.J.
6320, 6351*
BERNSTEIN, B.H.
6442*
BERNSTEIN, L.
6135
BERNSTEIN, O.
6255
BERQLIST, K.R.
6481*
BERRY, E.
6467*
BERTRAM, P.
6477*
BETTELHEIM, K.A.
6589*
BEZPROZVANNYI, B.K.
6462*
BIANCHI, L.
6116
BIANCHI PORRO, G.
6593
BINA, J.C.
6645*
BINDER, H.J.
6015
BIRNBACH, D.J.
6073*
BIRRELL, R.
6449*
BITENBINDER, E.O.
6489
BJERKESET, T.
6272
BLACK, J.B.
5995
BLACKSTONE, M.
6376
BLANCO, E.
6658
BLANQUET, P.
6183
BLATTNER, W.A.
6617
BLENDIS, L.
6323*
BLENKINSOPP, W.K.
6399*
BLOCH, K.J.
6128*
BLOCK, Y.E.
6436*
BLOMSTRAND, R.
6078*
BLONSKAYA, L.F.
6487
BLOOM, N.
6540*
BLUM, A.L.
6253
BLUMGART, L.H.
6333*
BLUMSOHN, D.
6276
BODGAN, A.T.
6102
BODROGI, L.
6527*
BOESBY, S.
6210
BOGATYUK, O.R.
6237
BOGDAL, J.
6402*
BOGDANOVICH, N.E.
6426
BOGOMOLETZ, W.V.
6227*
BOLGOV, D.F.
6584
BOLLAERT, A.
6182
BOLTON, W.K.
6421*
BONDAR, Z.A.
6195
BONDARENKO, V.V.
6624
BONNEL, F.
6192
BONVICINI, F.
6111
BOREL, C.A.
6111
BORUJEVIC, R.
6646*
BOSCH, J.
6532*
BOSL, F.
6285
BOTHA, J.B.C.
6146*
BOTHA, J.L.
6378*
BOUGNOUX, P.
6314
BOURNONVILLE, M.
6108
BOUWMAN, C.
6366*
BOYER, J.L.
6091*
BOZZETTI, F.
6600
BRADFIELD, J.W.B.
6399*
BRADLEY, D.W.
6481*, 6482*
BRAMIS, J.
6067
BRANDT, L.
6308*
BRASH, A.R.
6354
BREGMAN, D.
6485*
BREIMER, D.D.
6411*
BREITSAMETER, J.
6138
BREUER, H.
6024
BRIGGS, J.C.
6449*
BRITO, E.
6670
BROCK-UTNE, J.G.
6051
BROCKLEHURST, J.C.
6603
BRODIE, M.J.
6358*
BROEKELSCHEN, P.H.
6506*
BRON, B.A.
6253
BROOKS, R.G.
6202

BROSNAN, J.J.
6240
BROWN, J.
6367*
BROZIN, I.H.
6276
BRUEL, J.M.
6187, 6192
BRUNNER, C.M.
6421*
BRUNNER, S.
6165
BRYAN, J.A.
6485*
BRYAN, P.J.
6267*
BRYK, D.
6292*
BUERK, C.A.
6398*
BUILDER, J.
6042*
BUIST, T.A.S.
6224*
BULLOCK, G.
6413*
BULOVSKAYA, L.N.
6623
BUONANNO, G.
6497*
BURCHINSKY, G.I.
6269
BURGESS, L.W.
6019, 6020
BURGOS, G.
6316
BURHENNE, H.J.
6569*
BURICCHI, L.
6526*
BURKE, J.A.
6664
BURKE, V.
6074*
BURLEV, V.A.
6500*
BUROMSKAYA, G.A.
6625
BURR, R.
6007*
BURSHTEIN, C.I.
6422*
BUSHKOVA, R.K.
6321
BUSUTTIL, R.W.
6287*
BUTLER, W.H.
6293*
BUTT, J.
6389
BUTT, K.
6200*
BUYNAK, E.B.
6117
CALAME, A.
6437
CALDEROLI, H.
6206
CALDWELL, J.H.
6025
CALHOUN, T.R.
6225*
CAMAIONI, D.
6126
CAMERON, H.M.
6407*
CAMPBELL, C.B.
6445*
CAMPBELL, I.W.
6224*
CAMPBELL, P.E.
6460*, 6486*
CAMUS, C.
6645*
CANNON, H.G.
6472*
CANTARELLI, I.
6280
CAPRON, M.
6645*
CARBONE, P.P.
6360*
CARDOSO, J.M.
6642*
CAREVIC, O.
6089*
CAREY, W.D.
6136
CARLIER, Y.
6645*
CARLSON, H.C.
6289*
CARPENTIER, Y.
6040*
CARRILHO, F.
6532*
CASHORE, W.J.
6435*
CASTANEDA, C.
6658
CATANIA, V.C.
6600
CAVELL, B.
6356
CEBECI, H.
6203
CELINSKA, W.
6533*
CERVANTES, L.F.
6642*
CHACKO, A.K.
6406*
CHADWICK, V.S.
6070*
CHALGANOV, A.I.
6423
CHANDRASOMA, P.T.
6668
CHARIOT, J.
6095
CHARUZI, I.
6558*
CHATTERJEE, D.K.
6127
CHEJFEC, G.
6256
CHEKANOVA, S.K.
6620
CHEN, D.S.
6404*, 6491, 6493
CHENEY, M.
6020
CHERNYAVSKY, A.A.
6267
CHERUBIN, C.E.
6484*
CHIEN, K.R.
6088*
CHILD, D.L.
6528*
CHILD, P.T.
6378*
CHISTYAKOV, S.S.
6299
CHISTYAKOVA, O.V.
6229
CHOPARD, M.
6043
CHRISTENSON, T.
6564*
CHRISTIANSEN, L.V.
6045
CHRISTIE, M.
6656
CHROSTOWSKA, H.
6466*
CHUANG, V.P.
6322*
CHUNG, B.H.
6125
CHURCHILL, R.
6642*
CLAIN, J.E.
6070*
CLARK, J.
6030
CLARKE, B.F.
6224*
CLOUSE, M.E.
6361*
CODE, C.F.
6056
COENEN, Y.
6382
COHEN, M.I.
6606
COHEN, S.
6047, 6290*
COHEN, W.N.
6367*
COLODNY, A.H.
6529*
CONOLLY, M.E.
6354
CONSROE, P.
6450*
COOK, E.H.
6482*
COOKE, E.M.
6589*
COOKSLEY, W.G.E.
6446*
COOMBS, E.
6215

COOPERMAN, A.M.
6259
CORREA, P.
6334*
CORVI, G.
6593
COSTA, F.
6176
COSTA, J.
6604
COURCY, J.
6043
COUTSOFTIDES, T.
6261*, 6274
COY, P.
6613
CROFT, R.J.
6675*
CROMARTIE, R.S., III
6597
CURRAN, P.F.
6009
CZAJKOWSKI, J.
6103
DAGNELIE, J.
6182
DALAL, N.J.
6663
DALINKA, M.K.
6392
DALLEMAND, S.
6380*
DANILOV, M.V.
6582
DANKS, D.M.
6460*, 6486*
DANTAS, R.
6520*
DARDENNE, A.N.
6180, 6382
DARMOSTUK, V.Y.
6631
DART, G.C.
6464*
DARYABEIGI, J.
6279
DASHER, C.A.
6521*
DAVIS, M.
6068*
DAVISON, L.
6227*
DAVYDOV, A.A.
6236
DAVYDOVA, R.Z.
6422*
DAWSON, A.M.
6311*
DAWSON, J.
6201
DE CARLE, D.J.
6441*
DE DOMBAL, F.T.
6212
DE FRANCISCI, G.
6126
DE GIACOMO, M.
6126
DE GRAEF, J.
6040*
DE LA TOUR, J.
6095
DE MORAES NOVAES, H.
6176
DEBRAY, C.
6095, 6181
DEBRAY, C.
6181
DECASTRO, F.J.
6448*
DECOUFLE, P.
6375
DEERING, T.B.
6536*
DEGANI, C.
6636
DEGENSHEIN, G.A.
6549*
DEITEL, M.
6636
DELANY, H.M.
6135
DELLA CELLA, G.
6317
DELMONT, J.
6179
DELORT, P.
6043
DELUCA, R.F.
6204
DENES, A.E.
6481*
DENNIS, C.R.
6209*
DEPACT, G.
6108
DERGILOVA, M.P.
6620
DESJEUX, J.F.
6009
DESMYTER, J.
6471*
DESOUZA, C.
6483*
DEVILLE-CHABROLLE, A.
6319
DEYHLE, P.
6173, 6253
DIAKONOV, V.T.
6346
DIAKOVA, R.M.
6583
DIAMANT, N.E.
6028
DIBIROV, A.D.
6230
DICKSON, E.R.
6536*
DIENSTAG, J.L.
6456*, 6484*
DIETEL, J.
6186
DIETZE, G.
6079*
DILAWARI, J.
6323*
DINEEN, P.
6588*
DINTSMAN, M.
6552*, 6554*
DISSANAIKE, A.S.
6662
DODSON, P.
6651
DOGNALEK, J.
6395*
DOHI, I.
6567*
DONALDSON, L.A.
6358*, 6381
DONALDSON, S.S.
6599
DONCKERWOLCKE, R.A.
6452*
DONDELINGER, R.
6192
DOOLITTLE, P.D.
6602
DOROFEICHUK, V.G.
6426
DOSHI, J.C.
6652
DOUBRAVSKY, J.
6191
DOUGLAS, H.L., JR.
6360*
DOW, J.
6077*
DOWLING, H.
6012
DOWLING, K.F.
6061
DREESMAN, G.R.
6471*
DREILING, C.A.
6067
DRONFIELD, M.W.
6198*
DROPSY, G.
6640*
DRUSCHKY, F.
6420*
DUBOIS, A.
6187
DUBOVIK, N.T.
6307
DUCA, C.
6102
DUCA, S.
6102
DUCASSOU, C.
6183
DUNLOP, E.H.
6068*
DURANTE, E.
6175
DURBIN, R.P.
6039*
DURENG, G.
6043, 6044
DURET, R.L.
6182

DWYER, J.M.
6474*
DYBICKI, J.
6533*
DYUBENKO, K.A.
5998
DZIEWALTOWSKA, D.
6103
DZYUBICH, L.I.
6426
EBADI, A.
6209
EBELS, L.G.
6303
ECKEL, J.
6024
ECKNAUER, R.
6138
EDEN, K.V.
6619
EDGE, W.E.B.
6364*
EFUNI, S.N.
6265
EGBERTS, E.H.
6026*
EGGER, M.
6506*
EGOROV, A.P.
6265
EGOROV, O.S.
5999
EHRET, I.
6098
EILBER, F.R.
6615
EINARSSON, K.
6564*
EISEMAN, B.
6076*
EISENSTAT, T.E.
6336*
EISSELT, M.
6395*
EKBERG, O.
6337*
EL BADRAWY, N.
6646*
EL-SHARKAWY, T.Y.
6028
ELIZONDO, L.
6642*
ELLENBOGEN, G.
6205
ENDER, L.A.
6534*
ENDERLIN, F.E.
6071*
ENDO, O.
6530*
ERASMUS, D.A.
6661
ESTEL, G.
6023
EVENSHTEIN, Z.M.
6626
EWEN, S.W.B.
6352*
EWING, D.J.
6224*
EYAL, Z.
6558*
FABIANI, V.L.R.
6055
FABIANOVA, B.
6109
FAIRMAN, M.J.
6133
FALCK, J.
6186
FARAH, F.
6080*
FARBER, J.L.
6088*
FARID, Z.
6644*, 6660
FARMAN, J.
6380*
FAUERHOLDT, L.
6457*
FAURE, X.
6179
FAUSA, O.
6672*
FEDOROVSKAYA, E.O.
6489
FEDYANIN, Y.P.
6502
FEELEY, J.C.
6619
FEHER, T.
6527*
FEIFEL, G.
6286
FEIGENBERG, Z.
6552*, 6554*
FEINBERG, S.B.
6151*
FELITSYN, L.N.
6455
FENGLER, J.D.
6184
FERGUSON, C.L.
6149
FERGUSON, R.
6198*
FERNHOLZ, H.J.
6171
FERRUCCI, J.T., JR.
6199*
FEVERY, J.
6515
FIEDLER, L.
6154
FIELDS, H.A.
6471*, 6482*
FIGUEIREDO, A.
6520*
FIGUEIREDO, J.F.M.
6645*
FILHO, J.A.
6055
FILIMONOV, R.M.
6265
FILIPOVIC, D.
6499*
FINCH, J.
6394*
FIRSOV, E.S.
6238
FISCHER, M.
6113
FISCHMANN, B.
6606
FLAMINI, G.
6126
FLANIGAN, D.P.
6561*
FLATAU, E.
6674*
FLATMARK, A.
6408*
FLECKENSTEIN, P.
6676*
FLEMING, C.R.
6536*
FLETCHER, J.W.
6514*
FLIEGEL, C.P.
6529*
FOLLOWS, C.J.
6575*
FOLSCH, U.R.
6069*
FOMIN, A.N.
6300
FOMIN, N.N.
6300
FONSECA, P.C.
6055
FORD, J.R.
6562*
FORSSMAN, W.G.
5992
FORSTED, D.H.
6392
FOSS, D.C.
6152*
FRAGOSO, T.
6658
FRAME, C.M.
6132
FRANK, P.
6227*
FRANKEL, M.
6547*
FRANKEN, F.H.
6186
FRANKLIN, E.C.
6461*
FRANZKE, W.
6420*
FRASE, S.
6083*
FRAUMENI, J.F., JR.
6617
FREEMAN, J.B.
6581*
FREI, J.V.
6632
FREISE, J.
6443*
FRENK, S.
6316

FRETHEM, B. 6408*
FREUND, H. 6558*
FRIEDMAN, N.B. 6614
FRIER, B.M. 6444*
FRIK, W. 6171
FRINTZILAS, M. 6510*
FRITSCH, W.P. 6038*
FROLKIS, A.V. 6321
FROMM, H. 6586*
FROMMER, D.J. 6072*
FUCCELLA, L.M. 6593
FUCHS, H.F. 6172
FUJITA, R. 6549*
FUKUSHIMA, K. 6530*
FULLEN, W.D. 6416*
FUNSTON, M.R. 6410*
FURUGOURI, K. 6018
GACYK, W. 6533*
GALIAN, A. 6351*
GARDIOL, D. 6111
GARNICK, M.B. 6397*
GASSMANN, R. 6158
GAUTIER, A. 6111
GAZET, J.C. 6293*
GAZZARD, B.G. 6311*
GAZZINELLI, G. 6150
GEALL, M.G. 6536*
GEBBERS, J.C. 6349*
GEFEL, A. 6674*
GEGENAVA, O.P. 6340
GELMAN, S. 6552*
GELSTON, A. 6651*
GENTILE, S. 6497*
GEORGE, E.A. 6514*
GEPPE, A.A. 6221
GERASIMENKO, A.A. 6555*
GERDING, D.N. 6507*
GESERICK, G. 6501*
GEERTS, W.J.C. 6275
GHAVAMI, B. 6282
GHERI, R. 6526*
GHOSH, J.J. 6127
GIBBS, A.R. 6447*
GIBBS, C.D. 6218
GIBSON, R.G. 6521*
GILL, G. 6035
GILLAM, G.L. 6215
GILLESPIE, G. 6333*
GINSBERG, R.L. 6397*
GIRYN, I. 6103
GISVOLD, J.J. 6289*
GITNICK, G.L. 6458*
GLADIGAU, V. 6098
GLEASON, W.A., JR. 6448*
GLICKMAN, M.G. 6291*
GLOBER, G.A. 6324*
GO-BATENKO, V.P. 6265
GOCHO, K. 6571*
GOEVERTS, J. 6167
GOLDANIGA, G.C. 6593
GOLDBERG, P.K. 6540*
GOLDRING, J. 6391
GOLDSMITH, H.S. 6409*
GOLDSTEIN, L.I. 6548*
GOLOSOVA, T.V. 6500*
GOLUBENKO, A.M. 6463*
GONNELLA, F. 6497*
GOODALE, R. 6151*
GOODING, G.A.W. 6372
GORDON, A.S. 6073*
GORDON, D. 6200*
GORDON, R.L. 6547*
GOREVIC, P.D. 6461*
GOSSET, F. 6181
GOUEROU, H. 6181
GOUGH, T.A. 6213
GOULD, S.R. 6227*, 6354
GOULD, V.E. 6256
GRACEY, M. 6074*
GRAFE, W.R. 6588*
GRANIT, G. 6558*
GRASSI, G. 6280
GRASSI, G.B., JR. 6280
GRAZIANO, J.L. 6531*
GREBENEV, A.L. 6221
GREDZHEV, A.F. 6580*
GREEN, P.H.R. 6667
GREGG, J.A. 6361*
GREGORY, P.B. 6506*
GREWAL, R.S. 6652
GRIFFEN, W.C. 6322*
GRIGORYAN, E.G. 6647
GRIGOVICH, I.N. 6622
GRIGOVICH, L.N. 6622
GRIMAUD, J.A. 6646*
GRISCOM, N.T. 6529*
GROMOVA, O.A. 6086*
GROUSSIN, P. 6314
GROVES, W.G. 6058
GRUNST, J. 6079*
GUDZENKO, Z.P. 6384
GULLICK, H.D. 6365*

GUNDALAKH, A.I.
6468*
GUPTA, M.C.
6654
GURLEVA, G.G.
6647
GURLL, N.J.
6006*
GURSEL, E.M.
6373
GURWITH, M.J.
6637
GUTIERREZ, A.G.
6202
HACHEY, D.
6090*
HACKER, L.C.
6531*
HAGENDER, B.
6308*
HAGIHARA, P.F.
6322*
HAINES, A.
6323*
HALL, A.W.
6030
HALL, W.H.
6507*
HALL, W.T.
6483*
HALLAC, S.
6178
HALLIWELL, M.
6517*
HALTER, F.
6157
HALVORSEN, J.F.
6272
HAMADA, S.
6196, 6222
HAMLYN, A.N.
6546*
HAMOSH, M.
6141
HANLEY, J.
6360*
HANS, B.
6585*
HANS, S.S.
6585*
HANSON, R.F.
6090*
HANSON, V.
6442*
HANSSEN, K.F.
6060*
HANSSEN, L.E.
6060*, 6062
HANYU, F.
6579*
HAO, K.
6065
HAQQANI, M.T.
6327*
HARADA, H.
6590*
HARADA, K.
6590*
HARASAWA, S.
6027
HARDY, B.E.
6529*
HARDY, J.D.
6602
HARMON, J.W.
6143*
HARRIES, J.T.
6010
HARRIS, A.R.C.
6592
HARRIS, E.D., JR.
6598
HARTUNG, H.
6159
HARVEY, R.F.
6332*
HASSAM, A.G.
6124
HASSAN, A.
6644*, 6660
HASSELSTROM, K.
6577*
HATTANMARU, M.
6081*
HATTERY, R.R.
6363*
HAUSAMEN, T.U.
6038*
HAVEMANN, K.
6310*
HAWKER, P.C.
6013
HAYASAKA, H.
6657
HAYASHI, M.
6121
HEADING, R.C.
6224*
HEATON, K.W.
6332*
HEDEMAND, N.
6260
HEDMAN, P.
6669
HEFTI, M.L.
6158
HEIKKINEN, E.S.
6242
HEINKEL, K.
6174
HEISLER, S.
6059*
HELANDER, H.F.
6039*
HELLER, R.M.
6211
HELLERS, G.
6545*
HENDEL, P.
6613
HENDEN, T.
6508*
HENDERSHOTT, L.R.
6514*
HENNING, H.
6400*
HENRIQUES, L.V.
6577*
HENRY, D.A.
6449*
HENSON, D.E.
6617
HENSTORF, H.
6389
HERRMANN, M.
6096
HIEBERT, C.A.
6208
HIGASHI, G.I.
6660
HIGHSMITH, A.K.
6619
HILDEBRAND, H.
6356
HILL, M.D.
6506*
HILLEMAN, M.R.
6117
HIMAL, H.S.
6261*, 6274
HINDMAN, S.H.
6481*, 6482*
HIRA, P.R.
6653
HIRANO, K.
6137
HIRATA, K.
6249
HIRATSUKA, H.
6571*
HIRSCHOWITZ, B.I.
6521*
HJELT, K.
6609
HODENBERG, A.V.
6097
HODGSON, H.J.F.
6350*
HOFMANN, A.F.
6070*, 6542*
HOLLE, F.
6245
HOLLENDER, L.F.
6206
HOLLINGER, F.B.
6471*
HOLMES, J.H.
6394*
HOLST, J.J.
6032
HOLTZ, U.
6186
HOMAN, W.P.
6588*
HONJO, I.
6075*
HONOHAN, T.
6071*
HOOGENDIJK, J.L.
6312*
HORNBECK, C.L.
6482*
HOROWITZ, I.
6022

HORROCKS, J.C.
6212
HORWICH, A.
6435*
HORWITZ, M.A.
6618
HOSHI, H.
6248
HOSODA, S.
6162
HOSOGI, Y.
6156
HOSOKAWA, J.
6239
HOUGHTON, P.W.
6037*
HOULTON, P.J.C.
6051
HOWELL, H.S.
6531*
HUGHES, C.A.
6061
HUGHES, R.D.
6068*
HUGHES, W.
6047
HULTMAN, E.
6610
HUNG, C.R.
6046
HUVENNE, R.
6182
HUXTABLE, R.
6450*
HYKES, P.
6094
IBARRA-PEREZ, C.
6655
ICHINOSE, H.
6335*
IDEHARA, S.
6639
IGARASHI, Y.
5996
IHRE, T.
6545*
IINO, S.
6137
IKEDA, T.
6549*
IKENOBE, H.
6362*
IKEUCHI, H.
6248
IKEUCHI, T.
6530*
IKEZAKI, M.
6239
IKLE, D.
6394*
IKONEN, E.
6565*
IMAMOGLU, K.H.
6373
IMANISHI, H.
6239
IMRIE, C.W.
6391
INABA, T.
6396*
INAGAKI, T.
6453*
INOKUCHI, K.
6403*
INOUE, K.
6196, 6590*
IRWIN, G.R.
6472*
ISAKA, H.
6081*
ISHIKAWA, K.
6122
ISHIKAWA, R.
6370
ISHIZAKI, T.
6567*
ISMAIL-BEIGI, F.
6309*
ITO, S.
5992
ITTENSOHN, O.L.
6117
ITZCHAK, Y.
6291*
IVANOV, G.G.
6264
IVANOV, S.D.
6115
IVEY, K.
6389
IWAFUCHI, M.
6057
IWARSON, S.
6479*, 6556*
JACK, I.
6460*
JACKSON, W.P.U.
6378*
JACOB, A.I.
6540*
JAEGER, R.
6448*
JAFFE, B.M.
6225*, 6271
JAFFE, E.
6606
JAMART, J.
6206
JAMES, C.
6080*
JANDE, S.S.
6129*
JANDER, H.P.
6454*
JANEV, A.
6424
JANEVA, A.B.
6424
JANIK, J.S.
6331*
JANVOIE, L.
6313
JARNUM, S.
6676*
JEFFRIES, G.
6290*
JENSEN, H.E.
6281
JESSOP, A.
6212
JEWELL, D.P.
6350*
JICK, H.
6329*
JIRSA, M.
6094
JOHANSEN, A.
6045
JOHANSSON, S.V.
6611
JOHNSON, A.G.
6026*, 6243
JOHNSON, G.K.
6440*
JOHNSON, L.M.
6279
JOHNSON, W.D.
6334*
JOKINEN, K.
6216
JONES, D.C.L.
6037*
JONES, P.F.
6352*
JONES, T.C.
6641*
JORGENSEN, E.
6076*
JORI, G.P.
6497*
JOSKE, R.A.
6401*
JOSS, A.
6103
JUSSILA, J.
6263*
JUSTRABO, E.
6144*
JUSZCZYK, J.
6438
JUUTI, M.
6254
JYNGE, P.
6508*
KACZMAREK, M.J.
6063, 6064
KADELL, B.M.
6548*
KAHN, L.B.
6241
KAI, Y.
6033
KAIRALUOMA, M.I.
6031, 6214, 6216
KAKISHITA, M.
6222
KAKUMU, S.
6511*
KALBFLEISCH, H.
6310*
KALSBEEK, F.L.
6258
KALTIALA, E.K.
6242

KAMALOV, Y.R.
6369
KAMIYAMA, S.
6324*
KAMOI, I.
6148
KAN, S.P.
6662
KANE, J.L.
6483*
KANE, P.E.
6279
KANEKO, T.
6639
KANNO, H.
6249
KAPLAN, M.M.
6537*
KAPUSTIN, N.P.
6306
KARAMAN, N.V.
6553*
KARASINSKA, M.
6494*
KARCZ, D.
6156
KARELINA, E.A.
6223
KARJALAINEN, P.
6254
KARKOLA, P.
6216
KAROTKIN, E.H.
6435*
KARZON, D.T.
6374
KASHIMA, K.
6162
KASKEVICH, L.M.
6439*
KASSAB, H.J.
6461*
KASUMIAN, S.A.
6267
KASYANENKO, V.V.
6110
KATHER, H.
6283
KATHOLI, R.E.
6421*
KATON, R.M.
6419*
KATSAVOCHRISTOS, K.
6284
KATZ, R.L.
6537*
KAWANISHI, H.
6498*
KAZANBIEV, N.K.
6469*
KELBER, M.
6605
KELLEY, R.
6085*
KELLUM, J.M., JR.
6225*
KENWRIGHT, S.
6288*
KESSLER, M.
6011
KETTUNEN, K.
6254
KHACHATURYAN, N.M.
6341
KHAN, A.K.A.
6357
KHARCHENKO, V.T.
6305
KHASAROV, G.B.
6343
KHERSONSKAYA, R.Y.
6489
KHOSLA, S.N.
6633
KHRISTICH, A.C.
6576*
KHUBUTIYA, R.D.
6228
KICZKA, W.
6438
KIJIMA, M.
6251
KIKUCHI, K.
6249
KIMURA, K.
6642*
KING, K.K.
6442*
KINKHABWALA, M.
6200*
KINOSHITA, F.
6429
KINUGASA, K.
6162
KIRCHNER, S.G.
6211
KIRICHENKO, A.A.
6428
KIRKPATRICK, J.R.
6273
KISHIMOTO, H.
6122
KITA, S.
6142*
KITAMURA, T.
6039
KLATSKIN, G.
6474*
KLEIN, J.
6034
KLEMISCH, W.
6097
KLIMKIEWICZ, E.
6533*
KLOS, C.
6514*
KLUCAS, C.A.
6149
KNAUER, C.M.
6506*
KNEPIL, J.
6449*
KNIGHT, A.R.
6326*
KNIGHTS, E.M.
6585*
KNOX, E.G.
6601
KNUDSEN, L.
6676*
KNUTRUD, O.
6408*
KOBAYASHI, M.
6403*
KOBAYASHI, S.
6579*
KOBAYASHI, T.
6429
KOBLER, E.
6173
KOCH, H.
6551*
KOGA, I.
6148
KOGUTT, M.S.
6454*
KOHLER, J.
6586*
KOHLI, Y.
6239
KOHN, J.
6405*
KOHNEN, P.
6450*
KOHNO, A.
6075*
KOJI, T.
6434
KOLODEJ, A.
6053
KOLOSOV, A.I.
6623
KOMAROV, F.I.
6265
KONDO, M.
6239, 6429
KONDO, T.
6525*
KONDRATIEV, N.P.
6297
KONNO, T.
5996
KONOPLIA, P.P.
6580*
KONYAEVA, A.G.
6114
KOORNHOF, H.J.
6612
KOPLOVITZ, I.
6049
KOPYLOV, F.N.
6295
KOREF, O.
6527*
KOROTEEV, A.V.
6629
KOTI, S.T.
6663
KOURA, M.
6081*
KOURA, S.
6081*
KOWALCZYK, C.
6465*

KOWALEWSKI, K.
6053
KOYAMA, K.
6033
KOZINN, P.J.
6540*
KRASNOVA, I.S.
6294
KRAVCHUK, A.N.
6553*
KREJS, G.J.
6253
KREMER, H.
6164
KRIVCHIK, A.A.
6112
KROPACOVA, K.
6109
KRUGER, R.E.
6073*
KRUGLIK, G.D.
6677*
KRUPKIN, R.G.
6623
KRUSE, A.
6260
KRYSKA, A.
6438
KUBO, A.
6429
KUBOTA, M.
6033
KUIJTEN, R.H.
6452*
KUNATH, H.
6587*
KUNII, Y.
6249
KUROKAWA, S.
6453*
KUROSAWA, A.
6362*
KUSAKABE, K.
6370
KUSHCH, Y.B.
6343
KUSUMOTO, Y.
6434
KUZIN, A.I.
6539
LAATIKAINEN, T.
6565*
LABAYLE, D.
6320
LABRID, C.
6043, 6044
LAFLAMME, G.
6093
LAGNEAU, A.
6144*
LAING, R.R.
6152*
LAMARQUE, J.L.
6192
LAMERS, C.B.H.
6591*
LANDAU, L.I.
6215
LANDE, G.
6408*
LANDECKER, K.
6042*
LANGLEY, P.G.
6413*
LANGMAN, M.J.S.
6198*
LARANJEIRA, M.R.
6520*
LARMI, T.K.I.
6031, 6214, 6216, 6242
LAROUZE, B.
6473*
LAUFER, I.
6355
LAUGHLIN, L.W.
6644*
LAURENT, J.C.
6108
LAUSCHKE, G.
6432
LAUTERBACH, F.
6000*
LAVELLE, M.I.
6546*
LAWRENCE, W., JR.
6596
LAWS, H.
6454*
LAZAR, G.
6123
LE CHEVALLIER, P.
6313
LE ROITH, D.
6378*
LEBEDEV, S.P.
6369
LEE, P.T.
6585*
LEE, T.G.
6419*
LEERS, W.D.
6476*
LEEVY, C.M.
6511*
LEGENDRE, H.
6315
LEGG, M.A.
6361*
LEGGE, D.
6393*
LEKOMTSEVA, G.A.
6426
LEMKINA, L.M.
6106
LEPPER, K.
5993
LEPRINCE, C.
6005*
LESTER, R.
6495*
LETUTA, A.S.
6620
LEUTHOLD, E.
6158
LEVI, A.J.
6288*, 6671*
LEVINSON, M.J.
6477*
LEVITIN, P.M.
6421*
LEVKOVSKY, A.V.
6624
LEVO, Y.
6461*
LEVOWITZ, B.
6292*
LEVY, E.
6552*
LIEBERMANN-MEFFERT, D.
6247
LINCHENKO, I.F.
6628
LINDBLAD, L.
6523*
LINDE, J.
6379*
LINDENMAIER, H.
6154
LINDQUIST, B.
6356
LINDSTEDT, G.
6541*
LIPPER, S.
6241
LIPSHUTZ, G.R.
6419*
LIPTON, A.B.
6506*
LITTLE, P.K.
6673*
LITVINCHUK, M.D.
6092
LIVOLSI, V.A.
6594
LIVSHITS, E.G.
6303
LJASHCHENKO, P.S.
6099
LJUNGGREN, B.
6179
LLOYD, J.W.
6375
LOENING, W.E.K.
6364*
LOEWI, G.
6671*
LOF, A.
6078*
LOGINOV, A.S.
6436*
LOIKO, E.E.
6347
LONDON, W.T.
6473*
LONDONG, W.
6285
LONG, J.A., JR.
6199*
LONG, R.G.
6519*
LOSOWSKY, M.S.
6133
LOUISOT, P.
6131*

LOUP, P.
6250, 6282
LOUVEN, B.
6161
LUDERS, C.J.
6400*
LUDWIG, J.
6459*
LUNA-DEL VILLAR, J.
6316
LUNDBERG, P.A.
6541*
LUNDHOLM, K.
6523*, 6541*
LUNZENAUER, K.
6184
LUTHIER, F.
6313
LUTSEVICH, E.V.
6223
LUTZ, H.T.
6359*
LYAKHOVICH, V.V.
6086*
MACCARTY, R.L.
6363*
MACDONALD, C.M.
6077*
MACDONALD, J.S.
6606
MACDONALD, T.H.
6029
MACHALSKA, M.
6494*
MACHIDA, T.
6248
MACKAY, D.M.
6616
MADDEN, D.L.
6483*
MADSEN, E.H.
6260
MADSEN, T.
6210
MAGALINI, S.I.
6126
MAGOMEDOV, A.Z.
6230
MAGOMEDOV, S.M.
6230
MAHBOOB, S.
6130*
MAHON, W.A.
6396*
MAILLET, P.
6188
MAILMAN, D.S.
5993
MAKAROVSKAYA, A.I.
6489
MAKI, M.
6370
MAKINO, I.
6567*
MALAGELADA, J.R.
6070*
MALEK, H.
6209
MALLARD, R.E.
6374
MALUSZEK, S.
6501*
MANANKOVA, N.M.
6119
MANKES, R.
6023
MANKODI, N.A.
6650, 6652, 6663
MANNING, A.P.
6332*
MANSOUR, N.S.
6660
MANZILLO, G.
6475*
MARCHAL, G.
6180, 6382
MARCHALONIS, J.J.
6145*
MARCUSSEN, H.
6676*
MARGETA, V.A.
6058
MARISCAL, J.
6316
MARSAN, R.E.
6550*
MARTIN, A.
6131*
MARTIN, F.
6144*
MARTIN, M.S.
6144*
MARTIN, R.J.
6335*
MARTINI, G.A.
6310*
MARTINO PARODI, A.M.
6317
MAS, A.
6532*
MASI, A.T.
6477*
MASLENNIKOVA, A.A.
6235
MASON, G.K.
6336*
MASSA, F.
6182
MATARAZZO, S.A.
6290*
MATHE, J.C.
6319
MATHEWS, J.A.
6528*
MATHIASEN, M.S.
6260
MATSUBARA, Y.
6057
MATSUMOTO, K.
6549*
MATSUZAKI, M.
6639
MATTHIJS, E.
6524*
MATUCHANSKY, C.
6351*
MATVEEV, Y.E.
6584
MAX, M.H.
6544*
MAXTED, K.J.
6029
MAXWELL, J.D.
6293*
MAY, B.
6443*
MAY, J.P.
6315
MAY, V.
6678
MAYNARD, J.E.
6481*, 6482*
MAYR, K.
6566*
MAZURIN, B.G.
6344
MCADAM, W.A.F.
6212
MCCALL, J.T.
6536*
MCCAUSTLAND, K.A.
6482*
MCCULLOUGH, R.A.
6149
MCDONALD, D.G.
6361*
MCGREGOR, G.I.
6613
MCGUFFIE, C.
6445*
MCILLMURRAY, M.B.
6198*
MCINTOSH, W.
6381
MCINTOSH, W.B.
6358*
MCNULTY, S.
6546*
MEBUS, C.A.
6149
MEDELSI, M.
6313
MEDNE, T.A.
6303
MEDVID, M.V.
6649
MEEUWISSE, G.W.
6356
MEJEAN, C.
6005*
MEKHJIAN, H.S.
6025
MELENTIEV, M.G.
6220
MELISSINOS, K.
6284
MELMED, R.N.
6467*
MELNICK, J.L.
6471*
MENDIS, K.N.
6668

MENGE, H.
5990*, 6012, 6134, 6310*
MESSING, B.
6351*
METHAN, E.
6313
METMAN, E.H.
6314
METTRICK, D.F.
6002*
METZ, G.
6323*
MEYER, C.
6206
MEYERS, M.A.
6330*
MICHALKOVA, K.
6191
MICHEL, H.
6187, 6516
MICHEL, M.F.
6144*
MIDDLETON, H.M., III
6021
MIEDERER, S.E.
6161
MIHAS, A.A.
6454*, 6521*
MIKHEEVA, S.M.
6426
MIKI, K.
6137
MILES, A.E.
6146*
MILLA, P.J.
6010
MILLER, D.J.
6474*
MILLER, R.R.
6329*
MILLER, S.F.
6326*
MILLER, W.J.
6117
MILLMAN, I.
6473*
MINER, W.F.
6644*, 6660
MINERVINA, S.S.
6621
MINO, M.
6121
MINTZER, R.A.
6677*
MIRKOVITCH, E.V.
6012
MIRKOVITCH, V.
5990*, 6134
MIRKOVITCH, W.
6282
MISEVICHUS, I.R.
6233
MISUROVA, E.
6109
MITCHELL, G.F.
6145*
MITCHELL, W.
6380*
MITHAL, S.
6654
MITRA, G.
6127
MITSCHKE, H.
6036
MIURA, T.
6196
MIWA, I.
6027
MIWA, M.
6027
MIZUMOTO, R.
6075*
MJOS, C.D.
6508*
MODIGLIANI, R.
6320
MOERTEL, C.G.
6360*
MOGILEVSKAYA, K.A.
6347
MOKKA, R.E.M.
6031, 6214
MONDON, F.K.
6483*
MOORE, M.R.
6077*
MOOSSA, A.R.
6030
MORAND, P.
6314
MORELLI, A.
6510*
MORENZ, J.
6160
MORGAN, A.G.
6212
MORGAN, D.F.
6287*
MORGENSTERN, L.
6614
MORI, Y.
6033
MORIEARTY, P.L.
6670
MORIN, M.E.
6550*
MORISHIMA, N.
6118
MORITA, K.
6148
MORLEY, C.G.D.
6091*
MOROI, T.
6530*
MORRIS, J.S.
6348*
MORTON, D.L.
6615
MOSHCHICH, P.S.
6487
MOSIMANN, R.
6250, 6282
MOSKOWITZ, H.
6200*
MOSS, C.M.
6135
MOTA-SANTOS, T.A.
6150
MOTOYAMA, Y.
6525*
MOTSON, R.W.
6568*
MOUGENOT, J.F.
6167, 6319
MOUNTFORD, R.A.
6517*
MUCHNICK, C.
6651
MUKHIN, A.S.
6369
MUKHIN, I.V.
6580*
MULLER, D.P.R.
6010
MULLER, G.
6168
MUNCK, O.
6609
MUNEHISA, T.
6434
MUNRO, A.
6352*
MURAI, S.
6177
MURAKAMI, T.
6142*
MURPHY, B.P.
6401*
MURRAY-LYON, I.M.
6451*
MUSHA, H.
6538*
MUTO, T.
6057
MYERS, R.T.
6559*
MYERSON, D.
6386
MYERSON, P.J.
6386
MYREN, J.
6060*, 6226*, 6390
MYSNIK, G.G.
6580*
NAGAO, F.
6251
NAGAO, K.
6639
NAGASU, T.
6251
NAGASUE, N.
6403*
NAGATA, K.
6177, 6525*
NAGESH, K.G.
6666
NAGI, N.A.
6634
NAIR, C.N.
6652
NAITO, J.
6639
NAKAGAWA, S.
6567*

NAKAJO, S.
6162
NAKAMURA, N.
6251
NAKAYA, N.
6125
NAKAYAMA, C.
6148
NASONOV, E.I.
6500*
NAUGHTON, B.A.
6073*
NAZAROV, V.G.
6307
NEIMAN, H.L.
6677*
NELLANS, H.N.
6001*
NERI, B.
6526*
NESTEROV, S.S.
6383
NETAKHATA, Z.N.
6268
NEUPERT, V.
6560*
NICHOLAS, W.L.
6145*, 6656
NICKEL, W.O.
6373
NIKITINSKAYA, N.I.
6194
NIKOLAEVA, A.A.
6503
NILSSON, L.H.
6379*
NISHIGAKI, I.
6239
NISHINO, C.
6657
NISHINO, H.
6121
NITTA, H.
6057
NIZOV, A.A.
6430
NOBLETT, H.R.
6215
NODA, K.
6665
NOGALLER, A.M.
6430
NOMURA, A.
6324*
NORDBERG, G.F.
6066
NORDEN, A.
6308*
NOREIKA, L L.
6233
NORTHFIELD, T.C.
6353
NOSOVA, A.A.
6488
NOVIKOFF, P.M.
6082*
NOVIKOVA, I.K.
6294
NOVIKOVA, L.L.
6265
NUDELMAN, E.
6677*
NUKAGA, A.
6177
NURY, B.
6181
NUSBAUM, M.
6518*
NUSS, C.
6364*
NYGAARD, K.
6672*
O'FARRELL, S.
6589*
O'NEILL, J.A., JR.
6211, 6374
O'ONOFRIO, F.
6497*
ODA, T.
6137
ODAR-CEDERLOF, I.
6611
OGAWA, H.
6033
OGLE, S.J.
6451*
OH, W.
6435*
OHASHI, Y.
6142*
OISHI, F.
6196
OKABE, S.
6046, 6050
OKIMURA, T.
6222
OKUDA, K.
6538*
OKUYAMA, S.
6453*
OLBE, L.
6048
OLSSON, R.
6556*
OLUMIDE, F.
6076*
OMICHI, T.
6222
ONO, Y.
6370
ORAZGALIEV, B.D.
6629
ORECCHIA, C.
6280
ORLIKOV, G.A.
6266
OSHIBE, M.
6248
OSHIUMI, Y.
6148
OSNES, M.
6226*
OSSOINIG, K.C.
6635
OSTLING, H.
6078*
OTTESEN, B.V.
6110
OTTO, H.F.
6349*
OWEN, J.P.
6546*
OWMAN, T.
6362*
OYESIKU, J.E.J.
6010
OZHIGANOV, E.L.
6339
PAAKKONEN, M.
6263*
PALOYAN, D.
6376
PANNONE, M.K.
6066
PAPPAIOANOU, M.
6643*
PARADINAS, F.J.
6451*
PARE, W.P.
6052
PARFENOVA, N.S.
6107
PARKE, D.V.
6286
PARTOVI, P.
6414*
PASQUALE, G.
6475*
PASTERNACK, B.S.
6377*
PATEL, B.G.
6653
PATHE, H.
6560*
PAUL, T.
6650
PECK, B.
6598
PEDERSEN, E.B.
6165, 6676*
PELLEGRINO, J.
6150
PELLETIER, G.
6093
PELLIGRINI, C.
6030
PELLONI, S.
6253
PEREVALOV, A.Y.
6630
PERREAULT, C.
6261*, 6274
PERZIN, K.F.
6594
PESKIN, G.W.
6278
PETERSEN, P.
6504*, 6512*
PETITH, M.M.
6016
PETRUKUBI, R.J.
6290*

PETROVICH, Y.A.
6106
PFAFF, E.
6007*
PFAU, R.G.
6088*
PHELAN, P.D.
6215
PHILLIPS, C.A.
6673*
PICCININO, F.
6475*
PIETON, R.
6402*
PILIERO, J.A.
6073*
PILIERO, S.J.
6073*
PILKINGTON, T.R.E.
6293*
PINON, J.M.
6640*
PINOTTI, H.W.
6205
PINTO-CORREIA, J.
6520*
PIPER, D.W.
6042*
PIRES, I.R.
6520*
PIZZETTI, P.
6166
PLANTIN, L.O.
6611
PODDAR, M.K.
6127
PODESTA, R.B.
6002*
PODYMOVA, S.D.
6428, 6500*
POGROMOV, A.I.
6265
POLIKARPOV, M.Y.
6344
POLISHCHUK, F.A.
6338
POLK, H.C., JR
6544*
POLLOCK, J.G.
6391
POLONOVSKI, C.
6167, 6319
POMIER-LAYRARGUES, G.
6187
PONETTE, E.
6382
POPANDOPULO, G.P.
6580*
POPIELA, T.
6156
POPOV, T.A.
6439*
POPOV, V.M.
6628
POPOVIC, E.
6499*
PORTELA-GOMES, G.
6520*
POSPELOVA, L.N.
6086*
POSTOVIT, V.A.
6468*
POTEKAEVA, M.A.
6462*
POTTER, B.J.
6350*
POULOSE, K.P.
6666
POULSEN, P.E.
6045
POURTAGHVA, M.
6473*
POWELL, L.W.
6445*, 6446*
POWERS, S.R., JR.
6365*
PRAJAPAT, D.K.
6276
PRATA, A.
6645*
PRICE, C.D.
6447*
PRICE, F.L.
6311*
PRINGOT, J.
6382
PROBST, P.
6400*
PROCTOR, E.M.
6659
PROTCHENKO, N.V.
6345
PROVOST, P.J.
6117
PRUDKOV, I.D.
6295
PRUNA, D.C.
6202
PRZYJEMSKI, J.
6466*
PUEYO, J.
6187
PUNTO, L.
6031
PURCELL, R.H.
6456*, 6484*
PUTNAK, J.R.
6472*
PUTNAM, C.W.
6398*
PUTNAM, T.C.
6406*
PYATNITSKY, N.N.
6110
PYLTSOV, I.M.
6294
PYROZHKOV, M.A.
6115
QUASDORF, G.
6189
QUASDORF, M.
6189
RABISCHONG, P.
6192
RACUSEN, L.
6015
RADER, V.
6432
RAGLAND, J.B.
6083*
RAIA, A.
6205
RAMSAY, L.E.
6417*
RANA, S.V.S.
6087*
RANDELL, J.B.
6451*
RANEK, L.
6457*
RANERI, A.J.
6336*
RANSHAW, J.
6014
RANSON, J.H.C.
6377*
RAO, G.M.
6666
RAO, G.S.
6024
RAO, M.L.
6024
RASHCHINSKAIA, N.T.
6557*
RASMUSSEN, P.A.
6609
RASUKAS, V.A.
6233
RAWLINS, M.D.
6080*
RAY, T.K.
6017
RAYNAUD, A.
6187
REGUSCI, A.
6638
REICH, M.
6076*
REIF, A.
6334*
REINHARDT, G.F.
6531*
RETNASABAPATHY, A.
6662
REVSIS, M.G.
6345
REY, J.F.
6179
REYNOLDS, D.G.
6006*, 6143*
RHODES, M.E.
6149
RIBET, A.
6178
RICHEY, J.
6495*
RICHMAN, A.
6244
RICHTER, E.
6411*
RIDLEY, P.T.
6058
RIECKEN, E.O.
6310*

RIGHTSELL, W.A.
6477*
RIKIMARU, S.
6222
RILEY, A.K.
6013
RIND, J.
6292*
RIOTTOT, M.
6005*
RITCHIE, W.P., JR.
6041*, 6054
RIVA, F.T.
5994
ROBERT, K.H.
6066
ROBERTS, J.
6413*
ROBINS-BROWNE, R.M.
6612
ROBINS, R.E.
6613
ROBINSON, J.W.L.
5990*, 6012, 6134
ROCHESTER, D.
6240
RODES, J.
6532*
RODIMIN, V.V.
6534*
RODRIGUES, J.G.
6205
ROESSNER, K.D.
6673*
ROGERS, A.I.
6204
ROGERS, J.
6460*, 6486*
ROGERS, L.F.
6677*
ROGERS, S.
6495*
ROGOTSKAYA, L.T.
6489
ROHNER, H.G.
6161
ROLAND, M.
6262*
ROLLS, B.A.
6140
ROLSHCHIKOV, I.M.
6648
ROMMEL, K.
6138
ROSENBERG, M.L.
6619
ROSENBERT, H.K.
6529*
ROSENFIELD, A.T.
6574*
ROSENMUND, H.
6063, 6064
ROSENTUL, E.B.
6194
ROTH, H.J.
6159
ROTH, S.
6310*
ROUNTHWAITE, F.J.
6632
ROY, M.
6073*
ROZEN, P.
6674*
RUBIN, M.H.
6413*
RUDMAN, D.
6522*
RUGE, W.
6586*
RUMPELT, H.J.
6513*
RUSSELL, R.M.
6309*
RUTGAIZER, Y.M.
6321
RUTTHAUWE, H.W.
6038*
RYBERG, B.
6048
RYCHAGOV, G.P.
6344
RYMER, R.
6315
RYZHANOV, V.I.
6321
RYZHKOVA, L.A.
6163, 6431
SABESIN, S.M.
6083*
SABIN, E.
6061
SACQUET, E.
6005*
SAGARO, E.
6658
SAGNELLI, E.
6475*
SAIK, R.P.
6278
SAITOH, K.
6590*
SAKAKIBARA, N.
6579*
SAKSEN, E.F.
6625
SAKU, M.
6403*
SAKURAI, T.
6251
SALEPCIOGLU, A.
6203
SALGANIK, R.I.
6119
SALTER, R.H.
6257
SALVADORI, B.
6600
SALVIN, L.G.
6375
SAMPLE, W.F.
6548*
SANCHEZ-TAPIAS, J.
6496*
SANDERSON, I.
6293*
SANDSMARK, M.
6277
SANER, H.
6203
SANKARAN, S.
6366*
SANTANGELO, A.
6600
SARD, D.M.
6643*
SARLES, H.
6385
SATO, S.
6065
SATZINGER, G.
6100
SAUDEK, C.D.
6478*
SAVCHENKO, N.F.
6295
SAWARYN, T.
6494*
SAZONOV, A.M.
6534*
SCHECHTER, G.P.
6606
SCHEDL, H.P.
6008, 6016
SCHEIN, P.S.
6606
SCHELLEKENS, P.T.
6312*
SCHERSTEN, T.
6523*, 6541*
SCHEUER, P.J.
6519*
SCHIEBLER, T.H.
5991*
SCHIMMELPFENNIG, W.
6501*
SCHIODT, T.
6457*
SCHLOSSER, J.H.
6058
SCHMERIN, M.J.
6641*
SCHMIDT, E.
6443*
SCHNOSENBERG, I.
6138
SCHREIBER, D.R.
6151*
SCHRUMPF, E.
6226*
SCHUJMAN, E.
6674*
SCHULTZ, S.G.
6001*
SCHWABE, C.W.
6643*
SCHWARTZ, S.E.
6019, 6020
SCHWENK, M.
6007*
SCIERL, E.A.
6507*
SCOTT, B.B.
6133

SCRAGG, J.N.
6659
SEAMONDS, B.
6047
SEGAL, A.W.
6671*
SEGAL, H.G.
6472*
SEIDELMANN, F.E.
6367*
SEIGE, K.
6168
SEKIYA, S.
6123
SELIGMANN, M.
6351*
SELMAN-LAMA, M.
6655
SEMENDIAEVA, M.E.
6462*
SEN, F.G.
6650, 6652, 6663
SENAC, J.P.
6192
SEPPANEN, E.J.
6242
SEPTI, F.
6178
SEPULVEDA, F.V.
6012, 6134
SERCK-HANSSEN, A.
6226*
SEWELL, C.W.
6522*
SEXTON, D.J.
6651
SHAFF, M.I.
6410*
SHAH, P.N.
6663
SHANYGINA, K.I.
6107
SHARP, H.L.
6090*
SHAW, A.
6029
SHAW, J.R.
6661
SHCHEGLOVA, S.A.
6468*
SHEARBURN, E.W., III
6041*
SHEEDY, P.F., II
6363*
SHEINBAUM, M.P.
6338
SHERLOCK, S.
6496*, 6519*
SHETH, U.K.
6650
SHEVCHENKO, L.T.
6270
SHIBATSUJI, H.
6196
SHIGAREV, T.D.
6368
SHIKHODIROV, V.V.
5999
SHILS, M.E.
6595
SHIMADA, A.
6324*
SHIMIZU, T.
6057
SHIMOJO, H.
6104
SHINDO, K.
6325*
SHINER, M.
6288*
SHIRACHI, T.
6147
SHIRAKABE, H.
6362*
SHLIMOVICH, P.S.
6503
SHMIDT, D.
6432
SHOUTER, R.A.
6589*
SHOSHIEV, L.N.
6647
SHTELMAKH, O.I.
6489
SHUGAILO, V.T.
6649
SHOLOTKO, A.M.
6627
SIBERT, J.R.
6387
SIDOROV, V.S.
6346
SIEBENMANN, R.E.
6253
SIEGEL, J.H.
6348*
SIGAL, Z.M.
6301
SIGSTAD, H.
6255
SILK, D.B.A.
6068*
SILVERMAN, M.J.
6292*
SIMKO, V.
6085*
SIMON, B.
6283
SIMONNEAU, M.
6167
SIMONOV, N.N.
6623
SIMONOWITZ, C.
6376
SINGER, J.A.
6537*
SINGSEN, B.H.
6442*
SJOLUND, K.
6308*
SJOSTRAND, S.E.
6048
SKALIY, P.
6619
SKINNER, D.B.
6030
SKUDE, G.
6505*
SLAVIN, G.
6288*
SLOBODYAN, L.M.
6425
SMAKOV, G.M.
6220
SMALL, D.M.
6573*
SMIRNOV, V.V.
6342
SMITH, A.L.
6460*, 6486*
SMITH, J.N.
6389
SMITH, P.M.
6145*
SMITH, S.
6450*
SMITH, S.J.
6289*
SMIYAN, I.S.
6425
SNAPE, W.J., JR.
6290*
SNYDMAN, D.R.
6485*
SO, K.
6530*
SOBCHISHIN, I.V.
6555*
SODOMANN, C.P.
6310*
SOINOV, N.A.
6342
SOLC, P.
6318
SOLDATOV, B.S.
6584
SOLHAUG, J.H.
6272
SOLCUAR, I.M.
6345
SOLOMON, A.E.
6449*
SOLOVIEVA, N.A.
5997
SOMOVA, A.V.
6500*
SOTO, J.M.
6067
SOUCHARD, M.
6095
SOHA, J.
6402*, 6470*
SPARBERG, M.
6677*
SPARKS, F.C.
6615
SPARSO, B.F.
6169
SPELLBERG, M.A.
6578*
SPENCER, H.C.
6651
SPENCER, R.P.
6386

SPENNEY, J.G.
6521*
SPERANSKY, A.I.
6500*
SPERSCHNEIDER, H.
6587*
SPIETH, W.
6171
SPINELLI, P.
6155
STAAL, G.E.J.
6415*
STACHURA, J.
6402*
STADAAS, J.
6226*
STANLEY, M.M.
6531*
STARZL, T.E.
6398*
STAUFFER, J.Q.
6019, 6020
STEFANI, D.V.
6430
STEIN, D.
6380*
STEIN, G.
6587*
STENDIG-LINDBERG, G.
6610
STENSTAM, M.
6308*
STEPHENS, D.H.
6363*
STERCHI, J.M.
6559*
STEVENS, C.E.
6484*
STEWART, W.K.
6444*
STILLMAN, A.E.
6450*
STILWELL, C.A.
6374
STOCKER, H.
6158
STOLTE, M.
6551*
STONE, D.E.
6074*
STONE, R.M.
6356*
STOOPEN, M.
6642*
STOOPLER, M.
6619
STORM, F.K.
6615
STRANDBERG, P.O.
6611
STRANGE, R.C.
6508*
STRAUS, F.H., II
6240
STRAUSS, E.W.
6003*
STRELNIKOV, B.E.
6648
STRONG, J.P.
6334*
STROSBERG, J.M.
6598
STRUCHKOV, Y.V.
6223
STRUNIN, L.
6412*
SUCIU, A.
6102
SUGAWA, C.
6366*
SUGIMURA, T.
6065
SUGIURA, M.
6137
SUGONYAEVA, N.P.
6110
SULIMA, S.Y.
6418*
SULLIVAN, M.A.
6290*
SULSER, H.
6173
SULTANOV, G.V.
6469*
SUMTSOV, N.A.
6427
SUNDGREN, C.
6394*
SUNG, J.L.
6404*, 6491, 6493
SUTOR, D.J.
6543*
SUYAMA, T.
6530*
SUZUKI, H.
5996, 6137
SUZUKI, K.
6538*
SUZUKI, S.
6027
SVENNEVIG, J.L.
6255
SWEET, D.
6421*
SWEET, K.
6207
SZAUER, J.S.
6246
SZCZEKLIK, A.
6402*
SZCZUDRAWA, J.
6402*
SZMUNESS, W.
6484*
SZYMONSKI, K.
6494*
TACHON, J.
6044
TAGUE, L.L.
6017
TAI, Y.H.
6009
TAJIKA, S.
6057
TAKADA, T.
6579*
TAKAGI, K.
6046, 6050
TAKAHASHI, M.
6248
TAKASUGI, Y.
6433
TAKATA, Y.
6046
TAKESUE, A.
6104
TAKETA, K.
6120
TAKEUCHI, K.
6046, 6050
TAKEUCHI, T.
6065
TANAKA, A.
6104
TANDON, B.N.
6654
TANI, R.
6027
TANNENBAUM, C.
6009, 6011
TANNENBAUM, V.
6011
TARAO, K.
6530*
TARQUINI, B.
6526*
TAUNTON, O.D.
6125
TAUSCHEL, H.D.
6096
TAVARES, C.A.P.
6150
TAYLOR, K.J.W.
6574*
TAYLOR, W.
6080*
TEDESCO, F.J.
6204
TEDESCO MARCHESE, L.
6176
TEMKINA, T.Y.
6296
TENENHOUSE, A.
6034
TERADA, M.
6252
TEUBER, J.
6420*
THEODOROPOULOS, G.
6284
THOMAS, F.B.
6025
THOMAS, H.C.
6496*
THOMPSON, H.
6219
THOMPSON, R.
6614
THOMPSON, R.P.H.
6528*
THOMSON, W.C.
6333*
TIRELLI, A.
6497*

TOBIAS, H.
6461*
TOGONIDZE, N.A.
6582
TOLMAN, K.G.
6440*
TOMPKINS, R.K.
6572*
TONDELLI, P.
6247
TOOTHILL, C.
6133
TORJESEN, P.
6062
TOROPOV, Y.D.
6302
TOTHILL, P.
6224*
TOTSUKA, M.
6657
TOURNUT, R.
6178
TOYAMA, S.
6177
TRABOLSI, B.
6660
TREGUBOV, G.S.
6343
TRENBEATH, M.
6389
TREWBY, P.N.
6412*
TRILLER, J.
6193
TRUELOVE, S.C.
6357
TRUTYAK, Y.V.
6298
TSCHAIKOWSKI, K.L.
6170
TSOUKANTAS, A.
6284
TSUKADA, Y.
6081*
TSYRLOV, I.B.
6086*
TUKALO, N.I.
6112
TURNBERG, L.A.
6013
TURNER, K.J.
6401*
TURSZ, T.
6351*
TUZHILIN, S.A.
6195
TVERSKAYA, S.S.
6583
TWIEHAUS, M.J.
6149
TYGSTRUP, N.
6457*
TYTGAT, G.N.
6312*
UCHIDA, Y.
6579*
UGLOW, P.
6332*
URAY, Z.
6102
URUSHIDANI, T.
6050
USMANOV, N.U.
6231
V. BRAUN, H.H.
6400*
VAIDYA, A.B.
6650, 6652
VAILLE, C.
6095
VAKIL, B.J.
6663
VALIGURA, I.S.
6555*
VALLAT, J.P.
6313
VALZELLI, G.
6593
VAN BERGE-HENEGOUWEN, G.P.
6542*
VAN BIERVLIET, J.P.G.M.
6415*
VAN DER HEIDEN, C.
6452*
VAN DER LOOS, H.
6282
VAN RHIJN, A.
6452*
VAN THIEL, D.F.
6495*
VAN TONGEREN, J.H.M.
6591*
VANAT, I.M.
6555*
VARADI, A.
6527*
VARTANYAN, M.G.
6234
VAVILOVA, T.P.
6106
VAYSSE, N.
6178
VENUGOPAL, M.K.
6292*
VETVIK, K.
6255
VILLAREJOS, V.M.
6117
VILLARI, F.S.
6176
VINIK, A.I.
6378*
VISHNEVETSKY, F.E.
6114
VISHNYAKOV, A.K.
6648
VIT'KO, I.M.
6557*
VIVAS, C.A.
6246
VIVER, J.
6532*
VOIGT, K.
6186
VOIGTSBERGER, P.
6560*
VOLFF, G.
6432
VOLKOVA, L.D.
6431
VOLLMER, K.C.
6097
VORONIN, V.A.
6153
VORONOVA, L.A.
6115
VOSKRESENSKY, P.K.
6197
VOSSELER, M.G.
6116
WADSTEIN, J.
6505*
WAGNER, K.
6501*
WAGNER, S.
6285
WAGNER, S.M.
6025
WAHLIN, T.
5991*, 6084*
WAKABAYASHI, T.
6122
WALDMANN, C.
6154, 6159
WALKER, W.A.
6128*
WALLACE, A.C.
6632
WALLS, K.W.
6651
WALMSLEY, G.L.
6212
WALT, A.J.
6366*
WALTHER, B.
6101
WALZ, V.
6551*
WARD, M.E.
6412*
WARNER, N.L.
6145*
WATANABE, A.
6120
WATANABE, Y.
6177
WATSON, T.A.
6632
WATT, J.
6328*
WATT, J.K.
6391
WAXMAN, M.
6380*
WAY, L.W.
6568*
WEAVER, D.
6366*
WEBSTER, A.C.B.
6288*
WEEDON, A.F.
6445*
WEIDENHILLER, S.
6164

WEINER, M.
6548*
WEIS, E.
6101
WELLS, J.G.
6619
WELLS, P.N.T.
6517*
WENGER, J.
6008
WERNER, B.G.
6473*
WERTHER, J.L.
6022
WESTABY, D.
6451*
WESTON, M.J.
6413*
WHITE, W.F.
6405*
WHITE, Y.S.
6413*
WHITECROSS, D.
6042*
WHITEHOUSE, G.H.
6328*
WHORWELL, P.J.
6673*
WICKLMAYR, M.
6079*
WIDERLITE, L.W.
6606
WIECHERS, B.
6186
WIESENFELD, N.
6278
WIGGINS, H.
6323*
WILKIE, L.I.
6543*
WILLARD, J.C.
6139
WILLARD, J.G.
6139
WILLERSHAUSEN, B.
6101
WILLIAMS, G.
6327*
WILLIAMS, G.C.
6090*
WILLIAMS, R.
6068*, 6412*
WILLIAMS, T.W.
6637
WILLIAMS, W.J.
6447*
WILLS, W.
6473*
WINCHESTER, J.F.
6449*
WINCKLER, J.
5991*
WINSHIP, D.
6389
WITTEBOL, P.
6275
WITZTUM, K.F.
6514*
WLASIUK, M.
6466*
WOBSER, E.
6161
WOLFRAM, S.A.
6139
WOLLOCH, Y.
6554*
WOOD, B.P.
6406*
WOOD, B.T.
6619
WOODHOUSE, C.R.J.
6388
WORMSLEY, K.G.
6069*
WORTZEL, E.
6204
WOUSSEN-COLLE, M.C.
6040*
WOZNIAK, L.
6103
WOZNY, E.
6402*
WRIGHT, F.W.
6570*
WRUBLE, L.D.
6477*
WU, M.
6128*
WU, T.K.
6365*
YAJIMA, H.
6033
YAKIMOV, Y.V.
6194
YAKOVLEV, Y.Y.
6340
YAMAGUCHI, T.
6121
YAMAMOTO, T.
6525*
YAMAMOTO, T.Y.
5996
YAMASAKI, T.
6370
YASUDA, H.
6579*
YAZOVY, F.P.
6621
YOSHIDA, K.
6248
YOSHII, H.
6081*
YOUNG, L.B.
6190
YOUNG, R.C.
6617
YOUNOSZAI, M.K.
6014
YUDIN, I.Y.
6339, 6345
YURKOV, Y.A.
6431
YURRYAVICHUS, B.P.
6233
ZAKHAROVA, N.E.
6086*
ZAMAN, S.N.
6365*
ZANOBONI, A.
6509*
ZANOBONI-MUCIACCIA, W.
6509*
ZAWUISKI, E.J.
6049
ZEITUNE, J.M.R.
6055, 6176
ZEMAN, F.J.
6130*
ZER, M.
6554*
ZHMINCHENKO, V.M.
6110
ZHUK, M.A.
6563*
ZHUKOV, V.S.
6306
ZHUKOVSKAYA, N.A.
6296
ZILLY, W.
6411*
ZIMMON, D.S.
6510*
ZIMOVSKY, V.L.
6553*
ZINNER, M.J.
6006*, 6143*
ZOBOVA, Z.N.
6321
ZOZULYA, A.A.
6105
ZUBAREV, P.N.
6535*
ZUCKERMAN, A.J.
6480*
ZUMTOBEL, V.
6285
ZUS, B.A.
6503

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

ABDOMEN
    INTESTINES
        PNEUMATOSIS, 6300
    PAIN
        AMYLASES, 6387
        PANCREATITIS, 6387
    PNEUMATOSIS
        SURGERY, 6300
    SURGERY
        PARENTERAL ALIMENTATION, 6627
    TUBERCULOSIS
        EPIDEMIOLOGY, 6608

ABSCESS
    AMEBIASIS
        COMPLICATIONS, 6649
        LIVER, 6655
    CHILD
        DIAGNOSIS, 6624
        THERAPY, 6624
    LIVER
        AMEBIASIS, 6649
        BACTERIAL INFECTIONS, 6666
        THERAPY, 6666

ABSORPTION
    ALBUMINS
        MARKER STUDY, 6004*
    ANEMIA, PERNICIOUS
        VITAMIN B12, 6609
    CALCIUM
        GROWTH FACTORS, 6014
    CHENODEOXYCHOLIC ACID, 6542*
    COLON
        OXALATES, 6019, 6020
    DIABETES
        PEPTIDES, 6008
    FATS
        CALCIUM, 6003*
        MAGNESIUM, 6003*
    ILEUM
        CALCIUM, 6014
        POTASSIUM, 6001*
    INTESTINE, SMALL
        CALCIUM, 6014
        FATS, 6003*
        VITAMIN B6, 6021
    INTESTINES
        IRON, 6018
        TRIGLYCERIDES, 6162
    JEJUNUM
        CALCIUM, 6014
        CARBOHYDRATES, 6010
        ELECTROLYTES, 6012
        FATS, 6003*
        FRUCTOSE, 6010
        GLUCOSE, 6010
        VITAMIN B6, 6021
        WATER, 6012, 6025
    OXALATES
        CATHARTICS, 6019
        DRUG EFFECTS ON, 6019
    PROTEINS
        MARKER STUDY, 6004*
        SURGERY, 6004*
    STOMACH
        CARCINOGENS, 6022
    TRIGLYCERIDES
        MALABSORPTION SYNDROMES, 6162

ABSORPTION (continued)
    ULCER, PEPTIC
        SURGERY, 6263*
    WATER
        CAFFEINE, 6025
        DRUG EFFECTS ON, 6025

ACETYLCHOLINE
    COLON
        MUSCLES, 6026*

ACHALASIA
    DILATATION
        THERAPY, 6221
    ESOPHAGEAL REFLUX
        SPHINCTER, 6205
        SURGERY, 6205

ACID PHOSPHATASE
    STOMACH
        ACID SECRETION, 6039*

ACID SECRETION
    SEE ALSO BICARBONATE SECRETION,
      HYPERCHLORHYDRIA, SECRETION
    ANESTHESIA
        NERVOUS CONTROL, 6049
    ANTRUM
        ULCER, PEPTIC, 6261*
    CALCIUM
        SERUM, 6047
    FISTULA
        DIET, 6040*
        DRUG EFFECTS ON, 6058
        PROTEINS, 6040*
    GLUCOSE
        CHOLESTASIS, 6057
    HEIDENHAIN POUCH
        DIET, 6040*
        GASTRIN, 6040*
        PROTEINS, 6040*
    KWASHIORKOR
        CHILD, 6176
    PREGNANCY
        ANESTHESIA, 6051
    STOMACH, 6017
        ACID PHOSPHATASE, 6039*
        AMINO ACIDS, 6055
        ANESTHESIA, 6049
        CHILD, 6176
        FISTULA, 6040*, 6058
        GLUCOSE, 6055, 6057
        H2 RECEPTOR ANTAGONISTS, 6048,
          6283
        HISTAMINE, 6056
        INFANT, 6038*
        PEPSIN, 6044
        STRESS, 6052
        ULCER, PEPTIC, 6261*
        ULTRASTRUCTURE, 6039*
        VAGOTOMY, 6271
    STRESS
        EROSIONS, 6052
    TUBERCULOSIS
        MILK, 6626

ACIDITY
    CECUM
        DIET, 6139

ACIDITY (continued)
  CECUM (continued)
    FEEDING, 6139
  STOMACH
    ANESTHESIA, 6051
    PREGNANCY, 6051

ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  ADENOSINE TRIPHOSPHATE
    CALCIUM, 6059*
    PANCREAS, 6059*
    PROTEINS, 6059*
  LIVER CIRRHOSIS
    DIAGNOSIS, 6508*
  LIVER DISEASES
    DIAGNOSIS, 6508*
  SALIVARY GLANDS
    CALCIUM, 6034
    PROTEINS, 6034

ADENOSINE TRIPHOSPHATASE
  LIVER
    DRUG EFFECTS ON, 6127

ADENOSINE TRIPHOSPHATE
  ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    CALCIUM, 6059*
    PANCREAS, 6059*
    PROTEINS, 6059*
  BILE
    NERVOUS CONTROL, 6106
  GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
    CALCIUM, 6059*
    PANCREAS, 6059*
    PROTEINS, 6059*
  LIVER
    NERVOUS CONTROL, 6106

ADOLESCENCE
  BILIARY TRACT
    ULCER, PEPTIC, 6268
  LIVER
    ULCER, PEPTIC, 6268

ADRENERGIC RECEPTOR BLOCKADERS
  STOMACH
    SECRETION, 6046

ALBUMINS
  ABSORPTION
    MARKER STUDY, 6004*
  AMYLASES
    ASSAY, 6065
  LIVER
    SYNTHESIS, 6541*
  UREMIA
    METABOLISM, 6611

ALCOHOLISM
  ASCITES
    DRUG THERAPY, 6506*
  DRUG METABOLISM, 6515
  HYPERTENSION, 6417*
  LIVER
    ENZYMES, 6505*
  LIVER INJURY
    SULFHYDRYL COMPOUNDS, 6077*
  MAGNESIUM
    DEFICIENCY, 6610
    MUSCLES, 6610

ALCOHOLISM (continued)
  MUSCLES
    ELECTROLYTES, 6610
  PANCREAS, 6369
  SERUM
    AMYLASES, 6505*
    BILIRUBIN, 6505*

ALCOHOLS
  DRUG METABOLISM, 6515
  ESOPHAGUS
    NEOPLASMS, 6213
  FRUCTOSE, 6515
  LIVER
    FETUS, 6121
    INFANT, 6121
    METABOLISM, 6078*
    URIC ACID, 6079*
  LIVER CIRRHOSIS
    STATISTICAL STUDY, 6601
  METABOLISM
    BIOCHEMISTRY, 6515
  NEOPLASMS
    NITROSAMINES, 6213
  PANCREATITIS, CHRONIC
    FATS, 6385
    NERVOUS CONTROL, 6385
    PROTEINS, 6385
  TOXICITY
    BIOCHEMISTRY, 6515
  VITAMIN A
    DEFICIENCY, 6078*

ALKALINE PHOSPHATASE
  INTESTINE, SMALL
    WOUNDS AND INJURIES, 6135
  INTESTINES
    FETUS, 6137

ALKALOIDS
  HYPERTENSION, PORTAL
    DRUG-INDUCED, 6450*
  LIVER INJURY
    DRUG-INDUCED, 6450*

ALPHA 1 ANTITRYPSIN
  DEFICIENCY
    LIVER DISEASES, 6402*
  GENETIC FACTORS, 6399

ALPHA-CHAIN DISEASE
  MALABSORPTION SYNDROMES
    ENTEROPATHY, 6310*

ALPHA FETOPROTEIN
  LIVER
    NEOPLASMS, 6081*
    NEOPLASMS, MALIGNANT, 6403*, 6404*,
      6405*
  LIVER INJURY
    CARBON TETRACHLORIDE, 6114
  NEOPLASMS
    PROGNOSIS, 6590*
  SYNTHESIS, 6114

AMEBIASIS
  ABSCESS
    LIVER, 6655

- AMEBIASIS (continued)
  - COLON
    - RADIOLOGY, 6642*
  - COMPLICATIONS
    - ABSCESS, 6649
  - DYSENTERY
    - CHILD, 6659
    - DRUG THERAPY, 6659
  - EPIDEMIOLOGY
    - FAMILIAL FACTORS, 6651
  - INTESTINES
    - COLITIS, 6667
    - DYSENTERY, 6667
    - EPIDEMIOLOGY, 6667
  - LIVER
    - ABSCESS, 6649
    - COMPLICATIONS, 6649
    - DIAGNOSIS, 6660
    - DRUG THERAPY, 6660
    - EPIDEMIOLOGY, 6667
    - RUPTURE, 6655
    - THERAPY, 6655
  - RECTUM
    - EPIDEMIOLOGY, 6667
  - TRANSMISSION, 6641*
  - VENEREAL DISEASES, 6641*

- AMINES
  - LIVER COMA
    - BLOOD PLATELETS, 6510*

- AMINO ACIDS
  - BILE, 6069*
  - HEPATOCYTES
    - TRANSPORT, 6024
  - INTESTINE, SMALL
    - ION TRANSPORT, 6009
  - LIVER CIRRHOSIS
    - DEFICIENCY, 6522*
  - LIVER INJURY
    - ANALGESICS AND ANTIPYRETICS, 6449*
  - SERUM, 6069*
  - STOMACH
    - ACID SECRETION, 6055
  - ULCER
    - DRUG-INDUCED, 6050

- AMINO TRANSFERASES
  - HEPATITIS, INFECTIOUS
    - DIAGNOSIS, 6465*
  - LIVER, 6118

- AMYLASES
  - ABDOMEN
    - PAIN, 6387
  - ALBUMINS
    - ASSAY, 6065
  - ALCOHOLISM
    - SERUM, 6505*
  - CHILD
    - PANCREATITIS, 6387
  - GLOBULINS
    - ASSAY, 6065
    - CHEMICAL COMPOSITION, 6063
  - GLYCOGEN
    - HYDROLYSIS, 6064
  - HEPATITIS, INFECTIOUS
    - PANCREAS FUNCTION TESTS, 6463*
  - ISOENZYMES
    - TEMPERATURE, 6358*

- AMYLASES (continued)
  - PANCREAS
    - HYDROLYSIS, 6064
  - PANCREATITIS
    - SERUM, 6381
  - PROTEINS
    - ASSAY, 6065
  - SALIVARY GLANDS
    - HYDROLYSIS, 6064
  - STARCH
    - HYDROLYSIS, 6064

- ANALGESICS AND ANTIPYRETICS
  - HEPATITIS, CHRONIC
    - DRUG-INDUCED, 6440*
  - HEPATITIS, TOXIC, 6441*
  - INTESTINES
    - MOTILITY, 6552*
  - LIVER CIRRHOSIS
    - DRUG-INDUCED, 6440*
  - LIVER INJURY
    - AMINO ACIDS, 6449*
    - DRUG-INDUCED, 6440*, 6441*, 6449*
    - PREVENTION, 6449*
    - THERAPY, 6449*
  - STOMACH
    - ASPIRIN, 6045
    - DRUG EFFECTS ON, 6045
    - ELECTROPHYSIOLOGY, 6552*
    - MOTILITY, 6552*

- ANCYLOSTOMIASIS
  - ASCARIASIS, 6644*

- ANDROGENS
  - LIVER INJURY
    - ETIOLOGY, 6451*
    - HORMONES, 6451*
  - PELIOSIS HEPATIS
    - ETIOLOGY, 6451*

- ANEMIA, PERNICIOUS
  - STOMACH
    - ENDOSCOPY, 6173
  - VITAMIN B12
    - ABSORPTION, 6609
    - RADIONUCLIDES, 6609

- ANESTHESIA
  - ACID SECRETION
    - NERVOUS CONTROL, 6049
  - INTESTINES
    - MOTILITY, 6552*
  - PREGNANCY
    - ACID SECRETION, 6051
  - STOMACH
    - ACID SECRETION, 6049
    - ACIDITY, 6051
    - ELECTROPHYSIOLOGY, 6552*
    - MOTILITY, 6552*

- ANESTHETICS
  - HEPATITIS
    - DIAGNOSIS, 6447*
    - DRUG-INDUCED, 6447*
    - HYPERSENSITIVITY, 6447*

- ANGIOGRAPHY
  - DUODENUM
    - VARICES, 6291*
  - LIVER
    - PROSTAGLANDINS, 6393*
  - PANCREAS
    - NEOPLASMS, 6362*
    - NEOPLASMS, MALIGNANT, 6361*
  - PANCREATITIS
    - COMPLICATIONS, 6391

- ANISAKIASIS
  - GASTROINTESTINAL SYSTEM
    - ETIOLOGY, 6657
  - IMMUNOGLOBULINS
    - EPIDEMIOLOGY, 6657
  - TRANSMISSION, 6657

- ANOMALY
  - BLEEDING
    - RECTUM, 6322*
  - CECUM
    - APPENDECTOMY, 6337*
  - COLON
    - RECTUM, 6322*
  - PANCREAS
    - ENDOSCOPY, 6179
    - PANCREATOGRAPHY, 6179

- ANOMALY, CONGENITAL
  - GALLBLADDER
    - FAMILIAL FACTORS, 6559*

- ANORECTUM
  - SEE ALSO RECTUM

- ANTACIDS
  - BINDING
    - BILE ACIDS AND SALTS, 6070*

- ANTHELMINTICS
  - DRUG THERAPY
    - COMPLICATIONS, 6663
  - ECHINOCOCCOSIS
    - EPIDEMIOLOGY, 6656
  - PARASITES AND PARASITIC DISEASES
    - COMPLICATIONS, 6652
    - DRUG EFFECTS ON, 6650
    - DRUG THERAPY, 6663
    - TOLERANCE, 6652

- ANTI-INFLAMMATORY AGENTS
  - ESOPHAGUS
    - PRESSURE STUDY, 6031
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 6593

- ANTIBACTERIALS
  - GLYCOSIDES, 6625

- ANTIBIOTICS
  - COLITIS
    - DRUG-INDUCED, 6329*
    - EPIDEMIOLOGY, 6329*
    - GEOGRAPHICAL FACTORS, 6329*
  - COMPLICATIONS
    - KIDNEYS, 6532*
  - DRUG THERAPY
    - COMPLICATIONS, 6532*

- ANTIBIOTICS (continued)
  - JAUNDICE
    - DRUG-INDUCED, 6446*
    - ETIOLOGY, 6446*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
  - LIVER CIRRHOSIS
    - PERITONITIS, 6507*
  - PERITONITIS
    - DRUG THERAPY, 6507*
  - SODIUM
    - DEFICIENCY, 6532*

- ANTIBODIES
  - AUSTRALIA ANTIGEN
    - EPIDEMIOLOGY, 6477*
    - ETHNIC FACTORS, 6476*
    - SOCIOECONOMIC FACTORS, 6476*
  - DIARRHEA
    - CHILD, 6167
  - HEPATITIS
    - EPIDEMIOLOGY, 6484*
  - HEPATITIS, CHRONIC
    - PATHOLOGY, 6500*
  - HEPATITIS, INFECTIOUS
    - ANTIGENS, 6472*
    - EPIDEMIOLOGY, 6484*
    - SERODIAGNOSIS, 6472*
  - HEPATITIS, SERUM
    - PLASMA, 6483*
  - SCHISTOSOMIASIS
    - IMMUNOLOGY, 6645*
  - VENEREAL DISEASES, 6422*

- ANTIGENS
  - HEPATITIS
    - DANE PARTICLES, 6471*
  - HEPATITIS, INFECTIOUS
    - ANTIBODIES, 6472*
    - DANE PARTICLES, 6471*
    - FAMILIAL FACTORS, 6493
    - GEOGRAPHICAL FACTORS, 6493
    - SERODIAGNOSIS, 6472*
  - PORPHYRIA, 6420*

- ANTRECTOMY
  - INTESTINE, SMALL
    - ESOPHAGUS, 6030
  - ULCER
    - GASTRIN, 6278

- ANTRUM
  - ACID SECRETION
    - ULCER, PEPTIC, 6261*
  - GASTRIN
    - ULCER, PEPTIC, 6261*
  - SECRETION
    - GASTRIN, 6261*
    - ULCER, PEPTIC, 6261*
  - VAGOTOMY
    - ULCER, 6274

- ANUS
  - SEE ALSO RECTUM

- APPENDECTOMY
  - CECUM
    - ANOMALY, 6337*
    - COMPLICATIONS, 6344

APPENDICITIS
    CHILD, 6342, 6347
        DIAGNOSIS, 6340
        DYSENTERY, 6338
    COMPLICATIONS, 6344
    DIAGNOSIS
        COMPLICATIONS, 6340
    INFANT, 6347
    PREGNANCY
        DIAGNOSIS, 6194

APPENDIX
    CARCINOID TUMOR
        SECRETION, 6327*
    THERAPY, 6341

ARTERIES
    CHEMICAL COMPOSITION
        GASES, 6418*
    HYPERTENSION, PORTAL
        SPLEEN, 6534*
    LIVER DISEASES
        GASES, 6418*

ASCARIASIS
    ANCYLOSTOMIASIS, 6644*
    CHILD
        DIET, 6654
        NUTRITION DISORDERS, 6654
        THERAPY, 6654
    DRUG THERAPY, 6644*
    INTESTINES
        IMMUNITY, 6149

ASCITES
    ALCOHOLISM
        DRUG THERAPY, 6506*
    DIURETICS
        COMPLICATIONS, 6506*
    DRUG THERAPY
        DIURETICS, 6506*
    LIVER CIRRHOSIS
        COMPLICATIONS, 6537*
        ENDOTOXINS, 6530*
        PERITONITIS, 6507*
        THERAPY, 6531*
    LIVER DISEASES, ALCOHOLIC
        DRUG THERAPY, 6506*
    NEONATE
        DIAGNOSIS, 6529*

SPIRIN
    LIVER
        CHILD, 6442*
        TOXICITY, 6442*
    STOMACH
        ANALGESICS AND ANTIPYRETICS, 6045
        DRUG EFFECTS ON, 6045
        ENZYMES, 6042*
    TOXICITY
        CHILD, 6442*

TRESIA
    BILIARY TRACT
        ETIOLOGY, 6460*
    ESOPHAGUS
        NEONATE, 6211
        SIMULATION, 6211

ATROPHY
    INTESTINE, SMALL
        GALLBLADDER, 6061
        HORMONES, 6061
        PANCREAS, 6061
        PARENTERAL ALIMENTATION, 6061

ATROPINE
    ULCER
        CLASSIFICATION, 6266

AUSTRALIA ANTIGEN
    ANTIBODIES
        EPIDEMIOLOGY, 6477*
        ETHNIC FACTORS, 6476*
        SOCIOECONOMIC FACTORS, 6476*
    CARRIER STATE
        ETHNIC FACTORS, 6476*
        SOCIOECONOMIC FACTORS, 6476*
    EPIDEMIOLOGY, 6477*
    HEPATITIS
        CARRIER STATE, 6475*
        IMMUNOLOGY, 6474*
        LIVER, 6470*
        SERUM, 6470*
    HEPATITIS, CHRONIC
        CHILD, 6499*
        LIVER, 6470*
        LIVER CIRRHOSIS, 6499*
        PATHOLOGY, 6500*
        PROGNOSIS, 6501*
        SERUM, 6470*
    HEPATITIS, INFECTIOUS
        EPIDEMIOLOGY, 6491
        LIVER, 6470*
        REVIEW, 6490
        SERUM, 6470*
        STATISTICAL STUDY, 6492
    INSECTS, 6473*
    LIVER
        NEOPLASMS, MALIGNANT, 6434
        PATHOLOGY, 6475*
    LIVER CIRRHOSIS
        CHILD, 6499*
        LIVER, 6470*
        SERUM, 6470*
    LIVER DISEASES
        SERUM, 6470*
    LIVER INJURY
        CARRIER STATE, 6475*

BACTERIA
    CROHN'S DISEASE
        THERAPY, 6356
    GASTROENTERITIS
        INFANT, 6612
    INTESTINE, SMALL
        LIVER CIRRHOSIS, 6520*
    INTESTINES
        BILE ACIDS AND SALTS, 6074*
        DIETARY FACTORS, 6589*
    JEJUNUM
        LIVER CIRRHOSIS, 6520*
    LIVER
        CARDIOVASCULAR SYSTEM, 6540*
    LYMPHOMA
        MALABSORPTION SYNDROMES, 6309*

BACTERIAL INFECTIONS
- BILIARY TRACT
  - SURGERY, 6554*
- LIVER
  - ABSCESS, 6666
  - SYNERGY, 6666
- SALMONELLOSIS
  - DIAGNOSIS, 6630

BARIUM
- DUODENUM
  - DYSPEPSIA, 6260
- DYSPEPSIA
  - ENDOSCOPY, 6257
- ESOPHAGUS
  - DYSPEPSIA, 6260
- STOMACH
  - DYSPEPSIA, 6260

BEZOARS
- STOMACH, 6237

BICARBONATE SECRETION
- SEE ALSO SECRETION
- PANCREAS
  - HORMONE EFFECTS ON, 6060*
  - SOMATOSTATIN, 6060*

BILE
- ADENOSINE TRIPHOSPHATE
  - NERVOUS CONTROL, 6106
- AMINO ACIDS, 6069*
- BILIARY TRACT DISEASES
  - DIAGNOSIS, 6581*
- BILIRUBIN
  - DRUG EFFECTS ON, 6099
  - SEROTONIN, 6099
- CANNULATION
  - TECHNIQUES, 6071*
- CHOLAGOGUES AND CHOLERETICS
  - METABOLISM, 6097
- CHOLECYSTECTOMY
  - PHOSPHORUS, 6543*
- CHOLELITHIASIS
  - PHOSPHORUS, 6543*
- CHOLESTEROL, 6085*
- COPPER
  - BINDING, 6072*
  - WILSON'S DISEASE, 6072*
- ENZYMES
  - NERVOUS CONTROL, 6106
- HYPERSENSITIVITY
  - THERAPY, 6093
- ILEUM
  - MOTILITY, 6093
- INTESTINE, SMALL
  - MOTILITY, 6093
- JAUNDICE, OBSTRUCTIVE
  - INTESTINE, SMALL, 6579*
- LIPIDS
  - DRUG EFFECTS ON, 6397*
  - METABOLISM, 6397*
  - PHENOBARBITAL, 6397*
- OXIDOREDUCTASES
  - NERVOUS CONTROL, 6106

BILE (continued)
- SECRETION
  - CERULEIN, 6095
  - CHOLAGOGUES AND CHOLERETICS, 6092, 6096
  - DRUG EFFECTS ON, 6092, 6095, 6096, 6099
  - INSULIN, 6092
  - SEROTONIN, 6099

BILE ACIDS AND SALTS
- ANTACIDS
  - BINDING, 6070*
- CHOLELITHIASIS
  - CHOLESTEROL, 6572*
  - THERAPY, 6567*
- CHOLESTASIS, 6111
  - CIRCULATION, 6523*
  - EXCRETION, 6523*
  - METABOLISM, 6445*
  - MONOAMINE OXIDASE, 6086*
  - PREGNANCY, 6565*
- CIRCULATION
  - INTESTINAL ABSORPTION, 6523*
- INTESTINAL ABSORPTION
  - LACTOSE, 6035*
- INTESTINES
  - BACTERIA, 6074*
- LIVER CIRRHOSIS
  - CHOLESTASIS, 6523*
  - CIRCULATION, 6523*
  - RADIOIMMUNOASSAY, 6521*
  - SERUM, 6521*
- LIVER DISEASES
  - INFLAMMATORY BOWEL DISEASES, 6348*
  - METABOLISM, 6428
- METABOLISM
  - HEMOLYSIS, 6090*
  - LIVER CIRRHOSIS, 6090*
- STOMACH DISEASES
  - PERMEABILITY, 6054
  - REFLUX, 6054

BILE DUCTS
- CANNULATION
  - TECHNIQUES, 6071*
- DILATATION
  - CHOLANGIOGRAPHY, 6548*
  - DIAGNOSIS, 6410*
  - ULTRASONOGRAPHY, 6410*, 6548*
- DISEASE
  - ENZYMES, 6557
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 6190
  - RADIOLOGY, 6190
- OBSTRUCTION
  - DRAINAGE, 6580*
- SURGERY
  - GLUTATHIONE, 6555*

BILIARY TRACT
- ADOLESCENCE
  - ULCER, PEPTIC, 6268
- ATRESIA
  - ETIOLOGY, 6460*
- CADMIUM
  - EXCRETION, 6066
- CHILD
  - ULCER, PEPTIC, 6268

- BILIARY TRACT (continued)
    - NEOPLASMS, MALIGNANT
        - CYSTS, 6561*
        - DISEASES ASSOCIATED WITH, 6561*
    - SURGERY
        - BACTERIAL INFECTIONS, 6554*
        - COMPLICATIONS, 6554*, 6582
        - HEMATOBILIA, 6582
        - TECHNIQUES, 6558*

- BILIARY TRACT DISEASES
    - CHILD
        - MONOSACCHARIDES, 6425
    - DIAGNOSIS
        - BILE, 6581*
        - CHOLANGIOGRAPHY, 6581*
        - RADIOLOGY, 6544*
        - ULTRASONOGRAPHY, 6575*
    - DUODENUM
        - RADIOLOGY, 6169
    - LACTOSE INTOLERANCE, 6318
    - LYSOZYMES
        - PATHOLOGY, 6426
    - MALABSORPTION SYNDROMES
        - LACTOSE, 6318
    - MONOSACCHARIDES
        - EXCRETION, 6425
    - STOMACH
        - RADIOLOGY, 6169
    - SURGERY
        - TECHNIQUES, 6558*

- BILIRUBIN
    - ALCOHOLISM
        - SERUM, 6505*
    - BILE
        - DRUG EFFECTS ON, 6099
        - SEROTONIN, 6099
    - CHOLESTASIS
        - DIAGNOSIS, 6566*
    - HEPATITIS, INFECTIOUS
        - DIAGNOSIS, 6465*
    - JAUNDICE
        - NEONATE, 6435*
    - LIVER
        - METABOLISM, 6094
        - SECRETION, 6094
    - SECRETION, 6147

- LEEDING
    - SEE ALSO HEMORRHAGE
    - ANOMALY
        - RECTUM, 6322*
    - GASTROINTESTINAL SYSTEM
        - ANTI-INFLAMMATORY AGENTS, 6593
        - DIAGNOSIS, 6159, 6198*
        - DRUG-INDUCED, 6593
        - ENDOSCOPY, 6159, 6198*, 6212
        - RADIOLOGY, 6198*
        - RISK FACTORS, 6212
    - STOMACH
        - CLOTTING, 6146*
        - LASER, 6146*
        - THERAPY, 6146*

- LOOD
    - CHEMICAL COMPOSITION
        - GASES, 6418*
    - LIVER DISEASES
        - CHEMICAL COMPOSITION, 6418*

- BLOOD PLATELETS
    - HYPERTENSION, PORTAL, 6400*
    - LIVER CIRRHOSIS, 6400*
    - LIVER COMA, 6413*
        - AMINES, 6510*
        - NOREPINEPHRINE, 6510*
    - LIVER DISEASES, 6400*
    - LIVER INJURY, 6413*

- BONES
    - GASTRECTOMY
        - VITAMIN D, 6254
    - PANCREATITIS
        - DISEASES ASSOCIATED WITH, 6392
        - ISCHEMIA, 6392
        - NECROSIS, 6392

- BURNS
    - ESOPHAGUS, ARTIFICIAL
        - COLON, 6209

- BURNS, CHEMICAL
    - STOMACH
        - WOUNDS AND INJURIES, 6233

- CADMIUM
    - BILIARY TRACT
        - EXCRETION, 6066
    - PANCREAS
        - EXCRETION, 6066

- CAFFEINE
    - ABSORPTION
        - WATER, 6025

- CALCIUM
    - ABSORPTION
        - FATS, 6003*
        - GROWTH FACTORS, 6014
    - ACID SECRETION
        - SERUM, 6047
    - ADENOSINE TRIPHOSPHATE
        - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
        - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
    - CECUM
        - TRANSPORT, 6016
    - COLON
        - TRANSPORT, 6016
    - DUODENUM
        - ULTRASTRUCTURE, 6129*
    - ILEUM
        - ABSORPTION, 6014
        - TRANSPORT, 6014
    - INTESTINE, LARGE
        - TRANSPORT, 6016
    - INTESTINE, SMALL
        - ABSORPTION, 6014
        - TRANSPORT, 6014
        - ULTRASTRUCTURE, 6129*
    - JEJUNUM
        - ABSORPTION, 6014
        - FATS, 6003*
        - TRANSPORT, 6014
    - KWASHIORKOR
        - SERUM, 6316
    - MALABSORPTION SYNDROMES
        - SERUM, 6316

- CALCIUM (continued)
  - MARASMUS
    - SERUM, 6316
  - SALIVARY GLANDS
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6034
    - PROTEINS, 6034
  - TRANSPORT
    - GROWTH FACTORS, 6014
    - VITAMIN D, 6016

- CALCULI
  - SEE ALSO COMMON BILE DUCT CALCULI
  - CHOLANGIOGRAPHY
    - DIAGNOSIS, 6547*
  - LIVER
    - ENDOSCOPY, 6571*

- CARBOHYDRATES
  - INTESTINE, SMALL
    - ION TRANSPORT, 6009
  - JEJUNUM
    - ABSORPTION, 6010
  - LIVER
    - METABOLISM, 6104
  - STOMACH
    - METABOLISM, 6264
  - ULCER, PEPTIC
    - METABOLISM, 6264

- CARBON TETRACHLORIDE
  - LIVER INJURY
    - ALPHA FETOPROTEIN, 6114
    - NUCLEIC ACIDS, 6115
    - PREVENTION, 6087*
    - ZINC, 6087*

- CARCINOGENS
  - HYPERTENSION, PORTAL
    - LIVER INJURY, 6453*
  - STOMACH
    - ABSORPTION, 6022

- CARCINOID TUMOR
  - APPENDIX
    - SECRETION, 6327*

- CARDIOVASCULAR SYSTEM
  - SEE ALSO CIRCULATION
  - HEPATITIS
    - CHILD, 6488
  - HEPATITIS, INFECTIOUS
    - CHILD, 6488
  - LIVER
    - BACTERIA, 6540*
    - ENDOTOXINS, 6540*
    - PRESSURE STUDY, 6518*

- CATECHOLAMINES
  - COLON
    - ION TRANSPORT, 6015

- CATHARTICS
  - ABSORPTION
    - OXALATES, 6019
  - COLON
    - RADIOLOGY, 6165

- CECUM
  - SEE ALSO COLON, INTESTINE. LARGE
  - ACIDITY
    - DIET, 6139
    - FEEDING, 6139
  - ANOMALY
    - APPENDECTOMY, 6337*
  - DIET
    - MORPHOLOGY, 6140
    - MOTILITY, 6140
  - DIVERTICULITIS, 6343
  - ILEUM
    - NEOPLASMS, 6294
  - NEOPLASMS
    - DIAGNOSIS, 6294
    - RADIOLOGY, 6294
  - OBSTRUCTION
    - CYSTIC FIBROSIS, 6364*
    - DISEASES ASSOCIATED WITH, 6364*
    - SURGERY, 6364*
  - TRANSPORT
    - CALCIUM, 6016

- CELIAC DISEASE
  - CHILD
    - DIAGNOSIS, 6163
  - COMPLICATIONS
    - LIVER INJURY, 6308*
  - DIAGNOSIS
    - XYLOSE, 6163
  - MILK, 6317
  - STEATORRHEA
    - AGE FACTORS, 6311*
    - DIAGNOSIS, 6311*

- CELL CULTURE
  - HEPATOCYTES
    - METABOLISM, 6101
    - MORPHOLOGY, 6101
  - LIVER
    - NEOPLASMS, 6081*
  - SCHISTOSOMIASIS
    - TECHNIQUES, 6661

- CERULEIN
  - BILE
    - SECRETION, 6095
  - CHOLECYSTOGRAPHY, 6549*
  - STOMACH
    - MOTILITY, 6027

- CHENODEOXYCHOLIC ACID
  - ABSORPTION, 6542*
  - HEPATITIS, NONVIRAL, 6116
  - METABOLISM, 6542*

- CHILD
  - ABSCESS
    - DIAGNOSIS, 6624
    - THERAPY, 6624
  - AMEBIASIS
    - DYSENTERY, 6659
  - APPENDICITIS, 6342, 6347
    - DIAGNOSIS, 6340
  - ASCARIASIS
    - DIET, 6654
    - NUTRITION DISORDERS, 6654
    - THERAPY, 6654

CHILD (continued)
  BILIARY TRACT
    ULCER, PEPTIC, 6268
  BILIARY TRACT DISEASES
    MONOSACCHARIDES, 6425
  CELIAC DISEASE
    DIAGNOSIS, 6163
  CHOLECYSTITIS
    DIAGNOSIS, 6583
    GANGRENE, 6584
  DIARRHEA
    ANTIBODIES, 6167
  DUODENUM
    RUPTURE, 6306
  DYSENTERY
    APPENDICITIS, 6338
    DRUG THERAPY, 6659
  GASTROENTERITIS
    ETIOLOGY, 6637
    REVIEW, 6637
  GASTROINTESTINAL SYSTEM
    TRYPSIN, 6621
  HEPATITIS
    CARDIOVASCULAR SYSTEM, 6488
    CIRCULATION, 6488
    DIAGNOSIS, 6489
    EPIDEMIOLOGY, 6484*, 6489
    IMMUNITY, 6487
  HEPATITIS, CHRONIC
    AUSTRALIA ANTIGEN, 6499*
    LIVER CIRRHOSIS, 6499*
  HEPATITIS, INFECTIOUS
    CARDIOVASCULAR SYSTEM, 6488
    CIRCULATION, 6488
    DIAGNOSIS, 6489
    EPIDEMIOLOGY, 6484*, 6489
    IMMUNITY, 6487
  HORMONES, ADRENAL CORTEX
    THERAPY, 6622
  INTESTINE, SMALL
    RUPTURE, 6306
    ULTRASTRUCTURE, 5996
  INTESTINES
    INTUSSUSCEPTION, 6331*
  JAUNDICE, OBSTRUCTIVE
    DIAGNOSIS, 6576*
  KWASHIORKOR
    ACID SECRETION, 6176
  LIVER
    ASPIRIN, 6442*
    ULCER, PEPTIC, 6268
  LIVER CIRRHOSIS
    AUSTRALIA ANTIGEN, 6499*
  LIVER DISEASES
    DIAGNOSIS, 6431
    MONOSACCHARIDES, 6425
  PANCREATITIS
    AMYLASES, 6387
    COMPLICATIONS, 6384
  SALIVARY GLANDS
    NEOPLASMS, 6600
  STOMACH
    ACID SECRETION, 6176
    ULCER, 6279
  TOXICITY
    ASPIRIN, 6442*
  ULCER
    PSEUDOTUMORS, 6279

CHLORIDES
  COLON
    ION TRANSPORT, 6013

CHOLAGOGUES AND CHOLERETICS
  BILE
    METABOLISM, 6097
    SECRETION, 6096
  CHEMICAL PROPERTIES, 6100
  PLASMA
    CHROMATOGRAPHY, 6098
    METABOLISM, 6098
  SECRETION
    BILE, 6092
  SYNTHESIS, 6100
  URINE
    CHROMATOGRAPHY, 6098
    METABOLISM, 6097, 6098

CHOLANGIOGRAPHY
  BILE DUCTS
    DILATATION, 6548*
  BILIARY TRACT DISEASES
    DIAGNOSIS, 6581*
  CALCULI
    DIAGNOSIS, 6547*
  CONTRAST MEDIA, 6188
  CYSTS
    DIAGNOSIS, 6547*
  ENDOSCOPY
    COMPLICATIONS, 6545*
    TECHNIQUES, 6186
  JAUNDICE
    DIAGNOSIS, 6548*
    TECHNIQUES, 6546*
  LIVER
    TECHNIQUES, 6546*
  LIVER DISEASES
    TECHNIQUES, 6546*
  MANOMETRY, 6188
    SURGERY, 6185
  STRICTURE
    DIAGNOSIS, 6547*
  SURGERY, 6188
  TECHNIQUES, 6187, 6188, 6538
    DIETARY FACTORS, 6191

CHOLANGITIS
  SCLEROSIS
    DIAGNOSIS, 6562*
    DRUG THERAPY, 6562*
    SURGERY, 6562*
    THERAPY, 6562*

CHOLECYSTECTOMY
  BILE
    PHOSPHORUS, 6543*
  CHOLELITHIASIS
    THERAPY, 6572*
  COMPLICATIONS
    PREVENTION, 6553
  INTESTINES
    MOTILITY, 6552*
  STOMACH
    ELECTROPHYSIOLOGY, 6552*
    MOTILITY, 6552*

CHOLECYSTITIS
- CHILD
  - DIAGNOSIS, 6583
- COMPLICATIONS
  - GANGRENE, 6584
- DIAGNOSIS
  - DRAINAGE, 6152*
  - THERMOGRAPHY, 6563*
- GANGRENE
  - CHILD, 6584

CHOLECYSTOGRAPHY
- CERULEIN, 6549*
- CONTRAST MEDIA, 6189
- TECHNIQUES
  - DIETARY FACTORS, 6191

CHOLECYSTOKININ
- COLON
  - MUSCLES, 6026*
- DEFICIENCY
  - ANALYSIS, 6631
- PANCREOZYMIN
  - DEFICIENCY, 6631

CHOLELITHIASIS
- SEE ALSO GALLSTONES
- BILE
  - PHOSPHORUS, 6543*
- CHOLECYSTECTOMY
  - THERAPY, 6572*
- CHOLESTEROL
  - BILE ACIDS AND SALTS, 6572*
  - PHOSPHOLIPIDS, 6572*
  - SOLUBILITY, 6572*
- DIAGNOSIS
  - DRAINAGE, 6152*
- DISEASES ASSOCIATED WITH
  - HYPERCALCEMIA, 6564*
  - PARATHYROID GLANDS, 6564*
- ETIOLOGY
  - REVIEW, 6573*
- PATHOLOGY
  - REVIEW, 6573*
- THERAPY
  - BILE ACIDS AND SALTS, 6567*
  - REVIEW, 6572*

CHOLERA
- GASTROENTERITIS
  - ANURIA, 6592
- ILEUM
  - ION TRANSPORT, 6012
- JEJUNUM
  - ION TRANSPORT, 6012

CHOLESTASIS
- ACID SECRETION
  - GLUCOSE, 6057
- BILE ACIDS AND SALTS, 6111
  - CIRCULATION, 6523*
  - EXCRETION, 6523*
  - METABOLISM, 6445*
- DIAGNOSIS
  - BILIRUBIN, 6566*
  - LIPOPROTEINS, 6438, 6566*
  - LIVER FUNCTION TESTS, 6566*
- DRUG-INDUCED, 6445*
  - HYPOGLYCEMIC AGENTS, 6444*

CHOLESTASIS (continued)
- DRUG METABOLISM
  - DRUG EFFECTS ON, 6411*
- ETIOLOGY
  - IMMUNOLOGY, 6446*
- HYPOGLYCEMIC AGENTS
  - COMPLICATIONS, 6444*
- JAUNDICE
  - DIAGNOSIS, 6574*
  - ULTRASONOGRAPHY, 6574*
- LIVER CIRRHOSIS
  - BILE ACIDS AND SALTS, 6523*
- MONOAMINE OXIDASE
  - BILE ACIDS AND SALTS, 6086*
  - CYTOCHROMES, 6086*
  - LIPIDS, 6086*
  - PEROXIDATION, 6086*
- PREGNANCY
  - BILE ACIDS AND SALTS, 6565*
  - LIVER FUNCTION TESTS, 6565*

CHOLESTEROL
- BILE, 6085*
- CHOLELITHIASIS
  - BILE ACIDS AND SALTS, 6572*
  - PHOSPHOLIPIDS, 6572*
  - SOLUBILITY, 6572*
- COMMON BILE DUCT CALCULI
  - SOLUBILITY, 6568*
- LIVER
  - DRUG EFFECTS ON, 6127
  - METABOLISM, 6119
- METABOLISM
  - HEPATITIS, 6478*
- PLASMA
  - STEROLS, 6478*

CHROMATOGRAPHY
- GLUCAGON
  - TECHNIQUES, 6032
- HORMONES, GASTROINTESTINAL
  - TECHNIQUES, 6032
- PLASMA
  - CHOLAGOGUES AND CHOLERETICS, 6098
- URINE
  - CHOLAGOGUES AND CHOLERETICS, 6098

CIRCADIAN RHYTHM
- LIVER CIRRHOSIS
  - PROLACTIN, 6526*

CIRCULATION
- SEE ALSO CARDIOVASCULAR SYSTEM
- BILE ACIDS AND SALTS
  - INTESTINAL ABSORPTION, 6523*
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6523*
- COLITIS, ULCERATIVE
  - CROHN'S DISEASE, 6350*
  - IMMUNOGLOBULINS, 6350*
- DUODENUM
  - VARICES, 6291*
- HEPATITIS
  - CHILD, 6488
- HEPATITIS, INFECTIOUS
  - CHILD, 6488
- INTESTINE, SMALL
  - ULTRASTRUCTURE, 6142*

- CIRCULATION (continued)
  - INTESTINES
    - COMPLICATIONS, 6301
    - ISCHEMIA, 6607
  - LIVER
    - ENZYMES, 6104
    - METABOLISM, 6104
    - TRANSPLANTATION, 6108, 6432
  - LIVER CIRRHOSIS
    - BILE ACIDS AND SALTS, 6523*
  - LIVER INJURY
    - THERAPY, 6113
  - SHUNT
    - MARKER STUDY, 6143*
    - TECHNIQUES, 6143*
  - STOMACH
    - ENDOTOXINS, 6006*
  - VARICES
    - OBSTRUCTION, 6291*

- COLITIS
  - AMEBIASIS
    - INTESTINES, 6667
  - ANTIBIOTICS
    - EPIDEMIOLOGY, 6329*
    - GEOGRAPHICAL FACTORS, 6329*
  - DRUG-INDUCED
    - ANTIBIOTICS, 6329*
    - EPIDEMIOLOGY, 6329*
    - GEOGRAPHICAL FACTORS, 6329*
  - ISCHEMIA
    - DISEASES ASSOCIATED WITH, 6328*
  - NEOPLASMS, MALIGNANT
    - DISEASES ASSOCIATED WITH, 6328*
  - SHIGELLOSIS
    - MEGACOLON, 6605

- OLITIS, ULCERATIVE
  - COLON
    - RADIOLOGY, 6355
  - CROHN'S DISEASE
    - CIRCULATION, 6350*
    - DIAGNOSIS, 6353
    - DRUG THERAPY, 6353
    - IMMUNOGLOBULINS, 6350*
  - DIAGNOSIS
    - DRUG THERAPY, 6353
  - DRUG THERAPY
    - COMPLICATIONS, 6357
    - METABOLISM, 6357
  - ETIOLOGY
    - IMMUNOLOGY, 6349*
  - HISTOCHEMISTRY, 6349*
  - HYPERSENSITIVITY
    - THERAPY, 6356
  - IMMUNOGLOBULINS, 6351*
    - CIRCULATION, 6350*
  - PROSTAGLANDINS
    - SYNTHESIS, 6354
  - RADIOLOGY
    - ENDOSCOPY, 6355
    - REVIEW, 6355
  - SURGERY
    - PRECANCEROUS CONDITIONS, 6352*
    - REVIEW, 6352*
    - SEQUELAE, 6352*
  - ULTRASTRUCTURE, 6349*

- COLON
  - SEE ALSO CECUM, INTESTINE, LARGE
  - ABSORPTION
    - OXALATES, 6019, 6020
  - AMEBIASIS
    - RADIOLOGY, 6642*
  - ANOMALY
    - RECTUM, 6322*
  - COLITIS, ULCERATIVE
    - RADIOLOGY, 6355
  - ENDOSCOPY, 6166
  - ESOPHAGUS, ARTIFICIAL
    - BURNS, 6209
  - INTESTINAL OBSTRUCTION
    - CLASSIFICATION, 6336*
    - SURGERY, 6336*
  - ION TRANSPORT
    - CATECHOLAMINES, 6015
    - CHLORIDES, 6013
    - EPINEPHRINE, 6015
    - POTASSIUM, 6013
    - SODIUM, 6013
  - ISCHEMIA
    - DISEASES ASSOCIATED WITH, 6380*
  - JEJUNUM
    - ENZYMES, 5990*
    - REGENERATION, 5990*
    - VILLI, 5990*
  - MOTILITY
    - NEOPLASMS, MALIGNANT, 6324*
  - MUSCLES
    - ACETYLCHOLINE, 6026*
    - CHOLECYSTOKININ, 6026*
    - GLUCAGON, 6026*
    - HORMONE EFFECTS ON, 6026*
  - NECROSIS
    - DISEASES ASSOCIATED WITH, 6380*
  - NEOPLASMS
    - DIAGNOSIS, 6326*
  - NEOPLASMS, MALIGNANT
    - BREATH TEST, 6323*
    - DISEASES ASSOCIATED WITH, 6328*
    - FECES, 6324*
    - GEOGRAPHICAL FACTORS, 6324*
    - IMMUNOTHERAPY, 6144*
  - PHYSIOLOGY
    - REVIEW, 6136
  - PNEUMATOSIS, 6333*
  - POLYPS
    - EPIDEMIOLOGY, 6334*
    - NEOPLASMS, 6334*
  - PSEUDO-OBSTRUCTION
    - DIAGNOSIS, 6330*
    - RADIOLOGY, 6330*
  - RADIOLOGY
    - CATHARTICS, 6165
    - ENEMA, 6165
  - RECTUM
    - NEOPLASMS, 6326*
  - SECRETION
    - GLUCOSE, 6132
  - TRANSPORT
    - CALCIUM, 6016
    - OXALATES, 6020

- COLONOSCOPY
  - REVIEW, 6197

- COMMON BILE DUCT CALCULI
  - SEE ALSO CALCULI
  - CHOLESTEROL
    - SOLUBILITY, 6568*
  - SOLUBILITY
    - REVIEW, 6568*
    - TECHNIQUES, 6568*
  - THERAPY
    - ENDOSCOPY, 6551*
    - REVIEW, 6569*, 6568*
    - TECHNIQUES, 6569*

- COMPUTERS
  - ESOPHAGEAL REFLUX
    - ANALYSIS, 6210
  - LIVER
    - TOMOGRAPHY, 6192
  - LIVER DISEASES
    - DIAGNOSIS, 6192
  - PANCREAS
    - TOMOGRAPHY, 6192
  - PANCREATITIS
    - TOMOGRAPHY, 6382
  - TOMOGRAPHY
    - NEOPLASMS, 6363*
    - PANCREATIC DISEASES, 6363*

- CONNECTIVE TISSUE
  - GALLBLADDER
    - NERVOUS CONTROL, 5991*

- CONSTIPATION
  - DIAGNOSIS
    - REVIEW, 6603
  - THERAPY
    - REVIEW, 6603

- CONTRACEPTIVES, ORAL
  - LIVER
    - NEOPLASMS, BENIGN, 6409*

- CONTRAST MEDIA
  - CHOLANGIOGRAPHY, 6188
  - CHOLECYSTOGRAPHY, 6189
  - DUODENUM
    - DYSPEPSIA, 6260
  - ESOPHAGUS
    - DYSPEPSIA, 6260
  - STOMACH
    - DYSPEPSIA, 6260

- COPPER
  - BILE
    - BINDING, 6072*
    - WILSON'S DISEASE, 6072*
  - LIVER CIRRHOSIS, OBSTRUCTIVE
    - DRUG EFFECTS ON, 6536*
  - WILSON'S DISEASE
    - EXCRETION, 6072*
    - METABOLISM, 6072*

- CROHN'S DISEASE
  - SEE ALSO ENTERITIS, ENTERITIS, REGIONAL
  - BACTERIA
    - THERAPY, 6356

- CROHN'S DISEASE (continued)
  - COLITIS, ULCERATIVE
    - CIRCULATION, 6350*
    - DIAGNOSIS, 6353
    - DRUG THERAPY, 6353
    - IMMUNOGLOBULINS, 6350*
  - COMPLICATIONS
    - ARTHRITIS, 6678
    - SPLENOMEGALY, 6674*
  - DIAGNOSIS
    - DRUG THERAPY, 6353
  - DRUG THERAPY, 6671*
  - PERFORATION, 6675*
  - SURGERY
    - RECURRENCE, 6672
  - THERAPY
    - DIET, 6671*
  - VIRUSES, 6673*

- CYSTIC FIBROSIS
  - CECUM
    - OBSTRUCTION, 6364*
  - COMPLICATIONS
    - INTESTINAL OBSTRUCTION, 6364*
  - ILEUM
    - OBSTRUCTION, 6364*
  - INTESTINE, LARGE
    - OBSTRUCTION, 6364*
  - INTESTINE, SMALL
    - OBSTRUCTION, 6364*
  - JEJUNUM
    - OBSTRUCTION, 6364*

- CYSTS
  - BILIARY TRACT
    - NEOPLASMS, MALIGNANT, 6561*
  - CHOLANGIOGRAPHY
    - DIAGNOSIS, 6547*
  - INTESTINE, SMALL
    - MESENTERY, 6305
  - LIVER, 6429
  - RETROPERITONEAL SPACE
    - FATS, 6298
    - INTESTINAL OBSTRUCTION, 6298

- CYTOCHROMES
  - CHOLESTASIS
    - MONOAMINE OXIDASE, 6086*

- DEFECATION
  - SEE ALSO EXCRETION
  - INFECTION
    - ELECTROLYTES, 6629

- DIABETES
  - ABSORPTION
    - PEPTIDES, 6008
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 6379*
  - STOMACH
    - MOTILITY, 6224*
  - TRANSPORT
    - PEPTIDES, 6008

- DIAPHRAGM
  - HERNIA
    - SURGERY, 6215

- DIARRHEA
  - CHILD
    - ANTIBODIES, 6167

- DIET
  - ASCARIASIS
    - CHILD, 6654
  - CECUM
    - ACIDITY, 6139
    - MORPHOLOGY, 6140
    - MOTILITY, 6140
  - CROHN'S DISEASE
    - THERAPY, 6671*
  - EPIDEMIOLOGY
    - DISEASE, 6601
    - STATISTICAL STUDY, 6601
  - FATTY LIVER
    - LIPIDS, 6082*
  - FISTULA
    - ACID SECRETION, 6040*
  - GALLSTONES
    - SYNTHESIS, 6084*
  - HEIDENHAIN POUCH
    - ACID SECRETION, 6040*
    - GASTRIN, 6040*
  - INTESTINE, SMALL
    - MORPHOLOGY, 6140
    - MOTILITY, 6140
  - IRRITABLE COLON
    - THERAPY, 6332*
  - LIVER
    - GLUCOSE PHOSPHATE DEHYDROGENASE, 6120
  - STATISTICAL STUDY
    - DISEASE, 6601

- IGESTION
  - LIPASE
    - FATS, 6141
  - STOMACH
    - PATHOLOGY, 6043

- STENTION
  - INTESTINAL OBSTRUCTION
    - GASES, 6292*

- URETICS
  - ASCITES
    - COMPLICATIONS, 6506*
    - DRUG THERAPY, 6506*
  - METABOLISM, 6527*
    - LIVER CIRRHOSIS, 6527*

- VERTICULITIS
  - CECUM, 6343
  - INTESTINE, LARGE, 6343
    - DIAGNOSIS, 6346
    - RADIOLOGY, 6346
  - SIGMOID, 6343

- ERTICULUM
  - INTESTINE, LARGE
    - DIAGNOSIS, 6346
    - RADIOLOGY, 6346

- INAGE
  - BILE DUCTS
    - OBSTRUCTION, 6580*

- DRAINAGE (continued)
  - CHOLECYSTITIS
    - DIAGNOSIS, 6152*
  - CHOLELITHIASIS
    - DIAGNOSIS, 6152*
  - GALLBLADDER DISEASES
    - DIAGNOSIS, 6152*
  - JAUNDICE, OBSTRUCTIVE
    - TECHNIQUES, 6579*

- DRUG-INDUCED
  - CHOLESTASIS, 6445*
    - HYPOGLYCEMIC AGENTS, 6444*
  - COLITIS
    - ANTIBIOTICS, 6329*
    - EPIDEMIOLOGY, 6329*
    - GEOGRAPHICAL FACTORS, 6329*
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 6593
  - HEPATITIS
    - ANESTHETICS, 6447*
  - HEPATITIS, CHRONIC
    - ANALGESICS AND ANTIPYRETICS, 6440*
  - HYPERTENSION, PORTAL
    - ALKALOIDS, 6450*
  - JAUNDICE
    - ANTIBIOTICS, 6446*
    - ETIOLOGY, 6446*
    - HEPATITIS, CHRONIC, 6443*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
  - LIVER CIRRHOSIS
    - ANALGESICS AND ANTIPYRETICS, 6440*
  - LIVER INJURY
    - ALKALOIDS, 6450*
    - ANALGESICS AND ANTIPYRETICS, 6440*, 6441*, 6449*
    - TRANQUILIZING AGENTS, 6126
  - MITOCHONDRIA
    - HEPATOCYTES, 6122
  - NEOPLASMS, MALIGNANT
    - PREGNANCY, 6617
  - STOMACH
    - ULCER, 6050
  - ULCER
    - AMINO ACIDS, 6050

- DRUG METABOLISM
  - ALCOHOLISM, 6515
  - ALCOHOLS, 6515
  - CHOLESTASIS
    - DRUG EFFECTS ON, 6411*
  - INTESTINE, SMALL
    - HYPNOTIC AGENTS, 6396*
  - LIVER
    - AGE FACTORS, 6080*
  - LIVER CIRRHOSIS
    - DRUG EFFECTS ON, 6411*

- DRUG THERAPY
  - ALCOHOLISM
    - ASCITES, 6506*
  - AMEBIASIS
    - DYSENTERY, 6659
  - ANTHELMINTICS
    - COMPLICATIONS, 6663
  - ANTIBIOTICS
    - COMPLICATIONS, 6532*
  - ASCARIASIS, 6644*

- DRUG THERAPY (continued)
  - ASCITES
    - DIURETICS, 6506*
  - CHOLANGITIS
    - SCLEROSIS, 6562*
  - COLITIS, ULCERATIVE
    - COMPLICATIONS, 6357
    - CROHN'S DISEASE, 6353
    - DIAGNOSIS, 6353
    - METABOLISM, 6357
  - CROHN'S DISEASE, 6671*
    - DIAGNOSIS, 6353
  - DYSENTERY
    - CHILD, 6659
  - GASTRITIS
    - SECRETION, 6228
    - VITAMIN E, 6228
  - INTESTINES
    - TUBERCULOSIS, 6588*
  - LIVER
    - AMEBIASIS, 6660
    - NEOPLASMS, MALIGNANT, 6403*
  - LIVER CIRRHOSIS
    - PERITONITIS, 6507*
  - LIVER DISEASES, ALCOHOLIC
    - ASCITES, 6506*
  - PANCREAS
    - NEOPLASMS, 6373
    - NEOPLASMS, MALIGNANT, 6360*
  - PARASITES AND PARASITIC DISEASES
    - ANTHELMINTICS, 6663
  - PERITONITIS
    - ANTIBIOTICS, 6507*
  - SCHISTOSOMIASIS
    - ANALYSIS, 6669
    - TECHNIQUES, 6661
  - SODIUM
    - DEFICIENCY, 6532*
  - STOMACH
    - NEOPLASM METASTASIS, 6249
    - ULCER, PEPTIC, 6270

- DUMPING SYNDROME
  - GASTRECTOMY, 6255

- DUODENUM
  - SEE ALSO ILEUM, INTESTINE, SMALL, JEJUNUM
  - CALCIUM
    - ULTRASTRUCTURE, 6129*
  - DYSPEPSIA
    - BARIUM, 6260
    - CONTRAST MEDIA, 6260
    - ENDOSCOPY, 6260
  - ENDOSCOPY
    - BIOPSY, 6164
  - GIARDIASIS
    - INTUBATION, 6658
  - PERFORATION
    - IATROGENESIS, 6545*
  - RADIOLOGY
    - BILIARY TRACT DISEASES, 6169
  - RUPTURE
    - CHILD, 6306
  - ULCER
    - CLASSIFICATION, 6266
    - HAPTOGLOBINS, 6284
    - PERFORATION, 6276

- DUODENUM (continued)
  - ULCER (continued)
    - SURGERY, 6267
    - VAGOTOMY, 6275, 6280, 6281, 6282
  - VARICES
    - ANGIOGRAPHY, 6291*
    - CIRCULATION, 6291*
    - OBSTRUCTION, 6291*

- DYES
  - LIVER
    - METABOLISM, 6094
    - SECRETION, 6094

- DYSENTERY
  - AMEBIASIS
    - CHILD, 6659
    - DRUG THERAPY, 6659
    - INTESTINES, 6667
  - CHILD
    - APPENDICITIS, 6338
    - DRUG THERAPY, 6659

- DYSPEPSIA
  - DUODENUM
    - BARIUM, 6260
    - CONTRAST MEDIA, 6260
    - ENDOSCOPY, 6260
  - ENDOSCOPY
    - BARIUM, 6257
  - ESOPHAGUS
    - BARIUM, 6260
    - CONTRAST MEDIA, 6260
    - ENDOSCOPY, 6260
  - STOMACH
    - BARIUM, 6260
    - CONTRAST MEDIA, 6260
    - ENDOSCOPY, 6260

- ECHINOCOCCOSIS
  - EPIDEMIOLOGY
    - ANTHELMINTICS, 6656
    - STATISTICAL STUDY, 6656
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, 6628
  - TRANSMISSION
    - ETHNIC FACTORS, 6643*
    - OCCUPATIONAL FACTORS, 6643*
    - RISK FACTORS, 6643*
    - STATISTICAL STUDY, 6656

- ELECTROLYTES
  - ALCOHOLISM
    - MUSCLES, 6610
  - GASTROINTESTINAL SYSTEM
    - INFECTION, 6629
  - INFECTION
    - DEFECATION, 6629
  - JEJUNUM
    - ABSORPTION, 6012

- ELECTRON TRANSPORT
  - SEE ALSO ION TRANSPORT

- ELECTROPHYSIOLOGY
  - GALLBLADDER
    - ULTRASTRUCTURE, 5997
  - HEPATOCYTES
    - PRIMATES, 5992

- ELECTROPHYSIOLOGY (continued)
  - INTESTINES
    - PSEUDO-OBSTRUCTION, 6290*
  - STOMACH
    - ANALGESICS AND ANTIPYRETICS, 6552*
    - ANESTHESIA, 6552*
    - CHOLECYSTECTOMY, 6552*
  - ULCER
    - VAGOTOMY, 6282
  - VAGOTOMY
    - TECHNIQUES, 6243

- NDOCRINE SYSTEM
  - INTESTINES
    - DISEASE, 6036
    - HORMONES, GASTROINTESTINAL, 6036
    - REVIEW, 6036
  - STOMACH
    - DISEASE, 6036
    - HORMONES, GASTROINTESTINAL, 6036
    - REVIEW, 6036

- DOSCOPY
  - CHOLANGIOGRAPHY
    - COMPLICATIONS, 6545*
    - TECHNIQUES, 6186
  - COLITIS, ULCERATIVE
    - RADIOLOGY, 6355
  - COLON, 6166
  - COMMON BILE DUCT CALCULI
    - THERAPY, 6551*
  - COMPLICATIONS
    - PERFORATION, 6545*
  - DUODENUM
    - BIOPSY, 6164
    - DYSPEPSIA, 6260
  - DYSPEPSIA
    - BARIUM, 6257
  - ESOPHAGUS
    - COMPLICATIONS, 6158
    - DYSPEPSIA, 6260
    - HERNIA, 6161
    - OBSTRUCTION, 6201
    - REVIEW, 6218
  - GASTRECTOMY
    - NEOPLASMS, MALIGNANT, 6226*
  - GASTRITIS
    - BIOPSY, 6253
    - DIAGNOSIS, 6253
  - GASTROINTESTINAL SYSTEM, 6155, 6156
    - BIOPSY, 6157
    - BLEEDING, 6159, 6198*, 6212
    - COMPLICATIONS, 6157
    - HEMORRHAGE, 6212
  - INTESTINE, SMALL
    - COMPLICATIONS, 6158
  - LIVER
    - CALCULI, 6571*
  - PANCREAS
    - ANOMALY, 6179
    - FISTULA, 6376
    - NEOPLASMS, 6362*
    - NEOPLASMS, MALIGNANT, 6361*
    - PANCREATOGRAPHY, 6151*, 6359*
    - PSEUDOCYSTS, 6366*
    - SURGERY, 6154
  - PANCREATIC DISEASES
    - DIAGNOSIS, 6151*, 6359*
    - PANCREATOGRAPHY, 6359*

- ENDOSCOPY (continued)
  - PANCREATOGRAPHY
    - COMPLICATIONS, 6545*
  - STOMACH, 6174
    - ANEMIA, PERNICIOUS, 6173
    - COMPLICATIONS, 6158
    - DYSPEPSIA, 6260
  - SURGERY, 6154
  - THERAPY, 6154
  - VAGOTOMY, 6154

- ENDOTOXINS
  - LIVER
    - CARDIOVASCULAR SYSTEM, 6540*
    - STEROIDS, 6123
  - LIVER CIRRHOSIS
    - ASCITES, 6530*
    - PLASMA, 6530*
  - STOMACH
    - CIRCULATION, 6006*
    - ION TRANSPORT, 6006*

- ENEMA
  - COLON
    - RADIOLOGY, 6165

- ENTERITIS
  - SEE ALSO CROHN'S DISEASE
  - INTESTINE, SMALL
    - INTUSSUSCEPTION, 6297

- ENTERITIS, REGIONAL
  - SEE ALSO CROHN'S DISEASE
  - COMPLICATIONS
    - URINARY SYSTEM, 6677*

- EOSINOPHILS
  - STOMACH
    - INFLAMMATION, 6235

- EPINEPHRINE
  - COLON
    - ION TRANSPORT, 6015

- EROSIONS
  - ACID SECRETION
    - STRESS, 6052

- ERYTHROCYTES
  - LIPIDS, 6085*

- ESOPHAGEAL DISEASES
  - COMPLICATIONS, 6223
  - DIAGNOSIS, 6223
  - THERAPY, 6223

- ESOPHAGEAL REFLUX
  - ACHALASIA
    - SURGERY, 6205
  - COMPUTERS
    - ANALYSIS, 6210
  - ESOPHAGITIS
    - REVIEW, 6219
  - PATHOLOGY
    - REVIEW, 6217
  - SPHINCTER
    - ACHALASIA, 6205
    - SURGERY, 6205
  - VITAMIN C
    - DEFICIENCY, 6208

ESOPHAGITIS
- ESOPHAGEAL REFLUX
  - REVIEW, 6219
- IATROGENESIS
  - HIATAL HERNIA, 6206

ESOPHAGUS
- ANTI-INFLAMMATORY AGENTS
  - PRESSURE STUDY, 6031
- ATRESIA
  - NEONATE, 6211
  - SIMULATION, 6211
- DYSPEPSIA
  - BARIUM, 6260
  - CONTRAST MEDIA, 6260
  - ENDOSCOPY, 6260
- ENDOSCOPY
  - COMPLICATIONS, 6158
  - OBSTRUCTION, 6201
  - REVIEW, 6218
- HEMORRHAGE
  - HYPERTENSION, PORTAL, 6200*
  - PROGNOSIS, 6200*
- HERNIA
  - DIAGNOSIS, 6161
  - ENDOSCOPY, 6161
  - RADIOLOGY, 6161
- HYPERTENSION, PORTAL
  - HEMORRHAGE, 6533*
- INTESTINE, SMALL
  - ANTRECTOMY, 6030
  - SURGERY, 6030
- NEOPLASMS
  - ALCOHOLS, 6213
  - NITROSAMINES, 6213
  - REVIEW, 6216
  - THERAPY, 6216
- NEOPLASMS, MALIGNANT, 6222
  - SURGERY, 6202
- OBSTRUCTION
  - FOOD, 6199*
  - GLUCAGON, 6199*
  - THERAPY, 6199*
- PARASITES AND PARASITIC DISEASES
  - MUSCLES, 6662
- PERFORATION
  - THERAPY, 6204
- PERISTALSIS
  - NERVOUS CONTROL, 6028
- PRESSURE STUDY
  - TECHNIQUES, 6029
- RESPIRATORY SYSTEM
  - FISTULA, 6203
- SPHINCTER
  - PRESSURE STUDY, 6031
- STRICTURE
  - DILATATION, 6214
  - SURGERY, 6214
- VARICES
  - HEMORRHAGE, 6200*
  - HYPERTENSION, PORTAL, 6200*
  - PROGNOSIS, 6200*

ESOPHAGUS, ARTIFICIAL
- COLON
  - BURNS, 6209

EXCRETION
- SEE ALSO DEFECATION
- BILIARY TRACT
  - CADMIUM, 6066
- BILIARY TRACT DISEASES
  - MONOSACCHARIDES, 6425
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6523*
- INFLAMMATORY BOWEL DISEASES
  - OXALATES, 6586*
- LIVER DISEASES
  - MONOSACCHARIDES, 6425
- MALABSORPTION SYNDROMES
  - OXALATES, 6586*
- PANCREAS
  - CADMIUM, 6066
  - FATS, 6371
- PANCREATIC DISEASES
  - OXALATES, 6586*
- WILSON'S DISEASE
  - COPPER, 6072*

FATS
- SEE ALSO LIPIDS, TRIGLYCERIDES
- ABSORPTION
  - CALCIUM, 6003*
  - MAGNESIUM, 6003*
- INTESTINE, SMALL
  - ABSORPTION, 6003*
- JEJUNUM
  - ABSORPTION, 6003*
  - CALCIUM, 6003*
  - MAGNESIUM, 6003*
- LIPASE
  - DIGESTION, 6141
- PANCREAS
  - EXCRETION, 6371
- PANCREATITIS, CHRONIC
  - ALCOHOLS, 6385
- RETROPERITONEAL SPACE
  - CYSTS, 6298

FATTY ACIDS
- METABOLISM, 6124

FATTY LIVER
- DIAGNOSIS
  - RADIONUCLIDES, 6514*
- HEPATOCYTES
  - ULTRASTRUCTURE, 6504*
- LIPIDS
  - DIET, 6082*
- LIPOPROTEINS
  - SYNTHESIS, 6083*
- MITOCHONDRIA
  - ULTRASTRUCTURE, 6504*

FECES
- COLON
  - NEOPLASMS, MALIGNANT, 6324*
- GASTROINTESTINAL DISEASES
  - BIOCHEMISTRY, 6168
  - DIAGNOSIS, 6168

FEEDING
- CECUM
  - ACIDITY, 6139
- GASTRITIS
  - GASTRIN, 6177

FEEDING (continued)
  INFANT
    TECHNIQUES, 6638
  SERUM
    GASTRIN, 6177
  TECHNIQUES
    ANALYSIS, 6638

FETUS
  INTESTINES
    ALKALINE PHOSPHATASE, 6137
  LIVER
    ALCOHOLS, 6121
    MORPHOLOGY, 5999
  PANCREAS
    VEINS, 5998

FIBRINOGEN
  LIVER, 6102

FIBROSIS
  LIVER
    FAMILIAL FACTORS, 6414*
    HYPERTENSION, PORTAL, 6414*

FISTULA
  ACID SECRETION
    DIET, 6040*
    DRUG EFFECTS ON, 6058
    PROTEINS, 6040*
  ESOPHAGUS
    RESPIRATORY SYSTEM, 6203
  GASTRIN
    DIET, 6040*
  PANCREAS
    ENDOSCOPY, 6376
    SURGERY, 6376
  STOMACH
    ACID SECRETION, 6040*, 6058
    GASTRIN, 6040*

FOOD
  DISEASE
    DIAGNOSIS, 6618
    TRANSMISSION, 6618
  EPIDEMIOLOGY
    DISEASE, 6601
  ESOPHAGUS
    OBSTRUCTION, 6199*

FRUCTOSE
  ALCOHOLS, 6515
  JEJUNUM
    ABSORPTION, 6010

GALLBLADDER
  ANOMALY, CONGENITAL
    FAMILIAL FACTORS, 6559*
  HORMONES
    SECRETION, 6061
  INTESTINE, SMALL
    ATROPHY, 6061
  NEOPLASMS
    THERAPY, 6560*
  NERVOUS CONTROL
    CONNECTIVE TISSUE, 5991*
  TOMOGRAPHY, 6550*
  ULTRASONOGRAPHY, 6193

GALLBLADDER (continued)
  ULTRASTRUCTURE
    ELECTROPHYSIOLOGY, 5997

GALLBLADDER DISEASES
  DIAGNOSIS
    DRAINAGE, 6152*
    ULTRASONOGRAPHY, 6575*
  DIGANOSIS
    TECHNIQUES, 6550*
    TOMOGRAPHY, 6550*
  IMMUNOGLOBULINS, 6430

GALLSTONES
  SEE ALSO CHOLELITHIASIS
  CHEMICAL COMPOSITION
    GASES, 6570*
  DIET
    SYNTHESIS, 6084*
  GASES
    ETIOLOGY, 6570*
  PREVENTION, 6085*

GANGRENE
  CHOLECYSTITIS
    CHILD, 6584
    COMPLICATIONS, 6584

GASES
  ARTERIES
    CHEMICAL COMPOSITION, 6418*
  BLOOD
    CHEMICAL COMPOSITION, 6418*
  INTESTINAL OBSTRUCTION
    DISTENTION, 6292*
  INTESTINE, SMALL
    INTESTINAL OBSTRUCTION, 6292*
  LIVER DISEASES
    ARTERIES, 6418*
    VEINS, 6418*
  VEINS
    CHEMICAL COMPOSITION, 6418*

GASTRECTOMY
  DUMPING SYNDROME, 6255
  NEOPLASMS, MALIGNANT
    BIOPSY, 6226*
    DIAGNOSIS, 6226*
    ENDOSCOPY, 6226*
  VITAMIN D
    BONES, 6254
    MINERALS, 6254

GASTRIN
  ANTRUM
    SECRETION, 6261*
    ULCER, PEPTIC, 6261*
  GASTRITIS
    FEEDING, 6177
  HEIDENHAIN POUCH
    ACID SECRETION, 6040*
    DIET, 6040*
    PROTEINS, 6040*
  HYPOGLYCEMIA
    VAGOTOMY, 6285
  SERUM
    FEEDING, 6177
    HYPERCALCEMIA, 6591*
    INFANT, 6038*

GASTRIN (continued)
- STOMACH
  - FISTULA, 6040*
  - SECRETION, 6261*
  - ULCER, PEPTIC, 6261*
- SYNTHESIS
  - INFANT, 6038*
- ULCER
  - ANTRECTOMY, 6278
  - VAGOTOMY, 6278
- ZOLLINGER-ELLISON SYNDROME
  - DIAGNOSIS, 6591*

GASTRITIS
- DRUG THERAPY
  - VITAMIN E, 6228
- ENDOSCOPY
  - BIOPSY, 6253
  - DIAGNOSIS, 6253
- GASTRIN
  - FEEDING, 6177
- RADIOTHERAPY
  - COMPLICATIONS, 6225*
- REFLUX
  - SURGERY, 6250
- SECRETION
  - DEFICIENCY, 6228
  - DRUG THERAPY, 6228
- ULCER
  - SURGERY, 6250

GASTROENTERITIS
- CHILD
  - ETIOLOGY, 6637
  - REVIEW, 6637
- CHOLERA
  - ANURIA, 6592
- INFANT
  - BACTERIA, 6612
  - ETIOLOGY, 6612
- MILK, 6317

GASTROENTEROSTOMY
- OBSTRUCTION
  - LAPAROSCOPY, 6295

GASTROINTESTINAL DISEASES
- DIAGNOSIS
  - FECES, 6168
  - IMMUNOLOGY, 6160
- FECES
  - BIOCHEMISTRY, 6168
- INFLAMMATION, 6321
- LACTOSE INTOLERANCE, 6318
- MALABSORPTION SYNDROMES
  - LACTOSE, 6318
- OCCUPATIONAL FACTORS
  - ENVIRONMENTAL FACTORS, 6616
- WATER
  - TRANSMISSION, 6619

GASTROINTESTINAL SYSTEM
- ANISAKIASIS
  - ETIOLOGY, 6657
- BIOPSY
  - COMPLICATIONS, 6157

GASTROINTESTINAL SYSTEM (continued)
- BLEEDING
  - ANTI-INFLAMMATORY AGENTS, 6593
  - DIAGNOSIS, 6159, 6198*
  - DRUG-INDUCED, 6593
  - ENDOSCOPY, 6159, 6198*, 6212
  - RADIOLOGY, 6198*
  - RISK FACTORS, 6212
- ECHINOCOCCOSIS
  - NEOPLASMS, 6628
- ENDOSCOPY, 6155, 6156
  - BIOPSY, 6157
  - COMPLICATIONS, 6157
- GRANULOMA
  - DIAGNOSIS, 6585*
- HEMORRHAGE
  - ENDOSCOPY, 6212
  - RISK FACTORS, 6212
- INFECTION
  - ELECTROLYTES, 6629
  - TOXICITY, 6629
- IRRADIATION
  - SEQUELAE, 6614
- LYMPHOMA
  - SEZARY SYNDROME, 6606
- NEOPLASMS
  - SURGERY, 6595, 6596
- NEOPLASMS, MALIGNANT
  - GENETICS, 6623
- RADIATION
  - SEQUELAE, 6614
- RADIATION EFFECTS ON
  - SEQUELAE, 6614
- SURGERY, 6156
- TRYPSIN
  - CHILD, 6621

GASTROSTOMY
- STOMACH
  - SECRETION, 6037*

GENETICS
- GASTROINTESTINAL SYSTEM
  - NEOPLASMS, MALIGNANT, 6623

GIARDIASIS
- DUODENUM
  - INTUBATION, 6658
- REVIEW
  - DIAGNOSIS, 6664
  - EPIDEMIOLOGY, 6664
  - PATHOLOGY, 6664
  - PREVENTION, 6664
  - THERAPY, 6664
- SECRETIN
  - DIAGNOSIS, 6658

GLOBULINS
- AMYLASES
  - ASSAY, 6065
  - CHEMICAL COMPOSITION, 6063
- HEPATITIS
  - PREVENTION, 6479*
- HEPATITIS, INFECTIOUS
  - PREVENTION, 6479*

GLUCAGON
- CHROMATOGRAPHY
  - TECHNIQUES, 6032
- COLON
  - MUSCLES, 6026*
- ESOPHAGUS
  - OBSTRUCTION, 6199*
- LIVER CIRRHOSIS
  - DIAGNOSIS, 6508*
- LIVER DISEASES
  - DIAGNOSIS, 6508*
- RADIOIMMUNOASSAY
  - TECHNIQUES, 6032

GLUCONEOGENESIS
- LIVER FUNCTION TESTS
  - HEPATITIS, CHRONIC, 6466*
  - HEPATITIS, INFECTIOUS, 6466*
  - LIVER CIRRHOSIS, 6466*
  - LIVER DISEASES, 6466*

GLUCOSE
- ACID SECRETION
  - CHOLESTASIS, 6057
- COLON
  - SECRETION, 6132
- ILEUM
  - SECRETION, 6132
  - TRANSPORT, 6011
- INTESTINE, SMALL
  - ION TRANSPORT, 6009
  - TRANSPORT, 6011
- JEJUNUM
  - ABSORPTION, 6010
  - SECRETION, 6132
  - TRANSPORT, 6011
- LIVER CIRRHOSIS
  - DIAGNOSIS, 6508*
- LIVER DISEASES
  - DIAGNOSIS, 6508*
- STOMACH
  - ACID SECRETION, 6055, 6057
  - SECRETION, 6053

GLUCOSE PHOSPHATE
- ENZYMES
  - DEFICIENCY, 6415*

GLUCOSE PHOSPHATE DEHYDROGENASE
- DEFICIENCY
  - DIAGNOSIS, 6467*
  - DISEASES ASSOCIATED WITH, 6467*
  - HYPERBILIRUBINEMIA, 6467*
- LIVER
  - DIET, 6120
- LIVER INJURY, 6120

GLUCURONIDASE
- LIVER DISEASES
  - LIVER FUNCTION TESTS, 6395*

GLUTATHIONE
- BILE DUCTS
  - SURGERY, 6555*

GLYCOGEN
- AMYLASES
  - HYDROLYSIS, 6064

GLYCOGENOSIS
- DISEASES ASSOCIATED WITH, 6415*

GLYCOPROTEINS
- HEPATITIS, CHRONIC, 6525*
  - DIAGNOSIS, 6502
  - SERUM, 6468*
- HEPATITIS, INFECTIOUS
  - SERUM, 6468*
- LIVER CIRRHOSIS, 6525*
  - DIAGNOSIS, 6502
- LIVER DISEASES, 6525*

GLYCOSIDES
- ANTIBACTERIALS, 6625

GRANULOMA
- GASTROINTESTINAL SYSTEM
  - DIAGNOSIS, 6585*
- ILEUM
  - DIAGNOSIS, 6585*
- INTESTINE, SMALL
  - DIAGNOSIS, 6585*
- STOMACH
  - DIAGNOSIS, 6585*

GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
- ADENOSINE TRIPHOSPHATE
  - CALCIUM, 6059*
  - PANCREAS, 6059*
  - PROTEINS, 6059*

H2 RECEPTOR ANTAGONISTS
- STOMACH
  - ACID SECRETION, 6048, 6283
  - SECRETION, 6046

HALLUCINOGENS
- LIVER
  - DRUG EFFECTS ON, 6127

HAPTOGLOBINS
- ULCER
  - DUODENUM, 6284

HEIDENHAIN POUCH
- ACID SECRETION
  - DIET, 6040*
  - GASTRIN, 6040*
  - PROTEINS, 6040*
- GASTRIN
  - DIET, 6040*
  - PROTEINS, 6040*

HEMATOBILIA
- BILIARY TRACT
  - SURGERY, 6582

HEMATOPOIESIS
- LIVER
  - AGE FACTORS, 6073*

HEMODIALYSIS
- HEPATITIS, INFECTIOUS
  - EPIDEMIOLOGY, 6485*
  - TRANSMISSION, 6485*
- INTESTINE, SMALL
  - MORPHOLOGY, 6587*

- HEMOLYSIS
  - BILE ACIDS AND SALTS
    - METABOLISM, 6090*

- HEMORRHAGE
  - SEE ALSO BLEEDING
  - ESOPHAGUS
    - HYPERTENSION, PORTAL, 6200*
    - PROGNOSIS, 6200*
    - VARICES, 6200*
  - GASTROINTESTINAL SYSTEM
    - ENDOSCOPY, 6212
    - RISK FACTORS, 6212
  - HYPERTENSION, PORTAL
    - ESOPHAGUS, 6533*
    - FAMILIAL FACTORS, 6533*
  - LIVER
    - NEOPLASMS, BENIGN, 6409*
    - SURGERY, 6454*
    - THERAPY, 6454*
    - WOUNDS AND INJURIES, 6454*
  - PANCREAS
    - PSEUDOCYSTS, 6365*
  - PSEUDOCYSTS
    - SURGERY, 6365*
  - VARICES
    - HYPERTENSION, PORTAL, 6200*
    - PROGNOSIS, 6200*

- HEMOSTASIS
  - LIVER
    - SURGERY, 6423, 6427
    - TECHNIQUES, 6427
  - TECHNIQUES
    - REVIEW, 6423

- HEPATECTOMY
  - HYPERTENSION, PORTAL, 6398*

- HEPATITIS
  - ANESTHETICS
    - DIAGNOSIS, 6447*
    - HYPERSENSITIVITY, 6447*
  - ANTIBODIES
    - EPIDEMIOLOGY, 6484*
  - AUSTRALIA ANTIGEN
    - CARRIER STATE, 6475*
    - IMMUNOLOGY, 6474*
    - LIVER, 6470*
    - SERUM, 6470*
  - CARDIOVASCULAR SYSTEM
    - CHILD, 6488
  - CHILD
    - EPIDEMIOLOGY, 6484*
  - CHOLESTEROL
    - METABOLISM, 6478*
  - CIRCULATION
    - CHILD, 6488
  - DANE PARTICLES
    - ANTIGENS, 6471*
  - DIAGNOSIS
    - CHILD, 6489
    - HYPERBILIRUBINEMIA, 6467*
    - LIPOPROTEINS, 6438
  - DISEASES ASSOCIATED WITH, 6467*
  - DRUG-INDUCED
    - ANESTHETICS, 6447*
  - EPIDEMIOLOGY
    - CHILD, 6489

- HEPATITIS (continued)
  - IMMUNITY
    - CHILD, 6487
  - IMMUNOLOGY, 6474*
  - LIVER DISEASES, ALCOHOLIC, 6516
    - IMMUNOLOGY, 6511*
  - NEONATE, 6424
    - DISEASES ASSOCIATED WITH, 6486*
    - ETIOLOGY, 6460*
    - PROGNOSIS, 6486*
    - SURVIVAL, 6486*
  - PREVENTION, 6480*
    - GLOBULINS, 6479*
  - SERODIAGNOSIS
    - RADIOIMMUNOASSAY, 6482*
  - STEROLS
    - METABOLISM, 6478*
  - URINE
    - ENZYMES, 6464*
  - VACCINES
    - REVIEW, 6480*
  - VIRUSES
    - REVIEW, 6456*

- HEPATITIS, ACUTE
  - SURVIVAL
    - AGE FACTORS, 6458*
  - THERAPY
    - SURVIVAL, 6458*

- HEPATITIS, CHRONIC
  - ANTIBODIES
    - PATHOLOGY, 6500*
  - AUSTRALIA ANTIGEN
    - CHILD, 6499*
    - LIVER, 6470*
    - LIVER CIRRHOSIS, 6499*
    - PATHOLOGY, 6500*
    - PROGNOSIS, 6501*
    - SERUM, 6470*
  - BIOPSY
    - MORPHOLOGY, 6495
  - COMPLICATIONS
    - CRYOGLOBULINEMIA, 6497*
  - DIAGNOSIS
    - BIOPSY, 6184, 6457*
    - GLYCOPROTEINS, 6502
    - MORPHOLOGY, 6184, 6457*
  - DISEASES ASSOCIATED WITH
    - CRYOGLOBULINEMIA, 6461*
  - DRUG-INDUCED
    - ANALGESICS AND ANTIPYRETICS, 6440*
  - ETIOLOGY
    - IMMUNOLOGY, 6498*
  - GLUCONEOGENESIS
    - LIVER FUNCTION TESTS, 6466*
  - GLYCOPROTEINS, 6525*
  - IMMUNOGLOBULINS, 6401*, 6498*
    - PATHOLOGY, 6500*
  - IMMUNOSUPPRESSION
    - THERAPY, 6494*
  - JAUNDICE
    - DRUG-INDUCED, 6443*
  - LIVER CIRRHOSIS
    - CHILD, 6499*
  - LIVER FUNCTION TESTS, 6501*
  - LYMPHOCYTES
    - IMMUNOLOGY, 6496*
  - MORPHOLOGY, 6501*

HEPATITIS, CHRONIC (continued)
- PATHOLOGY, 6459*, 6462
- PROTEINS
  - ENZYMES, 6469*
- SERUM
  - GLYCOPROTEINS, 6468*
- THYROID GLAND, 6503

HEPATITIS, INFECTIOUS
- ANTIBODIES
  - EPIDEMIOLOGY, 6484*
- ANTIGENS
  - ANTIBODIES, 6472*
  - FAMILIAL FACTORS, 6493
  - GEOGRAPHICAL FACTORS, 6493
- AUSTRALIA ANTIGEN
  - EPIDEMIOLOGY, 6491
  - LIVER, 6470*
  - REVIEW, 6490
  - SERUM, 6470*
  - STATISTICAL STUDY, 6492
- CARDIOVASCULAR SYSTEM
  - CHILD, 6488
- CHILD
  - EPIDEMIOLOGY, 6484*
- CIRCULATION
  - CHILD, 6488
- CLASSIFICATION
  - REVIEW, 6490
- DANE PARTICLES
  - ANTIGENS, 6471*
- DIAGNOSIS
  - AMINO TRANSFERASES, 6465*
  - BILIRUBIN, 6465*
  - BIOPSY, 6184
  - CHILD, 6489
  - HYPERBILIRUBINEMIA, 6467*
  - MORPHOLOGY, 6184
  - TECHNIQUES, 6465*
  - ZINC, 6465*
- DISEASES ASSOCIATED WITH, 6467*
- ENZYMES
  - PEROXIDATION, 6469*
  - SERUM, 6469*
- EPIDEMIOLOGY
  - CHILD, 6489
- GLUCONEOGENESIS
  - LIVER FUNCTION TESTS, 6466*
- HEMODIALYSIS
  - EPIDEMIOLOGY, 6485*
  - TRANSMISSION, 6485*
- IMMUNITY
  - CHILD, 6487
- PANCREAS FUNCTION TESTS
  - AMYLASES, 6463*
- PATHOLOGY, 6459*
- PREVENTION, 6480*
  - GLOBULINS, 6479*
- PROTEINS
  - ENZYMES, 6469*
- SERODIAGNOSIS
  - ANTIBODIES, 6472*
  - ANTIGENS, 6472*
  - RADIOIMMUNOASSAY, 6482*
- SERUM
  - GLYCOPROTEINS, 6468*
- SIMULATION, 6117
- SURVIVAL
  - AGE FACTORS, 6458*

HEPATITIS, INFECTIOUS (continued)
- THERAPY
  - SURVIVAL, 6458*
- TRANSMISSION
  - REVIEW, 6490
- URINE
  - ENZYMES, 6464*
- VACCINES
  - REVIEW, 6480*
- VIRUSES
  - EPIDEMIOLOGY, 6481*

HEPATITIS, NONVIRAL
- CHENODEOXYCHOLIC ACID, 6116
- PATHOLOGY, 6459*

HEPATITIS, SERUM
- PLASMA
  - ANTIBODIES, 6483*
- SERODIAGNOSIS
  - RADIOIMMUNOASSAY, 6482*

HEPATITIS, TOXIC
- ANALGESICS AND ANTIPYRETICS, 6441*
- LIVER FUNCTION TESTS
  - DIAGNOSIS, 6439*
- PESTICIDES
  - DIAGNOSIS, 6439*
  - OCCUPATIONAL FACTORS, 6439*

HEPATOCYTES
- CELL CULTURE
  - METABOLISM, 6101
  - MORPHOLOGY, 6101
- ELECTROPHYSIOLOGY
  - PRIMATES, 5992
- FATTY LIVER
  - ULTRASTRUCTURE, 6504*
- LIVER
  - REGENERATION, 6110
- MITOCHONDRIA
  - DRUG-INDUCED, 6122
- TRANSPORT
  - AMINO ACIDS, 6024

HEPATOMEGALY
- ULTRASONOGRAPHY, 6354*

HERNIA
- DIAPHRAGM
  - SURGERY, 6215
- ESOPHAGUS
  - DIAGNOSIS, 6161
  - ENDOSCOPY, 6161
  - RADIOLOGY, 6161
- SURGERY
  - RESPIRATORY SYSTEM, 6215

HIATAL HERNIA
- COMPLICATIONS, 6220
- ESOPHAGITIS
  - IATROGENESIS, 6206
- SURGERY
  - COMPLICATIONS, 6207

HIRSCHSPRUNG'S DISEASE
- SEE ALSO MEGACOLON

HISTAMINE
  STOMACH
    ACID SECRETION, 6056
    SECRETION, 6053

HODGKIN'S DISEASE
  RADIOTHERAPY
    COMPLICATIONS, 6225*
  STOMACH, 6236

HORMONES
  GALLBLADDER
    SECRETION, 6061
  INTESTINE, SMALL
    ATROPHY, 6061
  LIVER DISEASES, ALCOHOLIC
    LIVER CIRRHOSIS, 6509*
  LIVER INJURY
    ANDROGENS, 6451*
    ETIOLOGY, 6451*
  PANCREAS
    SECRETION, 6061
  PELIOSIS HEPATIS
    ETIOLOGY, 6451*

HORMONES, ADRENAL CORTEX
  THERAPY
    CHILD, 6622
    COMPLICATIONS, 6622

HORMONES, GASTROINTESTINAL
  CHEMICAL PROPERTIES, 6033
  CHROMATOGRAPHY
    TECHNIQUES, 6032
  ENDOCRINE SYSTEM
    INTESTINES, 6036
    STOMACH, 6036
  RADIOIMMUNOASSAY
    TECHNIQUES, 6032

HYALIN SUBSTANCE
  LIVER DISEASES, ALCOHOLIC
    ULTRASTRUCTURE, 6512*, 6513*

HYPERBILIRUBINEMIA
  DIAGNOSIS
    COMPLICATIONS, 6436
    LIPOPROTEINS, 6438
  GLUCOSE PHOSPHATE DEHYDROGENASE
    DEFICIENCY, 6467*
  HEPATITIS
    DIAGNOSIS, 6467*
  HEPATITIS, INFECTIOUS
    DIAGNOSIS, 6467*
  NEONATE, 6437

HYPERCALCEMIA
  CHOLELITHIASIS
    DISEASES ASSOCIATED WITH, 6564*
  SERUM
    GASTRIN, 6591*

HYPERCHLORHYDRIA
  SEE ALSO ACID SECRETION,
    BICARBONATE SECRETION, SECRETION

HYPERPLASIA
  INTESTINES
    HYPOGAMMAGLOBULINEMIA, 6288*

HYPERSENSITIVITY
  COLITIS, ULCERATIVE
    THERAPY, 6356
  HEPATITIS
    ANESTHETICS, 6447*
  JAUNDICE
    ANTIBIOTICS, 6446*
    DRUG-INDUCED, 6446*
    ETIOLOGY, 6446*
  SCHISTOSOMIASIS
    IMMUNOLOGY, 6645*
  THERAPY
    BILE, 6093

HYPERTENSION
  ALCOHOLISM, 6417*
  LIVER FUNCTION TESTS, 6417*
  LIVER INJURY, 6417*

HYPERTENSION, PORTAL
  BLOOD PLATELETS, 6400*
  DRUG-INDUCED
    ALKALOIDS, 6450*
  ESOPHAGUS
    HEMORRHAGE, 6200*
    VARICES, 6200*
  FAMILIAL FACTORS
    HEMORRHAGE, 6533*
  HEMORRHAGE
    ESOPHAGUS, 6533*
  HEPATECTOMY, 6398*
  LIVER
    FIBROSIS, 6414*
    MORPHOLOGY, 6453*
    SURGERY, 6398*
    ULTRASTRUCTURE, 6453*
  LIVER INJURY
    CARCINOGENS, 6453*
  PRESSURE STUDY, 6200*
  SPLEEN
    ARTERIES, 6534*
  SURGERY, 6414*
    LIVER CIRRHOSIS, 6535*
    SPLEEN, 6534*, 6535*
    THERAPY, 6534*, 6535*
  VARICES
    HEMORRHAGE, 6200*

HYPERTROPHY
  LIVER
    NEOPLASMS, 6406*
  ULCER
    STOMACH, 6247

HYPNOTIC AGENTS
  INTESTINE, SMALL
    DRUG METABOLISM, 6396*
    METABOLISM, 6396*

HYPOGLYCEMIA
  IRON, 6448*
  PANCREATITIS, CHRONIC
    COMPLICATIONS, 6379*
    SOMATOSTATIN, 6378*
  VAGOTOMY
    GASTRIN, 6285

- HYPOGLYCEMIC AGENTS
    - CHOLESTASIS
        - DRUG-INDUCED, 6444*
    - COMPLICATIONS
        - CHOLESTASIS, 6444*

- HYPOTHERMIA
    - LIVER
        - LIVER FUNCTION TESTS, 6103
        - MORPHOLOGY, 6103
        - PERFUSION, 6103

- ILEUM
    - SEE ALSO DUODENUM, INTESTINE, SMALL, JEJUNUM
    - ABSORPTION
        - CALCIUM, 6014
    - CECUM
        - NEOPLASMS, 6294
    - GRANULOMA
        - DIAGNOSIS, 6585*
    - INTESTINAL ABSORPTION, 6134
    - ION TRANSPORT
        - CHOLERA, 6012
        - TOXINS, 6012
    - LACTOSE
        - INTESTINAL ABSORPTION, 6005*
    - MORPHOLOGY, 6134
    - MOTILITY
        - BILE, 6093
    - NEOPLASMS
        - DIAGNOSIS, 6294
        - RADIOLOGY, 6294
    - OBSTRUCTION
        - CYSTIC FIBROSIS, 6364*
        - DISEASES ASSOCIATED WITH, 6364*
        - SURGERY, 6364*
    - POTASSIUM
        - ABSORPTION, 6001*
    - SECRETION
        - GLUCOSE, 6132
    - SODIUM
        - POTASSIUM, 6001*
        - TRANSPORT, 6001*
    - TRANSPORT
        - CALCIUM, 6014
        - GLUCOSE, 6011
        - LYSOSOMES, 6023
        - NEONATE, 6023
        - SULFATES, 6023
    - WATER, ELECTROLYTE BALANCE, 6134

- IMMUNITY
    - ASCARIASIS
        - INTESTINES, 6149
    - DEFICIENCY
        - INTESTINAL ABSORPTION, 6303
    - HEPATITIS
        - CHILD, 6487
    - HEPATITIS, INFECTIOUS
        - CHILD, 6487
    - INTESTINE, SMALL
        - DEFICIENCY, 6303
    - PARASITES AND PARASITIC DISEASES
        - ASSAY, 6640*
        - ENZYMES, 6640*
        - IMMUNOGLOBULINS, 6145*
    - PROTEIN-LOSING ENTEROPATHIES, 6634

- IMMUNOGLOBULINS
    - ANISAKIASIS
        - EPIDEMIOLOGY, 6657
    - COLITIS, ULCERATIVE, 6351*
        - CIRCULATION, 6350*
        - CROHN'S DISEASE, 6350*
    - GALLBLADDER DISEASES, 6430
    - HEPATITIS, CHRONIC, 6401*, 6498*
        - PATHOLOGY, 6500*
    - INTESTINES
        - DISEASE, 6430
    - LIVER
        - SCHISTOSOMIASIS, 6646*
    - LIVER DISEASES, 6401*, 6430, 6498*
    - LIVER DISEASES, ALCOHOLIC, 6401*
    - OXIDOREDUCTASES
        - LACTATES, 6153
    - PANCREAS
        - SECRETION, 6067
    - PARASITES AND PARASITIC DISEASES
        - ENZYMES, 6640*
        - IMMUNITY, 6145*
    - SCHISTOSOMIASIS
        - IMMUNOLOGY, 6645*
        - KIDNEYS, 6670

- IMMUNOSUPPRESSION
    - HEPATITIS, CHRONIC
        - THERAPY, 6494*
    - SCHISTOSOMIASIS, 6150

- IMMUNOTHERAPY
    - COLON
        - NEOPLASMS, MALIGNANT, 6144*

- INFANT
    - APPENDICITIS, 6347
    - FEEDING
        - TECHNIQUES, 6638
    - GASTRIN
        - SYNTHESIS, 6038*
    - GASTROENTERITIS
        - BACTERIA, 6612
        - ETIOLOGY, 6612
    - INFECTION
        - PROTEINS, 6620
    - INTESTINE, SMALL
        - ULTRASTRUCTURE, 5996
    - LIVER
        - ALCOHOLS, 6121
        - NEOPLASMS, 6406*
    - PANCREAS
        - PSEUDOCYSTS, 6374
    - PYLORUS
        - STENOSIS, 6242
    - SALIVARY GLANDS
        - NEOPLASMS, 6600
    - SERUM
        - GASTRIN, 6038*
    - STOMACH
        - ACID SECRETION, 6038*

- INFECTION
    - ELECTROLYTES
        - DEFECATION, 6629
    - GASTROINTESTINAL SYSTEM
        - ELECTROLYTES, 6629
        - TOXICITY, 6629

- INFECTION (continued)
  - INFANT
    - PROTEINS, 6620
  - PARASITES AND PARASITIC DISEASES
    - INTESTINES, 6653
  - PROTEINS
    - THERAPY, 6620

- INFLAMMATION
  - GASTROINTESTINAL DISEASES, 6321
  - SALIVARY GLANDS
    - ULTRASONOGRAPHY, 6635
  - STOMACH
    - EOSINOPHILS, 6235
  - UROGENITAL SYSTEM
    - DIAGNOSIS, 6194

- INFLAMMATORY BOWEL DISEASES
  - LIVER DISEASES
    - BILE ACIDS AND SALTS, 6348*
  - OXALATES
    - EXCRETION, 6586*
  - SURGERY
    - COMPLICATIONS, 6676*
  - THERAPY
    - REVIEW, 6356
  - UROGENITAL SYSTEM
    - COMPLICATIONS, 6676*
    - OBSTRUCTION, 6676*

- INSECTICIDES
  - LIVER
    - LYSOSOMES, 6089*

- INSECTS
  - AUSTRALIA ANTIGEN, 6473*

- INSULIN
  - SECRETION
    - BILE, 6092

- INTESTINAL ABSORPTION
  - BILE ACIDS AND SALTS
    - CIRCULATION, 6523*
  - ILEUM, 6134
    - LACTOSE, 6005*
  - IMMUNITY
    - DEFICIENCY, 6303
  - JEJUNUM, 6134
  - LACTOSE
    - BILE ACIDS AND SALTS, 6005*

- INTESTINAL OBSTRUCTION
  - COLON
    - CLASSIFICATION, 6336*
    - SURGERY, 6336*
  - CYSTIC FIBROSIS
    - COMPLICATIONS, 6364*
  - GASES
    - DISTENTION, 6292*
  - INTESTINE, SMALL
    - GASES, 6292*
  - RETROPERITONEAL SPACE
    - CYSTS, 6298
  - SURGERY
    - DIAGNOSIS, 6299
  - UROGENITAL SYSTEM
    - SURGERY, 6302

- INTESTINE, LARGE
  - SEE ALSO CECUM, COLON
  - DIVERTICULITIS, 6343
    - DIAGNOSIS, 6346
    - RADIOLOGY, 6346
  - DIVERTICULUM
    - DIAGNOSIS, 6346
    - RADIOLOGY, 6346
  - NEOPLASMS
    - STATISTICAL STUDY, 6601
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 6325*
    - NUCLEIC ACIDS, 6325*
  - OBSTRUCTION
    - CYSTIC FIBROSIS, 6364*
    - DISEASES ASSOCIATED WITH, 6364*
    - SURGERY, 6364*
  - TRANSPORT
    - CALCIUM, 6016

- INTESTINE, SMALL
  - SEE ALSO DUODENUM, ILEUM, JEJUNUM
  - ABSORPTION
    - CALCIUM, 6014
    - FATS, 6003*
    - VITAMIN B6, 6021
  - ALKALINE PHOSPHATASE
    - WOUNDS AND INJURIES, 6135
  - ANTRECTOMY
    - ESOPHAGUS, 6030
  - ATROPHY
    - GALLBLADDER, 6061
    - HORMONES, 6061
    - PANCREAS, 6061
    - PARENTERAL ALIMENTATION, 6061
  - BACTERIA
    - LIVER CIRRHOSIS, 6520*
  - CALCIUM
    - ULTRASTRUCTURE, 6129*
  - CHILD
    - ULTRASTRUCTURE, 5996
  - CIRCULATION
    - ULTRASTRUCTURE, 6142*
  - DIET
    - MORPHOLOGY, 6140
    - MOTILITY, 6140
  - DRUG METABOLISM
    - HYPNOTIC AGENTS, 6396*
  - ENDOSCOPY
    - COMPLICATIONS, 6158
  - ENTERITIS
    - INTUSSUSCEPTION, 6297
  - ENZYMES, 6131
  - GASES
    - INTESTINAL OBSTRUCTION, 6292*
  - GRANULOMA
    - DIAGNOSIS, 6585*
  - HEMODIALYSIS
    - MORPHOLOGY, 6587*
  - HYPNOTIC AGENTS
    - METABOLISM, 6396*
  - IMMUNITY
    - DEFICIENCY, 6303
  - INFANT
    - ULTRASTRUCTURE, 5996
  - ION TRANSPORT, 6000*, 6002*
    - AMINO ACIDS, 6009
    - CARBOHYDRATES, 6009
    - GLUCOSE, 6009

INTESTINE, SMALL (continued)
- JAUNDICE, OBSTRUCTIVE
  - BILE, 6579*
- KIDNEY DISEASES
  - MORPHOLOGY, 6587*
- LYMPHOMA
  - MALABSORPTION SYNDROMES, 6309*
- MESENTERY
  - CYSTS, 6305
- MOTILITY
  - BILE, 6093
- MUCUS
  - IMMUNOLOGY, 6128*
- NEOPLASM METASTASIS, 6289*
- NEOPLASMS, 6289*
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 6287*, 6307
  - SURGERY, 6287*
- OBSTRUCTION
  - CYSTIC FIBROSIS, 6364*
  - DISEASES ASSOCIATED WITH, 6364*
  - SURGERY, 6364*
- PARASITES AND PARASITIC DISEASES
  - MORPHOLOGY, 6662
  - SEX FACTORS, 6662
  - ULTRASTRUCTURE, 6662
- PERFORATION
  - IATROGENESIS, 6545*
- PROTEINS
  - ENZYMES, 6133
- RUPTURE
  - CHILD, 6306
- SECRETION
  - IMMUNOLOGY, 6128*
  - MUCUS, 6128*
- SURGERY
  - ESOPHAGUS, 6030
- TRANSPORT
  - CALCIUM, 6014
  - GLUCOSE, 6011
  - LYSOSOMES, 6023
  - NEONATE, 6023
  - SODIUM, 6009
  - SULFATES, 6023
- ULCER
  - PERITONITIS, 6304

INTESTINES
- ABSORPTION
  - IRON, 6018
  - TRIGLYCERIDES, 6162
- AMEBIASIS
  - COLITIS, 6667
  - DYSENTERY, 6667
  - EPIDEMIOLOGY, 6667
- ASCARIASIS
  - IMMUNITY, 6149
- BACTERIA
  - BILE ACIDS AND SALTS, 6074*
  - DIETARY FACTORS, 6589*
- CIRCULATION
  - COMPLICATIONS, 6301
  - ISCHEMIA, 6607
- ELECTROPHYSIOLOGY
  - CHOLECYSTECTOMY, 6552*
- ENDOCRINE SYSTEM
  - DISEASE, 6036
  - HORMONES, GASTROINTESTINAL, 6036
  - REVIEW, 6036

INTESTINES (continued)
- ENZYMES
  - TECHNIQUES, 6138
- FETUS
  - ALKALINE PHOSPHATASE, 6137
- HYPERPLASIA
  - HYPOGAMMAGLOBULINEMIA, 6288*
- IMMUNOGLOBULINS
  - DISEASE, 6430
- INTUSSUSCEPTION
  - CHILD, 6331*
  - DIAGNOSIS, 6331*
  - THERAPY, 6331*
- IRON
  - BINDING, 6018
- ISCHEMIA
  - DIAGNOSIS, 6607
  - REVIEW, 6607
- LACTASE
  - AGE FACTORS, 6130*
  - NEONATE, 6130*
  - PREGNANCY, 6130*
  - PROTEINS, 6130*
- LEUKEMIA
  - COMPLICATIONS, 6419*
- MOTILITY
  - ANALGESICS AND ANTIPYRETICS, 6552*
  - ANESTHESIA, 6552*
  - CHOLECYSTECTOMY, 6552*
- PARASITES AND PARASITIC DISEASES
  - DIAGNOSIS, 6653
  - EPIDEMIOLOGY, 6653, 6665
  - INFECTION, 6653
  - PATHOLOGY, 6668
- PNEUMATOSIS, 6333*
  - ABDOMEN, 6300
- PSEUDO-OBSTRUCTION
  - ELECTROPHYSIOLOGY, 6290*
  - MOTILITY, 6290*
- SALMONELLOSIS
  - PERFORATION, 6633
- SCLERODERMA
  - FAMILIAL FACTORS, 6598
- TUBERCULOSIS
  - DIAGNOSIS, 6588*
  - DRUG THERAPY, 6588*
- WOUNDS AND INJURIES
  - LYSOZYMES, 6296

INTUBATION
- GIARDIASIS
  - DUODENUM, 6658

INTUSSUSCEPTION
- INTESTINE, SMALL
  - ENTERITIS, 6297
- INTESTINES
  - CHILD, 6331*
  - DIAGNOSIS, 6331*
  - THERAPY, 6331*

ION TRANSPORT
- COLON
  - CATECHOLAMINES, 6015
  - CHLORIDES, 6013
  - EPINEPHRINE, 6015
  - POTASSIUM, 6013
  - SODIUM, 6013

ION TRANSPORT (continued)
- ILEUM
  - CHOLERA, 6012
  - TOXINS, 6012
- INTESTINE, SMALL, 6000*, 6002*
  - AMINO ACIDS, 6009
  - CARBOHYDRATES, 6009
  - GLUCOSE, 6009
- JEJUNUM, 6002*
  - CHOLERA, 6012
  - TOXINS, 6012
- STOMACH, 6017
  - ENDOTOXINS, 6006*
- SULFOBROMOPHTHALEIN
  - MITOCHONDRIA, 6007*

IRON
- HYPOGLYCEMIA, 6448*
- INTESTINES
  - ABSORPTION, 6018
  - BINDING, 6018
- LIVER INJURY, 6448*

IRRADIATION
- SEE ALSO RADIATION
- GASTROINTESTINAL SYSTEM
  - SEQUELAE, 6614

IRRITABLE COLON
- THERAPY
  - DIET, 6332*

ISCHEMIA
- COLITIS
  - DISEASES ASSOCIATED WITH, 6328*
- COLON
  - DISEASES ASSOCIATED WITH, 6380*
- INTESTINES
  - CIRCULATION, 6607
  - DIAGNOSIS, 6607
  - REVIEW, 6607
- LIVER INJURY
  - NECROSIS, 6088*
- PANCREATITIS
  - BONES, 6392

ISOENZYMES
- AMYLASES
  - TEMPERATURE, 6358*
- LIVER DISEASES
  - URINE, 6431

JAUNDICE
- ANTIBIOTICS
  - ETIOLOGY, 6446*
  - HYPERSENSITIVITY, 6446*
  - IMMUNOLOGY, 6446*
- CHOLANGIOGRAPHY
  - TECHNIQUES, 6546*
- CHOLESTASIS
  - DIAGNOSIS, 6574*
  - ULTRASONOGRAPHY, 6574*
- DIAGNOSIS
  - BIOPSY, 6577*
  - CHOLANGIOGRAPHY, 6548*
  - CYTOLOGY, 6577*
  - ULTRASONOGRAPHY, 6548*, 6575*

JAUNDICE (continued)
- DRUG-INDUCED
  - ANTIBIOTICS, 6446*
  - ETIOLOGY, 6446*
  - HEPATITIS, CHRONIC, 6443*
  - HYPERSENSITIVITY, 6446*
  - IMMUNOLOGY, 6446*
- ETIOLOGY
  - HYPERSENSITIVITY, 6446*
  - IMMUNOLOGY, 6446*
- NEONATE, 6437
  - AGE FACTORS, 6435*
  - BILIRUBIN, 6435*

JAUNDICE, OBSTRUCTIVE
- BILE
  - INTESTINE, SMALL, 6579*
- BIOPSY
  - DIAGNOSIS, 6578*
- CHILD
  - DIAGNOSIS, 6576*
- DIAGNOSIS
  - BIOPSY, 6577*
  - CYTOLOGY, 6577*
  - LIPOPROTEINS, 6438
- DRAINAGE
  - TECHNIQUES, 6579*
- LEUKEMIA
  - COMPLICATIONS, 6419*
- LIVER
  - BIOPSY, 6578*

JEJUNUM
- SEE ALSO DUODENUM, ILEUM, INTESTINE, SMALL
- ABSORPTION
  - CALCIUM, 6014
  - CARBOHYDRATES, 6010
  - ELECTROLYTES, 6012
  - FRUCTOSE, 6010
  - GLUCOSE, 6010
  - VITAMIN B6, 6021
  - WATER, 6012, 6025
- BACTERIA
  - LIVER CIRRHOSIS, 6520*
- COLON
  - ENZYMES, 5990*
  - REGENERATION, 5990*
  - VILLI, 5990*
- FATS
  - ABSORPTION, 6003*
  - CALCIUM, 6003*
  - MAGNESIUM, 6003*
- INTESTINAL ABSORPTION, 6134
- ION TRANSPORT, 6002*
  - CHOLERA, 6012
  - TOXINS, 6012
- MORPHOLOGY, 6134
- OBSTRUCTION
  - CYSTIC FIBROSIS, 6364*
  - DISEASES ASSOCIATED WITH, 6364*
  - SURGERY, 6364*
- SECRETION
  - GLUCOSE, 6132
- TRANSPORT
  - CALCIUM, 6014
  - GLUCOSE, 6011
- ULCER
  - RECURRENCE, 6277
  - STOMACH, 6277

JEJUNUM *(continued)*
- ULTRASTRUCTURE, 5993
- WATER, ELECTROLYTE BALANCE, 6134

KIDNEY DISEASES
- INTESTINE, SMALL
  - MORPHOLOGY, 6587*
- LIVER DISEASES
  - THERAPY, 6416*

KIDNEYS
- ANTIBIOTICS
  - COMPLICATIONS, 6532*
- LIVER DISEASES
  - COMPLICATIONS, 6416*
- SCHISTOSOMIASIS
  - IMMUNOGLOBULINS, 6670

KWASHIORKOR
- ACID SECRETION
  - CHILD, 6176
- SERUM
  - CALCIUM, 6316

LACTASE
- INTESTINES
  - AGE FACTORS, 6130*
  - NEONATE, 6130*
  - PREGNANCY, 6130*
  - PROTEINS, 6130*
- PROTEINS
  - DEFICIENCY, 6130*

LACTATES
- OXIDOREDUCTASES
  - IMMUNOGLOBULINS, 6153

LACTOSE
- BILIARY TRACT DISEASES
  - MALABSORPTION SYNDROMES, 6318
- GASTROINTESTINAL DISEASES
  - MALABSORPTION SYNDROMES, 6318
- ILEUM
  - INTESTINAL ABSORPTION, 6005*
- INTESTINAL ABSORPTION
  - BILE ACIDS AND SALTS, 6005*

LACTOSE INTOLERANCE
- BILIARY TRACT DISEASES, 6318
- GASTROINTESTINAL DISEASES, 6318
- MILK, 6317

LAPAROSCOPY
- GASTROENTEROSTOMY
  - OBSTRUCTION, 6295

LASER
- STOMACH
  - BLEEDING, 6146*

LEUKEMIA
- COMPLICATIONS
  - JAUNDICE, OBSTRUCTIVE, 6419*
- INTESTINES
  - COMPLICATIONS, 6419*
- PANCREAS
  - COMPLICATIONS, 6419*

LIPASE
- DIGESTION
  - FATS, 6141

LIPIDS
- SEE ALSO FATS, TRIGLYCERIDES
- BILE
  - DRUG EFFECTS ON, 6397*
  - METABOLISM, 6397*
  - PHENOBARBITAL, 6397*
- CHOLESTASIS
  - MONOAMINE OXIDASE, 6066*
- ERYTHROCYTES, 6085*
- FATTY LIVER
  - DIET, 6082*
- LIVER DISEASES
  - SERUM, 6433
- METABOLISM
  - DRUG EFFECTS ON, 6397*
  - PHENOBARBITAL, 6397*

LIPODYSTROPHY, INTESTINAL
- DIAGNOSIS
  - RADIOLOGY, 6315
- DISEASES ASSOCIATED WITH, 6313
- IMMUNOLOGY
  - MICROORGANISMS, 6312*
- THERAPY, 6314

LIPOPROTEINS
- CHOLESTASIS
  - DIAGNOSIS, 6438, 6566*
- FATTY LIVER
  - SYNTHESIS, 6083*
- HEPATITIS
  - DIAGNOSIS, 6438
- HYPERBILIRUBINEMIA
  - DIAGNOSIS, 6438
- JAUNDICE, OBSTRUCTIVE
  - DIAGNOSIS, 6438
- LIVER
  - PLASMA, 6125
  - SYNTHESIS, 6125

LIVER
- ABSCESS
  - AMEBIASIS, 6649
  - BACTERIAL INFECTIONS, 6666
  - THERAPY, 6666
- ADENOSINE TRIPHOSPHATASE
  - DRUG EFFECTS ON, 6127
- ADENOSINE TRIPHOSPHATE
  - NERVOUS CONTROL, 6106
- ADOLESCENCE
  - ULCER, PEPTIC, 6268
- ALBUMINS
  - SYNTHESIS, 6541*
- ALCOHOLS
  - METABOLISM, 6078*
- AMEBIASIS
  - ABSCESS, 6655
  - COMPLICATIONS, 6649
  - DIAGNOSIS, 6660
  - DRUG THERAPY, 6660
  - EPIDEMIOLOGY, 6667
  - RUPTURE, 6655
  - THERAPY, 6655
- AMINO TRANSFERASES, 6118

LIVER (continued)
- ANGIOGRAPHY
  - PROSTAGLANDINS, 6393*
- ASPIRIN
  - CHILD, 6442*
- BACTERIAL INFECTIONS
  - SYNERGY, 6666
- CALCULI
  - ENDOSCOPY, 6571*
- CARDIOVASCULAR SYSTEM
  - BACTERIA, 6540*
  - ENDOTOXINS, 6540*
  - PRESSURE STUDY, 6518*
- CHILD
  - ULCER, PEPTIC, 6268
- CHOLANGIOGRAPHY
  - TECHNIQUES, 6546*
- CHOLESTEROL
  - DRUG EFFECTS ON, 6127
  - METABOLISM, 6119
- CYSTS, 6429
- DRUG EFFECTS ON
  - HALLUCINOGENS, 6127
- DRUG METABOLISM
  - AGE FACTORS, 6080*
- EMBRYOGENESIS
  - MORPHOLOGY, 5999
- ENZYMES
  - ALCOHOLISM, 6505*
  - CIRCULATION, 6104
  - NERVOUS CONTROL, 6106, 6107
- FETUS
  - ALCOHOLS, 6121
  - MORPHOLOGY, 5999
- FIBRINOGEN, 6102
- FIBROSIS
  - FAMILIAL FACTORS, 6414*
  - HYPERTENSION, PORTAL, 6414*
- GLUCOSE PHOSPHATE DEHYDROGENASE
  - DIET, 6120
- HEMATOPOIESIS
  - AGE FACTORS, 6073*
- HEMORRHAGE
  - SURGERY, 6454*
  - THERAPY, 6454*
- HEMOSTASIS
  - TECHNIQUES, 6427
- HEPATITIS
  - AUSTRALIA ANTIGEN, 6470*
- HEPATITIS, CHRONIC
  - AUSTRALIA ANTIGEN, 6470*
- HEPATITIS, INFECTIOUS
  - AUSTRALIA ANTIGEN, 6470*
- HYPOTHERMIA
  - LIVER FUNCTION TESTS, 6103
  - MORPHOLOGY, 6103
- IMMUNOGLOBULINS
  - SCHISTOSOMIASIS, 6646*
- INFANT
  - ALCOHOLS, 6121
- JAUNDICE, OBSTRUCTIVE
  - BIOPSY, 6578*
- LIPOPROTEINS
  - PLASMA, 6125
  - SYNTHESIS, 6125
- LIVER CIRRHOSIS
  - AUSTRALIA ANTIGEN, 6470*
- LYSOSOMES
  - INSECTICIDES, 6089*

LIVER (continued)
- METABOLISM
  - BILIRUBIN, 6094
  - CARBOHYDRATES, 6104
  - CIRCULATION, 6104
  - DYES, 6094
- MITOCHONDRIA
  - VAGOTOMY, 6105
- MORPHOLOGY
  - HYPERTENSION, PORTAL, 6453*
- NECROSIS
  - PREVENTION, 6088*
- NEOPLASMS
  - ALPHA FETOPROTEIN, 6081*
  - CELL CULTURE, 6081*
  - DIAGNOSIS, 6196
  - HYPERTROPHY, 6406*
  - INFANT, 6406*
  - NEONATE, 6406*
  - PATHOLOGY, 6407*
  - TECHNIQUES, 6196
  - ULTRASTRUCTURE, 6407*
- NEOPLASMS, BENIGN
  - CONTRACEPTIVES, ORAL, 6409*
  - HEMORRHAGE, 6409*
- NEOPLASMS, MALIGNANT
  - ALPHA FETOPROTEIN, 6403*, 6404*, 6405*
  - AUSTRALIA ANTIGEN, 6434
  - DIAGNOSIS, 6370, 6404*
  - DRUG THERAPY, 6403*
  - PROGNOSIS, 6403*, 6408*
  - SURGERY, 6403*, 6408*
  - THERAPY, 6408*
- NUCLEIC ACIDS
  - DRUG EFFECTS ON, 6127
- OXIDOREDUCTASES
  - NERVOUS CONTROL, 6106
- PATHOLOGY
  - AUSTRALIA ANTIGEN, 6475*
- PERFUSION, 6102
  - HYPOTHERMIA, 6103
  - LIVER FUNCTION TESTS, 6103
  - MORPHOLOGY, 6103
  - TECHNIQUES, 6068*
- PHOSPHOLIPIDS
  - DRUG EFFECTS ON, 6127
- PROTEINS
  - DRUG EFFECTS ON, 6127
  - SYNTHESIS, 6541*
- REGENERATION
  - AGE FACTORS, 6073*
  - HEPATOCYTES, 6110
  - NUCLEIC ACIDS, 6109
- RUPTURE
  - DISEASES ASSOCIATED WITH, 6421*
- SCANNING, SCINTILLATION
  - NEOPLASMS, 6196
  - REVIEW, 6517*
  - TECHNIQUES, 6517*
- SECRETION
  - BILIRUBIN, 6094
  - DYES, 6094
- STEROIDS
  - ENDOTOXINS, 6123
- SURGERY
  - HEMOSTASIS, 6423, 6427
  - HYPERTENSION, PORTAL, 6398*
  - TECHNIQUES, 6427

LIVER (continued)
- TOMOGRAPHY
  - COMPUTERS, 6192
- TOXICITY
  - ASPIRIN, 6442*
- TRANSPLANTATION
  - CIRCULATION, 6108, 6432
  - TECHNIQUES, 6108
- ULTRASONOGRAPHY, 6193, 6394*
- ULTRASTRUCTURE
  - HYPERTENSION, PORTAL, 6453*
  - SCHISTOSOMIASIS, 6646*
- URIC ACID
  - ALCOHOLS, 6079*
  - DRUG EFFECTS ON, 6079*
  - SYNTHESIS, 6079*
- VITAMIN A
  - DEFICIENCY, 6078*
- WOUNDS AND INJURIES
  - HEMORRHAGE, 6454*
  - LIVER FUNCTION TESTS, 6455
  - SURGERY, 6454*
  - THERAPY, 6454*, 6455

LIVER CIRRHOSIS
- ALCOHOLS
  - STATISTICAL STUDY, 6601
- AMINO ACIDS
  - DEFICIENCY, 6522*
- ASCITES
  - ENDOTOXINS, 6530*
  - PERITONITIS, 6507*
  - THERAPY, 6531*
- AUSTRALIA ANTIGEN
  - CHILD, 6499*
  - LIVER, 6470*
  - SERUM, 6470*
- BILE ACIDS AND SALTS
  - CIRCULATION, 6523*
  - METABOLISM, 6090*
  - RADIOIMMUNOASSAY, 6521*
- BLOOD PLATELETS, 6400*
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6523*
- COMPLICATIONS
  - ASCITES, 6537*
  - CRYOGLOBULINEMIA, 6497*
  - PLEURAL EFFUSION, 6537*
- DIAGNOSIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6508*
  - GLUCAGON, 6508*
  - GLUCOSE, 6508*
  - GLYCOPROTEINS, 6502
- DISEASES ASSOCIATED WITH
  - CRYOGLOBULINEMIA, 6461*
- DIURETICS
  - METABOLISM, 6527*
- DRUG-INDUCED
  - ANALGESICS AND ANTIPYRETICS, 6440*
- DRUG METABOLISM
  - DRUG EFFECTS ON, 6411*
- GLUCONEOGENESIS
  - LIVER FUNCTION TESTS, 6466*
- GLYCOPROTEINS, 6525*
- HEPATITIS, CHRONIC
  - AUSTRALIA ANTIGEN, 6499*
  - CHILD, 6499*
- HYPERTENSION, PORTAL
  - SURGERY, 6535*

LIVER CIRRHOSIS (continued)
- INTESTINE, SMALL
  - BACTERIA, 6520*
- JEJUNUM
  - BACTERIA, 6520*
- LIVER DISEASES, ALCOHOLIC
  - DIAGNOSIS, 6508*
  - HORMONES, 6509*
  - IMMUNOLOGY, 6511*
- LIVER FUNCTION TESTS, 6521*
- LYMPHOCYTES
  - IMMUNOLOGY, 6496*
- MORPHOLOGY, 6539
- OCCUPATIONAL FACTORS
  - SURVIVAL, 6375
- PERITONITIS
  - ANTIBIOTICS, 6507*
  - DRUG THERAPY, 6507*
- PLASMA
  - ENDOTOXINS, 6530*
- PROLACTIN
  - CIRCADIAN RHYTHM, 6526*
- PROTEINS
  - ENZYMES, 6469*
  - ETIOLOGY, 6524*
- SCANNING, SCINTILLATION
  - REVIEW, 6517*
- SECRETION, 6112
- SERUM
  - BILE ACIDS AND SALTS, 6521*
- SIMULATION
  - SURGERY, 6075*
- SODIUM
  - DEFICIENCY, 6532*
- STEROIDS
  - METABOLISM, 6527*
- SURGERY
  - PROGNOSIS, 6075*
- THYROID GLAND, 6503

LIVER CIRRHOSIS, OBSTRUCTIVE
- COMPLICATIONS
  - ARTHRITIS, 6528*
- COPPER
  - DRUG EFFECTS ON, 6536*
- DIAGNOSIS, 6519*
- DISEASES ASSOCIATED WITH
  - ARTHRITIS, 6528*
- SURVIVAL, 6519*

LIVER COMA
- BLOOD PLATELETS, 6413*
  - AMINES, 6510*
  - NOREPINEPHRINE, 6510*
- SURVIVAL
  - AGE FACTORS, 6458*
- THERAPY
  - SURVIVAL, 6458*

LIVER DISEASES
- ALPHA 1 ANTITRYPSIN
  - DEFICIENCY, 6402*
- ARTERIES
  - GASES, 6418*
- AUSTRALIA ANTIGEN
  - SERUM, 6470*
- BILE ACIDS AND SALTS
  - METABOLISM, 6428

- LIVER DISEASES (continued)
  - BLOOD
    - CHEMICAL COMPOSITION, 6418*
  - BLOOD PLATELETS, 6400*
  - CHILD
    - DIAGNOSIS, 6431
    - MONOSACCHARIDES, 6425
  - CHOLANGIOGRAPHY
    - TECHNIQUES, 6546*
  - COMPLICATIONS
    - CRYOGLOBULINEMIA, 6497*
    - KIDNEYS, 6416*
  - DIAGNOSIS, 6556
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6508*
    - COMPUTERS, 6192
    - GLUCAGON, 6508*
    - GLUCOSE, 6508*
    - TOMOGRAPHY, 6192
    - ULTRASONOGRAPHY, 6575*
    - URINE, 6431
  - DISEASES ASSOCIATED WITH
    - CRYOGLOBULINEMIA, 6461*
  - ETIOLOGY
    - IMMUNOLOGY, 6498*
  - FAILURE
    - REVIEW, 6412*
    - THERAPY, 6412*
  - GLUCONEOGENESIS
    - LIVER FUNCTION TESTS, 6466*
  - GLUCURONIDASE
    - LIVER FUNCTION TESTS, 6395*
  - GLYCOPROTEINS, 6525*
  - IMMUNOGLOBULINS, 6401*, 6430, 6498*
  - INFLAMMATORY BOWEL DISEASES
    - BILE ACIDS AND SALTS, 6348*
  - KIDNEY DISEASES
    - THERAPY, 6416*
  - LYMPHOCYTES
    - IMMUNOLOGY, 6496*
  - LYSOZYMES
    - PATHOLOGY, 6426
  - MONOSACCHARIDES
    - EXCRETION, 6425
  - PERFUSION
    - REVIEW, 6412*
  - SERUM
    - LIPIDS, 6433
  - URINE
    - ISOENZYMES, 6431
  - VEINS
    - GASES, 6418*

- LIVER DISEASES, ALCOHOLIC
  - ASCITES
    - DRUG THERAPY, 6506*
  - HEPATITIS, 6516
    - IMMUNOLOGY, 6511*
  - HYALIN SUBSTANCE
    - ULTRASTRUCTURE, 6512*, 6513*
  - IMMUNOGLOBULINS, 6401*
  - LIVER CIRRHOSIS
    - DIAGNOSIS, 6508*
    - HORMONES, 6509*
    - IMMUNOLOGY, 6511*
  - LYMPHOCYTES
    - IMMUNOLOGY, 6496*
  - SULFHYDRYL COMPOUNDS, 6077*

- LIVER FUNCTION TESTS
  - CHOLESTASIS
    - DIAGNOSIS, 6566*
    - PREGNANCY, 6565*
  - GLUCONEOGENESIS
    - HEPATITIS, CHRONIC, 6466*
    - HEPATITIS, INFECTIOUS, 6466*
    - LIVER CIRRHOSIS, 6466*
    - LIVER DISEASES, 6466*
  - GLUCURONIDASE
    - LIVER DISEASES, 6395*
  - HEPATITIS, CHRONIC, 6501*
  - HEPATITIS, TOXIC
    - DIAGNOSIS, 6439*
  - HYPERTENSION, 6417*
  - LIVER
    - HYPOTHERMIA, 6103
    - PERFUSION, 6103
    - WOUNDS AND INJURIES, 6455
  - LIVER CIRRHOSIS, 6521*
  - LIVER INJURY, 6455
  - OBESITY
    - SHUNT, INTESTINAL, 6293*
  - TOXICITY
    - MARKER STUDY, 6395*

- LIVER INJURY
  - ALCOHOLISM
    - SULFHYDRYL COMPOUNDS, 6077*
  - ANALGESICS AND ANTIPYRETICS
    - AMINO ACIDS, 6449*
    - PREVENTION, 6449*
    - THERAPY, 6449*
  - AUSTRALIA ANTIGEN
    - CARRIER STATE, 6475*
  - BLOOD PLATELETS, 6413*
  - CARBON TETRACHLORIDE
    - ALPHA FETOPROTEIN, 6114
    - NUCLEIC ACIDS, 6115
    - PREVENTION, 6087*
    - ZINC, 6087*
  - CELIAC DISEASE
    - COMPLICATIONS, 6308*
  - CIRCULATION
    - THERAPY, 6113
  - DRUG-INDUCED
    - ALKALOIDS, 6450*
    - ANALGESICS AND ANTIPYRETICS, 6440*, 6441*, 6449*
    - TRANQUILIZING AGENTS, 6126
  - ETIOLOGY
    - ANDROGENS, 6451*
    - HORMONES, 6451*
  - GLUCOSE PHOSPHATE DEHYDROGENASE, 6120
  - HORMONES
    - ANDROGENS, 6451*
  - HYPERTENSION, 6417*
  - HYPERTENSION, PORTAL
    - CARCINOGENS, 6453*
  - IRON, 6448*
  - ISCHEMIA
    - NECROSIS, 6088*
  - LIVER FUNCTION TESTS, 6455
  - PERFUSION
    - SURVIVAL, 6113
  - SHUNT, INTESTINAL
    - COMPLICATIONS, 6293*
  - THERAPY
    - PERFUSION, 6113

LIVER INJURY (continued)
- UREMIA
  - DISEASES ASSOCIATED WITH, 6452*
- ZINC
  - PREVENTION, 6087*

LYMPH
- SALIVARY GLANDS
  - NEOPLASM METASTASIS, 6615

LYMPHOCYTES
- HEPATITIS, CHRONIC
  - IMMUNOLOGY, 6496*
- LIVER CIRRHOSIS
  - IMMUNOLOGY, 6496*
- LIVER DISEASES
  - IMMUNOLOGY, 6496*
- LIVER DISEASES, ALCOHOLIC
  - IMMUNOLOGY, 6496*

LYMPHOMA
- INTESTINE, SMALL
  - MALABSORPTION SYNDROMES, 6309*
- MALABSORPTION SYNDROMES
  - BACTERIA, 6309*
- RADIOTHERAPY
  - COMPLICATIONS, 6225*
- SEZARY SYNDROME
  - GASTROINTESTINAL SYSTEM, 6606

LYSOSOMES
- ILEUM
  - TRANSPORT, 6023
- INTESTINE, SMALL
  - TRANSPORT, 6023
- LIVER
  - INSECTICIDES, 6089*

LYSOZYMES
- BILIARY TRACT DISEASES
  - PATHOLOGY, 6426
- INTESTINES
  - WOUNDS AND INJURIES, 6296
- LIVER DISEASES
  - PATHOLOGY, 6426

MAGNESIUM
- ABSORPTION
  - FATS, 6003*
- ALCOHOLISM
  - DEFICIENCY, 6610
  - MUSCLES, 6610
- JEJUNUM
  - FATS, 6003*

MALABSORPTION SYNDROMES
- ABSORPTION
  - TRIGLYCERIDES, 6162
- ALPHA-CHAIN DISEASE
  - ENTEROPATHY, 6310*
- BILIARY TRACT DISEASES
  - LACTOSE, 6318
- GASTROINTESTINAL DISEASES
  - LACTOSE, 6318
- INTESTINE, SMALL
  - LYMPHOMA, 6309*
- LYMPHOMA
  - BACTERIA, 6309*

MALABSORPTION SYNDROMES (continued)
- MILK, 6317
  - IMMUNOLOGY, 6319
  - PROTEINS, 6319
- OXALATES
  - EXCRETION, 6586*
- SERUM
  - CALCIUM, 6316
- URINE
  - OXALATES, 6320

MANOMETRY
- CHOLANGIOGRAPHY, 6188
  - SURGERY, 6185

MARASMUS
- SERUM
  - CALCIUM, 6316

MEGACOLON
- COLITIS
  - SHIGELLOSIS, 6605

MENETRIER'S DISEASE
- THERAPY, 6239

MESENTERY
- INTESTINE, SMALL
  - CYSTS, 6305

MICROORGANISMS
- LIPODYSTROPHY, INTESTINAL
  - IMMUNOLOGY, 6312*

MILK
- CELIAC DISEASE, 6317
- GASTROENTERITIS, 6317
- LACTOSE INTOLERANCE, 6317
- MALABSORPTION SYNDROMES, 6317
  - IMMUNOLOGY, 6319
  - PROTEINS, 6319
- TUBERCULOSIS
  - ACID SECRETION, 6626
  - YEAST, 6626

MINERALS
- GASTRECTOMY
  - VITAMIN D, 6254

MITOCHONDRIA
- FATTY LIVER
  - ULTRASTRUCTURE, 6504*
- HEPATOCYTES
  - DRUG-INDUCED, 6122
- LIVER
  - VAGOTOMY, 6105
- SULFOBROMOPHTHALEIN
  - ION TRANSPORT, 6007*
  - MEMBRANES, 6007*

MONOAMINE OXIDASE
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6086*
  - CYTOCHROMES, 6086*
  - LIPIDS, 6086*
  - PEROXIDATION, 6086*

- MONOSACCHARIDES
  - BILIARY TRACT DISEASES
    - EXCRETION, 6425
  - CHILD
    - BILIARY TRACT DISEASES, 6425
    - LIVER DISEASES, 6425
  - LIVER DISEASES
    - EXCRETION, 6425

- MOTILITY
  - CECUM
    - DIET, 6140
  - COLON
    - NEOPLASMS, MALIGNANT, 6324*
  - ILEUM
    - BILE, 6093
  - INTESTINE, SMALL
    - BILE, 6093
    - DIET, 6140
  - INTESTINES
    - ANALGESICS AND ANTIPYRETICS, 6552*
    - ANESTHESIA, 6552*
    - CHOLECYSTECTOMY, 6552*
    - PSEUDO-OBSTRUCTION, 6290*
  - STOMACH
    - ANALGESICS AND ANTIPYRETICS, 6552*
    - ANESTHESIA, 6552*
    - CERULEIN, 6027
    - CHOLECYSTECTOMY, 6552*
    - DIABETES, 6224*
    - HORMONE EFFECTS ON, 6027
    - MARKER STUDY, 6224*

- MOUTH
  - NEOPLASMS
    - STATISTICAL STUDY, 6601

- MUCUS
  - INTESTINE, SMALL
    - IMMUNOLOGY, 6128*
    - SECRETION, 6128*

- MUSCLES
  - ALCOHOLISM
    - ELECTROLYTES, 6610
    - MAGNESIUM, 6610
  - COLON
    - ACETYLCHOLINE, 6026*
    - CHOLECYSTOKININ, 6026*
    - GLUCAGON, 6026*
    - HORMONE EFFECTS ON, 6026*
  - PARASITES AND PARASITIC DISEASES
    - ESOPHAGUS, 6662

- NECROSIS
  - COLON
    - DISEASES ASSOCIATED WITH, 6380*
  - LIVER
    - PREVENTION, 6088*
  - LIVER INJURY
    - ISCHEMIA, 6088*
  - PANCREAS
    - THERAPY, 6368
  - PANCREATITIS
    - BONES, 6392
  - STOMACH
    - VAGOTOMY, 6258

- NEONATE
  - ASCITES
    - DIAGNOSIS, 6529*
  - ESOPHAGUS
    - ATRESIA, 6211
  - HEPATITIS, 6424
    - DISEASES ASSOCIATED WITH, 6486*
    - ETIOLOGY, 6460*
    - PROGNOSIS, 6486*
    - SURVIVAL, 6486*
  - HYPERBILIRUBINEMIA, 6437
  - ILEUM
    - TRANSPORT, 6023
  - INTESTINE, SMALL
    - TRANSPORT, 6023
  - INTESTINES
    - LACTASE, 6130*
  - JAUNDICE, 6437
    - AGE FACTORS, 6435*
    - BILIRUBIN, 6435*
  - LIVER
    - NEOPLASMS, 6406*

- NEOPLASM METASTASIS
  - INTESTINE, SMALL, 6289*
  - SALIVARY GLANDS
    - LYMPH, 6615
  - STOMACH
    - DRUG THERAPY, 6249
    - SURVIVAL, 6252

- NEOPLASMS
  - ALCOHOLS
    - NITROSAMINES, 6213
  - ALPHA FETOPROTEIN
    - PROGNOSIS, 6590*
  - CECUM
    - DIAGNOSIS, 6294
    - RADIOLOGY, 6294
  - COLON
    - DIAGNOSIS, 6326*
    - POLYPS, 6334*
    - RECTUM, 6326*
  - DIAGNOSIS
    - TECHNIQUES, 6326*
  - ECHINOCOCCOSIS
    - GASTROINTESTINAL SYSTEM, 6628
  - ESOPHAGUS
    - ALCOHOLS, 6213
    - NITROSAMINES, 6213
    - REVIEW, 6216
    - THERAPY, 6216
  - GALLBLADDER
    - THERAPY, 6560*
  - GASTROINTESTINAL SYSTEM
    - SURGERY, 6595, 6596
  - ILEUM
    - CECUM, 6294
    - DIAGNOSIS, 6294
    - RADIOLOGY, 6294
  - INTESTINE, LARGE
    - STATISTICAL STUDY, 6601
  - INTESTINE, SMALL, 6289*
  - LIVER
    - ALPHA FETOPROTEIN, 6081*
    - CELL CULTURE, 6081*
    - DIAGNOSIS, 6196
    - HYPERTROPHY, 6406*
    - INFANT, 6406*

NEOPLASMS (continued)
  LIVER (continued)
    NEONATE, 6406*
    PATHOLOGY, 6407*
    TECHNIQUES, 6196
    ULTRASTRUCTURE, 6407*
  MOUTH
    STATISTICAL STUDY, 6601
  PANCREAS
    ANGIOGRAPHY, 6362*
    DIAGNOSIS, 6180, 6183, 6362*
    DRUG THERAPY, 6373
    ENDOSCOPY, 6362*
    OCCUPATIONAL FACTORS, 6375
    RADIOTHERAPY, 6373
    SCANNING, SCINTILLATION, 6183
    SURGERY, 6362*, 6373
    SURVIVAL, 6375
    ULTRASONOGRAPHY, 6180
  RECTUM
    AGE FACTORS, 6339
    DIAGNOSIS, 6326*, 6339, 6345
    MORPHOLOGY, 6345
    OCCUPATIONAL FACTORS, 6375
    SURVIVAL, 6375
    THERAPY, 6339
  SALIVARY GLANDS
    CHILD, 6600
    INFANT, 6600
    PATHOLOGY, 6639
    RADIOTHERAPY, 6632
    THERAPY, 6613
  SCANNING, SCINTILLATION
    LIVER, 6196
  STOMACH, 6244
    DRUG THERAPY, 6248
    RECURRENCE, 6252
    SURGERY, 6248, 6252
    SURVIVAL, 6252
  SURGERY
    COMPLICATIONS, 6595, 6596
    NUTRITION DISORDERS, 6595, 6596
    UROGENITAL SYSTEM, 6595
  TOMOGRAPHY
    COMPUTERS, 6363*
    PANCREATIC DISEASES, 6363*
  UROGENITAL SYSTEM
    COMPLICATIONS, 6595
  VENEREAL DISEASES
    STOMACH, 6240

NEOPLASMS, BENIGN
  LIVER
    CONTRACEPTIVES, ORAL, 6409*
    HEMORRHAGE, 6409*
  SALIVARY GLANDS
    NEOPLASMS, MALIGNANT, 6594
  STOMACH, 6238

NEOPLASMS, MALIGNANT
  BILE DUCTS
    DIAGNOSIS, 6190
    RADIOLOGY, 6190
  BILIARY TRACT
    CYSTS, 6561*
    DISEASES ASSOCIATED WITH, 6561*
  COLON
    BREATH TEST, 6323*
    DISEASES ASSOCIATED WITH, 6328*

NEOPLASMS, MALIGNANT (continued)
  COLON (continued)
    FECES, 6324*
    GEOGRAPHICAL FACTORS, 6324*
    IMMUNOTHERAPY, 6144*
    MOTILITY, 6324*
  DISEASES ASSOCIATED WITH
    COLITIS, 6328*
  ESOPHAGUS, 6222
    SURGERY, 6202
  GASTRECTOMY
    BIOPSY, 6226*
    DIAGNOSIS, 6226*
    ENDOSCOPY, 6226*
  GASTROINTESTINAL SYSTEM
    GENETICS, 6623
  INTESTINE, LARGE
    DIAGNOSIS, 6325*
    NUCLEIC ACIDS, 6325*
  INTESTINE, SMALL
    DIAGNOSIS, 6287*, 6307
    SURGERY, 6287*
  LIVER
    ALPHA FETOPROTEIN, 6403*, 6404*,
      6405*
    AUSTRALIA ANTIGEN, 6434
    DIAGNOSIS, 6370, 6404*
    DRUG THERAPY, 6403*
    PROGNOSIS, 6403*, 6408*
    SURGERY, 6403*, 6408*
    THERAPY, 6408*
  NUCLEIC ACIDS
    DIAGNOSIS, 6325*
  PANCREAS
    ANGIOGRAPHY, 6361*
    BIOPSY, 6361*
    DIAGNOSIS, 6361*
    DRUG THERAPY, 6360*
    ENDOSCOPY, 6361*
    PANCREATOGRAPHY, 6361*
    ULTRASONOGRAPHY, 6361*
  PREGNANCY
    DRUG-INDUCED, 6617
  RECTUM
    BREATH TEST, 6323*
  SALIVARY GLANDS
    NEOPLASMS, BENIGN, 6594
    ULTRASONOGRAPHY, 6635
  STOMACH
    BIOCHEMISTRY, 6256
    DIAGNOSIS, 6234
    SECRETION, 6256
    ULTRASTRUCTURE, 6256

NERVOUS CONTROL
  ACID SECRETION
    ANESTHESIA, 6049
  BILE
    ADENOSINE TRIPHOSPHATE, 6106
    ENZYMES, 6106
    OXIDOREDUCTASES, 6106
  ESOPHAGUS
    PERISTALSIS, 6028
  GALLBLADDER
    CONNECTIVE TISSUE, 5991*
  LIVER
    ADENOSINE TRIPHOSPHATE, 6106
    ENZYMES, 6106, 6107
    OXIDOREDUCTASES, 6106

NERVOUS CONTROL (continued)
  PANCREATITIS, CHRONIC
    ALCOHOLS, 6385
    PROTEINS, 6385

NITROSAMINES
  ESOPHAGUS
    NEOPLASMS, 6213
  NEOPLASMS
    ALCOHOLS, 6213

NOREPINEPHRINE
  LIVER COMA
    BLOOD PLATELETS, 6510*

NUCLEIC ACIDS
  INTESTINE, LARGE
    NEOPLASMS, MALIGNANT, 6325*
  LIVER
    DRUG EFFECTS ON, 6127
    REGENERATION, 6109
  LIVER INJURY
    CARBON TETRACHLORIDE, 6115
  NEOPLASMS, MALIGNANT
    DIAGNOSIS, 6325*
  SERUM
    SYNTHESIS, 6091*
  SYNTHESIS
    HUMORAL FACTORS, 6091*

NUTRITION
  RADIOTHERAPY
    RADIATION EFFECTS ON, 6599

NUTRITION DISORDERS
  ASCARIASIS
    CHILD, 6654
  NEOPLASMS
    SURGERY, 6595, 6596

OBESITY
  SHUNT, INTESTINAL
    LIVER FUNCTION TESTS, 6293*

OBSTRUCTION
  BILE DUCTS
    DRAINAGE, 6580*
  CECUM
    CYSTIC FIBROSIS, 6364*
    DISEASES ASSOCIATED WITH, 6364*
  DUODENUM
    VARICES, 6291*
  ENDOSCOPY
    ESOPHAGUS, 6201
  ESOPHAGUS
    FOOD, 6199*
    GLUCAGON, 6199*
    THERAPY, 6199*
  GASTROENTEROSTOMY
    LAPAROSCOPY, 6295
  ILEUM
    CYSTIC FIBROSIS, 6364*
    DISEASES ASSOCIATED WITH, 6364*
    SURGERY, 6364*
  INFLAMMATORY BOWEL DISEASES
    UROGENITAL SYSTEM, 6676*

OBSTRUCTION (continued)
  INTESTINE, LARGE
    CYSTIC FIBROSIS, 6364*
    DISEASES ASSOCIATED WITH, 6364*
    SURGERY, 6364*
  INTESTINE, SMALL
    CYSTIC FIBROSIS, 6364*
    DISEASES ASSOCIATED WITH, 6364*
    SURGERY, 6364*
  JEJUNUM
    CYSTIC FIBROSIS, 6364*
    DISEASES ASSOCIATED WITH, 6364*
    SURGERY, 6364*
  VARICES
    CIRCULATION, 6291*

OXALATES
  ABSORPTION
    CATHARTICS, 6019
    DRUG EFFECTS ON, 6019
  COLON
    ABSORPTION, 6019, 6020
    TRANSPORT, 6020
  INFLAMMATORY BOWEL DISEASES
    EXCRETION, 6586*
  MALABSORPTION SYNDROMES
    EXCRETION, 6586*
    URINE, 6320
  PANCREATIC DISEASES
    EXCRETION, 6586*

OXIDATION
  ULCER, PEPTIC
    THERAPY, 6265

OXIDOREDUCTASES
  BILE
    NERVOUS CONTROL, 6106
  LACTATES
    IMMUNOGLOBULINS, 6153
  LIVER
    NERVOUS CONTROL, 6106

PAIN
  ABDOMEN
    AMYLASES, 6387
    PANCREATITIS, 6387
  ULCER, PEPTIC, 6232

PANCREAS
  ADENOSINE TRIPHOSPHATE
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 6059*
    GUANOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 6059*
  ALCOHOLISM, 6369
  AMYLASES
    HYDROLYSIS, 6064
  ANOMALY
    ENDOSCOPY, 6179
    PANCREATOGRAPHY, 6179
  BICARBONATE SECRETION
    HORMONE EFFECTS ON, 6060*
    SOMATOSTATIN, 6060*
  CADMIUM
    EXCRETION, 6066
  ENDOSCOPY
    PANCREATOGRAPHY, 6151*, 6359*

PANCREAS (continued)
  FATS
    EXCRETION, 6371
  FISTULA
    ENDOSCOPY, 6376
    SURGERY, 6376
  HORMONES
    SECRETION, 6061
  INTESTINE, SMALL
    ATROPHY, 6061
  LEUKEMIA
    COMPLICATIONS, 6419*
  NECROSIS
    THERAPY, 6368
  NEOPLASMS
    ANGIOGRAPHY, 6362*
    DIAGNOSIS, 6180, 6183, 6362*
    DRUG THERAPY, 6373
    ENDOSCOPY, 6362*
    OCCUPATIONAL FACTORS, 6375
    RADIOTHERAPY, 6373
    SCANNING, SCINTILLATION, 6183
    SURGERY, 6362*, 6373
    SURVIVAL, 6375
    ULTRASONOGRAPHY, 6180
  NEOPLASMS, MALIGNANT
    ANGIOGRAPHY, 6361*
    BIOPSY, 6361*
    DIAGNOSIS, 6361*
    DRUG THERAPY, 6360*
    ENDOSCOPY, 6361*
    PANCREATOGRAPHY, 6361*
    ULTRASONOGRAPHY, 6361*
  PSEUDOCYSTS
    COMPLICATIONS, 6366*
    DIAGNOSIS, 6182, 6366*
    ENDOSCOPY, 6366*
    HEMORRHAGE, 6365*
    INFANT, 6374
    PANCREATOGRAPHY, 6366*
    SURGERY, 6365*
    ULTRASONOGRAPHY, 6182, 6372
  SECRETIN
    HORMONE EFFECTS ON, 6060*
    SOMATOSTATIN, 6060*
  SECRETION
    DEFICIENCY, 6371
    IMMUNOGLOBULINS, 6067
  SURGERY
    ENDOSCOPY, 6154
  TOMOGRAPHY, 6367*
    COMPUTERS, 6192
  ULTRASONOGRAPHY, 6151*, 6181, 6359*
  VEINS
    FETUS, 5998
    ULTRASTRUCTURE, 5998
  WOUNDS AND INJURIES
    DIAGNOSIS, 6195

ANCREAS FUNCTION TESTS
  HEPATITIS, INFECTIOUS
    AMYLASES, 6463*
  SCANNING, SCINTILLATION
    TECHNIQUES, 6148
  TECHNIQUES, 6178

ANCREATIC DISEASES
  DIAGNOSIS
    ENDOSCOPY, 6151*, 6359*

PANCREATIC DISEASES (continued)
  DIAGNOSIS (continued)
    PANCREATOGRAPHY, 6151*, 6359*
    ULTRASONOGRAPHY, 6151*, 6180, 6182, 6359*
  ENDOSCOPY
    PANCREATOGRAPHY, 6359*
  OXALATES
    EXCRETION, 6586*
  STEATORRHEA
    AGE FACTORS, 6311*
    ETIOLOGY, 6311*
  TOMOGRAPHY
    COMPUTERS, 6363*
    NEOPLASMS, 6363*
  ULTRASONOGRAPHY, 6181

PANCREATIC DUCT
  TOMOGRAPHY, 6367*

PANCREATITIS
  ABDOMEN
    PAIN, 6387
  ANGIOGRAPHY
    COMPLICATIONS, 6391
  AORTOGRAPHY
    COMPLICATIONS, 6391
  BONES
    DISEASES ASSOCIATED WITH, 6392
    ISCHEMIA, 6392
    NECROSIS, 6392
  CHILD
    AMYLASES, 6387
    COMPLICATIONS, 6384
  COMPLICATIONS, 6380*
  DIAGNOSIS, 6383
    ULTRASONOGRAPHY, 6182
  PREGNANCY, 6388
  PROGNOSIS
    STATISTICAL STUDY, 6377*
  PSEUDOCYSTS
    COMPLICATIONS, 6389
  RETROPERITONEAL SPACE
    RADIONUCLIDES, 6386
  RISK FACTORS
    STATISTICAL STUDY, 6377*
  SERUM
    AMYLASES, 6381
  STATISTICAL STUDY
    SURVIVAL, 6377*
  THERAPY, 6383
    REVIEW, 6390
  TOMOGRAPHY
    COMPUTERS, 6382
    ULTRASONOGRAPHY, 6382

PANCREATITIS, CHRONIC
  ALCOHOLS
    FATS, 6385
    NERVOUS CONTROL, 6385
    PROTEINS, 6385
  COMPLICATIONS
    DIABETES, 6379*
    HYPOGLYCEMIA, 6379*
  DIAGNOSIS
    ULTRASONOGRAPHY, 6180
  HYPOGLYCEMIA
    SOMATOSTATIN, 6378*

PANCREATITIS, CHRONIC (continued)
- PROTEINS
  - NERVOUS CONTROL, 6385

PANCREATOGRAPHY
- ENDOSCOPY
  - COMPLICATIONS, 6545*
- PANCREAS
  - ANOMALY, 6179
  - ENDOSCOPY, 6151*, 6359*
  - NEOPLASMS, MALIGNANT, 6361*
  - PSEUDOCYSTS, 6366*
- PANCREATIC DISEASES
  - DIAGNOSIS, 6151*, 6359*
  - ENDOSCOPY, 6359*

PANCREOZYMIN
- CHOLECYSTOKININ
  - DEFICIENCY, 6631
- DEFICIENCY
  - ANALYSIS, 6631

PARASITES AND PARASITIC DISEASES
- ANTHELMINTICS
  - COMPLICATIONS, 6652
  - DRUG EFFECTS ON, 6650
  - TOLERANCE, 6652
- ASSAY
  - ENZYMES, 6640*
- DRUG THERAPY
  - ANTHELMINTICS, 6663
- ESOPHAGUS
  - MUSCLES, 6662
- IMMUNITY
  - ASSAY, 6640*
  - ENZYMES, 6640*
- IMMUNOGLOBULINS
  - ENZYMES, 6640*
  - IMMUNITY, 6145*
- INTESTINE, SMALL
  - MORPHOLOGY, 6662
  - SEX FACTORS, 6662
  - ULTRASTRUCTURE, 6662
- INTESTINES
  - DIAGNOSIS, 6653
  - EPIDEMIOLOGY, 6653, 6665
  - INFECTION, 6653
  - PATHOLOGY, 6668
- UROGENITAL SYSTEM
  - PATHOLOGY, 6668

PARATHYROID GLANDS
- CHOLELITHIASIS
  - DISEASES ASSOCIATED WITH, 6564*

PARENTERAL ALIMENTATION
- ABDOMEN
  - SURGERY, 6627
- INTESTINE, SMALL
  - ATROPHY, 6061
- SURGERY
  - REVIEW, 6627

PELIOSIS HEPATIS
- ETIOLOGY
  - ANDROGENS, 6451*
  - HORMONES, 6451*

PEPSIN
- STOMACH
  - ACID SECRETION, 6044

PEPTIDES
- DIABETES
  - ABSORPTION, 6008
  - TRANSPORT, 6008

PERFORATION
- CROHN'S DISEASE, 6675*
- DUODENUM
  - IATROGENESIS, 6545*
- ENDOSCOPY
  - COMPLICATIONS, 6545*
- ESOPHAGUS
  - THERAPY, 6204
- INTESTINE, SMALL
  - IATROGENESIS, 6545*
- SALMONELLOSIS
  - INTESTINES, 6633
- ULCER
  - DUODENUM, 6276
  - ETHNIC FACTORS, 6276
  - SURGERY, 6273

PERFUSION
- LIVER, 6102
  - HYPOTHERMIA, 6103
  - LIVER FUNCTION TESTS, 6103
  - MORPHOLOGY, 6103
  - TECHNIQUES, 6068*
- LIVER DISEASES
  - REVIEW, 6412*
- LIVER INJURY
  - SURVIVAL, 6113
  - THERAPY, 6113
- STOMACH
  - SECRETION, 6053

PERISTALSIS
- ESOPHAGUS
  - NERVOUS CONTROL, 6028

PERITONITIS
- DRUG THERAPY
  - ANTIBIOTICS, 6507*
- ETIOLOGY
  - ULCER, 6304
- INTESTINE, SMALL
  - ULCER, 6304
- LIVER CIRRHOSIS
  - ANTIBIOTICS, 6507*
  - ASCITES, 6507*
  - DRUG THERAPY, 6507*
- TUBERCULOSIS, 6597

PEROXIDATION
- CHOLESTASIS
  - MONOAMINE OXIDASE, 6086*
- HEPATITIS, INFECTIOUS
  - ENZYMES, 6469*

PESTICIDES
- HEPATITIS, TOXIC
  - DIAGNOSIS, 6439*
  - OCCUPATIONAL FACTORS, 6439*

PEUTZ-JEGHER'S SYNDROME
- PATHOLOGY, 6604

- PHENOBARBITAL
  - BILE
    - LIPIDS, 6397*
  - LIPIDS
    - METABOLISM, 6397*

- PHOSPHOLIPIDS
  - CHOLELITHIASIS
    - CHOLESTEROL, 6572*
  - LIVER
    - DRUG EFFECTS ON, 6127

- PHOSPHORUS
  - CHOLECYSTECTOMY
    - BILE, 6543*
  - CHOLELITHIASIS
    - BILE, 6543*

- PLASMA
  - CHOLAGOGUES AND CHOLERETICS
    - CHROMATOGRAPHY, 6098
    - METABOLISM, 6098
  - CHOLESTEROL
    - STEROLS, 6478*
  - HEPATITIS, SERUM
    - ANTIBODIES, 6483*
  - LIVER
    - LIPOPROTEINS, 6125
  - LIVER CIRRHOSIS
    - ENDOTOXINS, 6530*
  - SECRETIN
    - RADIOIMMUNOASSAY, 6062
  - STEROLS
    - METABOLISM, 6478*

- PNEUMATOSIS
  - ABDOMEN
    - SURGERY, 6300
  - COLON, 6333*
  - INTESTINES, 6333*
    - ABDOMEN, 6300

- POLYPS
  - COLON
    - EPIDEMIOLOGY, 6334*
    - NEOPLASMS, 6334*
  - RECTUM
    - EPIDEMIOLOGY, 6334*
  - STOMACH, 6229
    - CRONKHITE-CANADA SYNDROME, 6241

- PORPHYRIA
  - ANTIGENS, 6420*

- POTASSIUM
  - COLON
    - ION TRANSPORT, 6013
  - ILEUM
    - ABSORPTION, 6001*
    - SODIUM, 6001*
  - STOMACH
    - SECRETION, 6017

- PRECANCEROUS CONDITIONS
  - COLITIS, ULCERATIVE
    - SURGERY, 6352*
  - SURGERY
    - REVIEW, 6352*
    - SEQUELAE, 6352*

- PREGNANCY
  - ANESTHESIA
    - ACID SECRETION, 6051
  - APPENDICITIS
    - DIAGNOSIS, 6194
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 6565*
    - LIVER FUNCTION TESTS, 6565*
  - INTESTINES
    - LACTASE, 6130*
  - NEOPLASMS, MALIGNANT
    - DRUG-INDUCED, 6617
  - PANCREATITIS, 6388
  - STOMACH
    - ACIDITY, 6051

- PRIMATES
  - HEPATOCYTES
    - ELECTROPHYSIOLOGY, 5992

- PROCTITIS
  - SYPHILIS
    - DIAGNOSIS, 6335*

- PROLACTIN
  - LIVER CIRRHOSIS
    - CIRCADIAN RHYTHM, 6526*

- PROSTAGLANDINS
  - COLITIS, ULCERATIVE
    - SYNTHESIS, 6354
  - LIVER
    - ANGIOGRAPHY, 6353*

- PROTEIN-LOSING ENTEROPATHIES
  - IMMUNITY, 6634

- PROTEINS
  - ABSORPTION
    - MARKER STUDY, 6004*
    - SURGERY, 6004*
  - ADENOSINE TRIPHOSPHATE
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
    - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
  - AMYLASES
    - ASSAY, 6065
  - FISTULA
    - ACID SECRETION, 6040*
  - HEIDENHAIN POUCH
    - ACID SECRETION, 6040*
    - GASTRIN, 6040*
  - HEPATITIS, CHRONIC
    - ENZYMES, 6469*
  - HEPATITIS, INFECTIOUS
    - ENZYMES, 6469*
  - INFECTION
    - INFANT, 6620
    - THERAPY, 6620
  - INTESTINE, SMALL
    - ENZYMES, 6133
  - INTESTINES
    - LACTASE, 6130*
  - LACTASE
    - DEFICIENCY, 6130*
  - LIVER
    - DRUG EFFECTS ON, 6127
    - SYNTHESIS, 6541*

PROTEINS (continued)
- LIVER CIRRHOSIS
  - ENZYMES, 6469*
  - ETIOLOGY, 6524*
- MALABSORPTION SYNDROMES
  - MILK, 6319
- PANCREATITIS, CHRONIC
  - ALCOHOLS, 6385
  - NERVOUS CONTROL, 6385
- SALIVARY GLANDS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6034
  - CALCIUM, 6034
  - SECRETION, 6034
- UREMIA
  - DEFICIENCY, 6611

PSEUDO-OBSTRUCTION
- COLON
  - DIAGNOSIS, 6330*
  - RADIOLOGY, 6330*
- INTESTINES
  - ELECTROPHYSIOLOGY, 6290*
  - MOTILITY, 6290*

PSEUDOCYSTS
- HEMORRHAGE
  - SURGERY, 6365*
- PANCREAS
  - COMPLICATIONS, 6366*
  - DIAGNOSIS, 6182, 6366*
  - ENDOSCOPY, 6366*
  - HEMORRHAGE, 6365*
  - INFANT, 6374
  - PANCREATOGRAPHY, 6366*
  - SURGERY, 6365*
  - ULTRASONOGRAPHY, 6182, 6372
- PANCREATITIS
  - COMPLICATIONS, 6389

PSEUDOTUMORS
- ULCER
  - CHILD, 6279

PYLOROPLASTY
- TECHNIQUES
  - ANALYSIS, 6246
  - COMPLICATIONS, 6246
- VAGOTOMY
  - TECHNIQUES, 6245

PYLORUS
- RADIOTHERAPY
  - STRICTURE, 6225*
- STENOSIS
  - INFANT, 6242
  - SURGERY, 6242
  - TETANY, 6231

RADIATION
- SEE ALSO IRRADIATION
- GASTROINTESTINAL SYSTEM
  - SEQUELAE, 6614

RADIOIMMUNOASSAY
- GLUCAGON
  - TECHNIQUES, 6032
- HEPATITIS
  - SERODIAGNOSIS, 6482*

RADIOIMMUNOASSAY (continued)
- HEPATITIS, INFECTIOUS
  - SERODIAGNOSIS, 6482*
- HEPATITIS, SERUM
  - SERODIAGNOSIS, 6482*
- HORMONES, GASTROINTESTINAL
  - TECHNIQUES, 6032
- LIVER CIRRHOSIS
  - BILE ACIDS AND SALTS, 6521*
- SECRETIN
  - PLASMA, 6062

RADIOLOGY
- AMEBIASIS
  - COLON, 6642*
- BILE DUCTS
  - NEOPLASMS, MALIGNANT, 6190
- BILIARY TRACT DISEASES
  - DIAGNOSIS, 6544*
- CECUM
  - NEOPLASMS, 6294
- COLITIS, ULCERATIVE
  - COLON, 6355
  - ENDOSCOPY, 6355
  - REVIEW, 6355
- COLON
  - CATHARTICS, 6165
  - ENEMA, 6165
  - PSEUDO-OBSTRUCTION, 6330*
- DUODENUM
  - BILIARY TRACT DISEASES, 6169
- ESOPHAGUS
  - HERNIA, 6161
- GASTROINTESTINAL SYSTEM
  - BLEEDING, 6198*
- ILEUM
  - NEOPLASMS, 6294
- INTESTINE, LARGE
  - DIVERTICULITIS, 6346
  - DIVERTICULUM, 6346
- LIPODYSTROPHY, INTESTINAL
  - DIAGNOSIS, 6315
- STOMACH, 6227*
  - BILIARY TRACT DISEASES, 6169
  - TECHNIQUES, 6170, 6171, 6172

RADIONUCLIDES
- ANEMIA, PERNICIOUS
  - VITAMIN B12, 6609
- FATTY LIVER
  - DIAGNOSIS, 6514*
- PANCREATITIS
  - RETROPERITONEAL SPACE, 6386

RADIOTHERAPY
- COMPLICATIONS
  - GASTRITIS, 6225*
  - STOMACH, 6225*
  - THERAPY, 6636
  - ULCER, PEPTIC, 6225*
- HODGKIN'S DISEASE
  - COMPLICATIONS, 6225*
- LYMPHOMA
  - COMPLICATIONS, 6225*
- NUTRITION
  - RADIATION EFFECTS ON, 6599
- PANCREAS
  - NEOPLASMS, 6373

RADIOTHERAPY (continued)
- PYLORUS
  - STRICTURE, 6225*
- SALIVARY GLANDS
  - NEOPLASMS, 6632

RECTUM
- AMEBIASIS
  - EPIDEMIOLOGY, 6667
- BLEEDING
  - ANOMALY, 6322*
- COLON
  - ANOMALY, 6322*
  - NEOPLASMS, 6326*
- NEOPLASMS
  - AGE FACTORS, 6339
  - DIAGNOSIS, 6326*, 6339, 6345
  - MORPHOLOGY, 6345
  - OCCUPATIONAL FACTORS, 6375
  - SURVIVAL, 6375
  - THERAPY, 6339
- NEOPLASMS, MALIGNANT
  - BREATH TEST, 6323*
- POLYPS
  - EPIDEMIOLOGY, 6334*
- SYPHILIS
  - DIAGNOSIS, 6335*

REFLUX
- GASTRITIS
  - SURGERY, 6250
- STOMACH DISEASES
  - BILE ACIDS AND SALTS, 6054
  - DISEASES ASSOCIATED WITH, 6054
- ULCER
  - SURGERY, 6250

RESPIRATORY SYSTEM
- ESOPHAGUS
  - FISTULA, 6203
- HERNIA
  - SURGERY, 6215

RETROPERITONEAL SPACE
- CYSTS
  - INTESTINAL OBSTRUCTION, 6298
- FATS
  - CYSTS, 6298
- PANCREATITIS
  - RADIONUCLIDES, 6386

RUPTURE
- AMEBIASIS
  - LIVER, 6655
- DUODENUM
  - CHILD, 6306
- INTESTINE, SMALL
  - CHILD, 6306
- LIVER
  - DISEASES ASSOCIATED WITH, 6421*

SALIVARY GLANDS
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - CALCIUM, 6034
- AMYLASES
  - HYDROLYSIS, 6064
- CHILD
  - NEOPLASMS, 6600

SALIVARY GLANDS (continued)
- INFANT
  - NEOPLASMS, 6600
- INFLAMMATION
  - ULTRASONOGRAPHY, 6635
- MORPHOLOGY, 5995
- NEOPLASM METASTASIS
  - LYMPH, 6615
- NEOPLASMS
  - PATHOLOGY, 6639
  - RADIOTHERAPY, 6632
  - THERAPY, 6613
- NEOPLASMS, BENIGN
  - NEOPLASMS, MALIGNANT, 6594
- NEOPLASMS, MALIGNANT
  - ULTRASONOGRAPHY, 6635
- PATHOLOGY
  - HORMONE EFFECTS ON, 6035
  - METABOLISM, 6035
  - REVIEW, 6035
- PROTEINS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6034
  - CALCIUM, 6034
  - SECRETION, 6034
- ULTRASTRUCTURE, 5994

SALMONELLOSIS
- BACTERIAL INFECTIONS
  - DIAGNOSIS, 6630
- INTESTINES
  - PERFORATION, 6633

SCANNING, SCINTILLATION
- LIVER
  - NEOPLASMS, 6196
  - REVIEW, 6517*
  - TECHNIQUES, 6517*
- LIVER CIRRHOSIS
  - REVIEW, 6517*
- PANCREAS
  - NEOPLASMS, 6183
- PANCREAS FUNCTION TESTS
  - TECHNIQUES, 6148

SCHISTOSOMIASIS
- CELL CULTURE
  - TECHNIQUES, 6661
- DRUG THERAPY
  - ANALYSIS, 6669
  - TECHNIQUES, 6661
- IMMUNOGLOBULINS
  - KIDNEYS, 6670
- IMMUNOLOGY
  - ANTIBODIES, 6645*
  - HYPERSENSITIVITY, 6645*
  - IMMUNOGLOBULINS, 6645*
- IMMUNOSUPPRESSION, 6150
- LIVER
  - IMMUNOGLOBULINS, 6646*
  - ULTRASTRUCTURE, 6646*
- ULTRASTRUCTURE
  - TECHNIQUES, 6661

SCLERODERMA
- INTESTINES
  - FAMILIAL FACTORS, 6598

- SCLEROSIS
  - CHOLANGITIS
    - DIAGNOSIS, 6562*
    - DRUG THERAPY, 6562*
    - SURGERY, 6562*
    - THERAPY, 6562*

- SECRETIN
  - GIARDIASIS
    - DIAGNOSIS, 6658
  - PANCREAS
    - HORMONE EFFECTS ON, 6060*
    - SOMATOSTATIN, 6060*
  - RADIOIMMUNOASSAY
    - PLASMA, 6062

- SECRETION
  - SEE ALSO ACID SECRETION, BICARBONATE SECRETION, HYPERCHLORHYDRIA
  - ANTRUM
    - GASTRIN, 6261*
    - ULCER, PEPTIC, 6261*
  - BILE
    - CERULEIN, 6095
    - CHOLAGOGUES AND CHOLERETICS, 6092, 6096
    - DRUG EFFECTS ON, 6092, 6095, 6096, 6099
    - INSULIN, 6092
    - SEROTONIN, 6099
  - BILIRUBIN, 6147
  - CARCINOID TUMOR
    - APPENDIX, 6327*
  - COLON
    - GLUCOSE, 6132
  - GASTRITIS
    - DEFICIENCY, 6228
    - DRUG THERAPY, 6228
  - HORMONES
    - GALLBLADDER, 6061
    - PANCREAS, 6061
  - ILEUM
    - GLUCOSE, 6132
  - INTESTINE, SMALL
    - IMMUNOLOGY, 6128*
    - MUCUS, 6128*
  - JEJUNUM
    - GLUCOSE, 6132
  - LIVER
    - BILIRUBIN, 6094
    - DYES, 6094
  - LIVER CIRRHOSIS, 6112
  - PANCREAS
    - DEFICIENCY, 6371
    - IMMUNOGLOBULINS, 6067
  - SALIVARY GLANDS
    - PROTEINS, 6034
  - STOMACH
    - ADRENERGIC RECEPTOR BLOCKADERS, 6046
    - GASTRIN, 6261*
    - GASTROSTOMY, 6037*
    - GLUCOSE, 6053
    - H2 RECEPTOR ANTAGONISTS, 6046
    - HISTAMINE, 6053
    - NEOPLASMS, MALIGNANT, 6256
    - PERFUSION, 6053
    - POTASSIUM, 6017

- SECRETION (continued)
  - STOMACH (continued)
    - TECHNIQUES, 6037*
    - ULCER, PEPTIC, 6261*

- SERODIAGNOSIS
  - HEPATITIS
    - RADIOIMMUNOASSAY, 6482*
  - HEPATITIS, INFECTIOUS
    - ANTIBODIES, 6472*
    - ANTIGENS, 6472*
    - RADIOIMMUNOASSAY, 6482*
  - HEPATITIS, SERUM
    - RADIOIMMUNOASSAY, 6482*

- SEROTONIN
  - BILE
    - BILIRUBIN, 6099
    - SECRETION, 6099

- SERUM
  - ACID SECRETION
    - CALCIUM, 6047
  - ALCOHOLISM
    - AMYLASES, 6505*
    - BILIRUBIN, 6505*
  - AMINO ACIDS, 6069*
  - GASTRIN
    - FEEDING, 6177
    - HYPERCALCEMIA, 6591*
    - INFANT, 6038*
  - HEPATITIS
    - AUSTRALIA ANTIGEN, 6470*
  - HEPATITIS, CHRONIC
    - AUSTRALIA ANTIGEN, 6470*
    - GLYCOPROTEINS, 6468*
  - HEPATITIS, INFECTIOUS
    - AUSTRALIA ANTIGEN, 6470*
    - ENZYMES, 6469*
    - GLYCOPROTEINS, 6468*
  - KWASHIORKOR
    - CALCIUM, 6316
  - LIVER CIRRHOSIS
    - AUSTRALIA ANTIGEN, 6470*
    - BILE ACIDS AND SALTS, 6521*
  - LIVER DISEASES
    - AUSTRALIA ANTIGEN, 6470*
    - LIPIDS, 6433
  - MALABSORPTION SYNDROMES
    - CALCIUM, 6316
  - MARASMUS
    - CALCIUM, 6316
  - NUCLEIC ACIDS
    - SYNTHESIS, 6091*
  - PANCREATITIS
    - AMYLASES, 6381

- SHIGELLOSIS
  - COLITIS
    - MEGACOLON, 6605

- SHUNT
  - CIRCULATION
    - MARKER STUDY, 6143*
    - TECHNIQUES, 6143*
  - VEINS
    - CRYOPROBE, 6076*
    - TECHNIQUES, 6076*

SHUNT, INTESTINAL
  COMPLICATIONS
    LIVER INJURY, 6293*
  OBESITY
    LIVER FUNCTION TESTS, 6293*

SIGMOID
  DIVERTICULITIS, 6343

SODIUM
  COLON
    ION TRANSPORT, 6013
  DEFICIENCY
    ANTIBIOTICS, 6532*
    DRUG THERAPY, 6532*
  ILEUM
    POTASSIUM, 6001*
    TRANSPORT, 6001*
  INTESTINE, SMALL
    TRANSPORT, 6009
  LIVER CIRRHOSIS
    DEFICIENCY, 6532*

SOMATOSTATIN
  PANCREAS
    BICARBONATE SECRETION, 6060*
    SECRETIN, 6060*
  PANCREATITIS, CHRONIC
    HYPOGLYCEMIA, 6378*

SPHINCTER
  ESOPHAGEAL REFLUX
    ACHALASIA, 6205
    SURGERY, 6205
  ESOPHAGUS
    PRESSURE STUDY, 6031

SPLEEN
  HYPERTENSION, PORTAL
    ARTERIES, 6534*
    SURGERY, 6534*, 6535*

SPLENOMEGALY
  CROHN'S DISEASE
    COMPLICATIONS, 6674*

STARCH
  AMYLASES
    HYDROLYSIS, 6064

STEATORRHEA
  CELIAC DISEASE
    AGE FACTORS, 6311*
    DIAGNOSIS, 6311*
  ETIOLOGY
    AGE FACTORS, 6311*
    DIAGNOSIS, 6311*
  PANCREATIC DISEASES
    AGE FACTORS, 6311*
    ETIOLOGY, 6311*

STENOSIS
  PYLORUS
    INFANT, 6242
    SURGERY, 6242
    TETANY, 6231

STEROIDS
  LIVER
    ENDOTOXINS, 6123
  METABOLISM, 6527*
    LIVER CIRRHOSIS, 6527*

STEROLS
  METABOLISM
    HEPATITIS, 6478*
  PLASMA
    CHOLESTEROL, 6478*
    METABOLISM, 6478*

STOMACH
  ABSORPTION
    CARCINOGENS, 6022
  ACID SECRETION, 6017
    ACID PHOSPHATASE, 6039*
    AMINO ACIDS, 6055
    ANESTHESIA, 6049
    CHILD, 6176
    GLUCOSE, 6055, 6057
    H2 RECEPTOR ANTAGONISTS, 6048, 6283
    HISTAMINE, 6056
    INFANT, 6038*
    PEPSIN, 6044
    STRESS, 6052
    ULCER, PEPTIC, 6261*
    ULTRASTRUCTURE, 6039*
    VAGOTOMY, 6271
  ACIDITY
    ANESTHESIA, 6051
    PREGNANCY, 6051
  ANALGESICS AND ANTIPYRETICS
    DRUG EFFECTS ON, 6045
  ASPIRIN
    ANALGESICS AND ANTIPYRETICS, 6045
    DRUG EFFECTS ON, 6045
    ENZYMES, 6042*
  BEZOARS, 6237
  BLEEDING
    CLOTTING, 6146*
    LASER, 6146*
    THERAPY, 6146*
  CIRCULATION
    ENDOTOXINS, 6006*
  DIGESTION
    PATHOLOGY, 6043
  DYSPEPSIA
    BARIUM, 6260
    CONTRAST MEDIA, 6260
    ENDOSCOPY, 6260
  ELECTROPHYSIOLOGY
    ANALGESICS AND ANTIPYRETICS, 6552*
    ANESTHESIA, 6552*
    CHOLECYSTECTOMY, 6552*
  ENDOCRINE SYSTEM
    DISEASE, 6036
    HORMONES, GASTROINTESTINAL, 6036
    REVIEW, 6036
  ENDOSCOPY, 6174
    ANEMIA, PERNICIOUS, 6173
    COMPLICATIONS, 6158
  FISTULA
    ACID SECRETION, 6040*, 6058
    GASTRIN, 6040*
  GASTRIN
    ULCER, PEPTIC, 6261*

STOMACH (continued)
  GRANULOMA
    DIAGNOSIS, 6585*
  HODGKIN'S DISEASE, 6236
  INFLAMMATION
    EOSINOPHILS, 6235
  ION TRANSPORT, 6017
    ENDOTOXINS, 6006*
  METABOLISM
    CARBOHYDRATES, 6264
  MORPHOLOGY, 6262*
    VAGOTOMY, 6262*
  MOTILITY
    ANALGESICS AND ANTIPYRETICS, 6552*
    ANESTHESIA, 6552*
    CERULEIN, 6027
    CHOLECYSTECTOMY, 6552*
    DIABETES, 6224*
    HORMONE EFFECTS ON, 6027
    MARKER STUDY, 6224*
  NEOPLASM METASTASIS
    DRUG THERAPY, 6249
    SURVIVAL, 6252
  NEOPLASMS, 6244
    DRUG THERAPY, 6248
    RECURRENCE, 6252
    SURGERY, 6248, 6252
    SURVIVAL, 6252
  NEOPLASMS, BENIGN, 6238
  NEOPLASMS, MALIGNANT
    BIOCHEMISTRY, 6256
    DIAGNOSIS, 6234
    SECRETION, 6256
    ULTRASTRUCTURE, 6256
  PHYSIOLOGY
    REVIEW, 6259
  POLYPS, 6229
    CRONKHITE-CANADA SYNDROME, 6241
  RADIOLOGY, 6227*
    BILIARY TRACT DISEASES, 6169
    TECHNIQUES, 6170, 6171, 6172
  RADIOTHERAPY
    COMPLICATIONS, 6225*
  SECRETION
    ADRENERGIC RECEPTOR BLOCKADERS, 6046
    GASTRIN, 6261*
    GASTROSTOMY, 6037*
    GLUCOSE, 6053
    H2 RECEPTOR ANTAGONISTS, 6046
    HISTAMINE, 6053
    PERFUSION, 6053
    POTASSIUM, 6017
    TECHNIQUES, 6037*
    ULCER, PEPTIC, 6261*
  ULCER
    AGE FACTORS, 6247
    CHILD, 6279
    DRUG-INDUCED, 6050
    ETIOLOGY, 6041*
    HEALING, 6286
    HYPERTROPHY, 6247
    JEJUNUM, 6277
    MORPHOLOGY, 6251
    RECURRENCE, 6277
    SEX FACTORS, 6247
    STRESS, 6041*
    SURGERY, 6230, 6251

STOMACH (continued)
  ULCER, PEPTIC
    DRUG THERAPY, 6270
    RECURRENCE, 6271
    VAGOTOMY, 6271
  VAGOTOMY
    NECROSIS, 6258
    ULCER, 6258
  VENEREAL DISEASES
    NEOPLASMS, 6240
  WOUNDS AND INJURIES
    BURNS, CHEMICAL, 6233

STOMACH DISEASES
  BILE ACIDS AND SALTS
    PERMEABILITY, 6054
  DIAGNOSIS
    CYTOLOGY, 6175
  REFLUX
    BILE ACIDS AND SALTS, 6054
    DISEASES ASSOCIATED WITH, 6054

STRESS
  ACID SECRETION
    EROSIONS, 6052
  STOMACH
    ACID SECRETION, 6052
    ULCER, 6041*
  ULCER
    ETIOLOGY, 6041*

STRICTURE
  CHOLANGIOGRAPHY
    DIAGNOSIS, 6547*
  ESOPHAGUS
    DILATATION, 6214
    SURGERY, 6214
  RADIOTHERAPY
    PYLORUS, 6225*

SULFATES
  ILEUM
    TRANSPORT, 6023
  INTESTINE, SMALL
    TRANSPORT, 6023

SULFHYDRYL COMPOUNDS
  LIVER DISEASES, ALCOHOLIC, 6077*
  LIVER INJURY
    ALCOHOLISM, 6077*

SULFOBROMOPHTHALEIN
  MITOCHONDRIA
    ION TRANSPORT, 6007*
    MEMBRANES, 6007*

SYPHILIS
  PROCTITIS
    DIAGNOSIS, 6335*
  RECTUM
    DIAGNOSIS, 6335*

TEMPERATURE
  AMYLASES
    ISOENZYMES, 6358*

THERMOGRAPHY
  CHOLECYSTITIS
    DIAGNOSIS, 6563*

THYROID GLAND
  HEPATITIS, CHRONIC, 6503
  LIVER CIRRHOSIS, 6503

TOMOGRAPHY
  COMPUTERS
    NEOPLASMS, 6363*
    PANCREATIC DISEASES, 6363*
  GALLBLADDER, 6550*
  GALLBLADDER DISEASES
    DIGANOSIS, 6550*
  LIVER
    COMPUTERS, 6192
  LIVER DISEASES
    DIAGNOSIS, 6192
  NEOPLASMS
    PANCREATIC DISEASES, 6363*
  PANCREAS, 6367*
    COMPUTERS, 6192
  PANCREATIC DUCT, 6367*
  PANCREATITIS
    COMPUTERS, 6382
    ULTRASONOGRAPHY, 6382

TOXICITY
  ALCOHOLS
    BIOCHEMISTRY, 6515
  ASPIRIN
    CHILD, 6442*
  GASTROINTESTINAL SYSTEM
    INFECTION, 6629
  LIVER
    ASPIRIN, 6442*
  LIVER FUNCTION TESTS
    MARKER STUDY, 6395*

TOXINS
  ILEUM
    ION TRANSPORT, 6012
  JEJUNUM
    ION TRANSPORT, 6012

TRANQUILIZING AGENTS
  LIVER INJURY
    DRUG-INDUCED, 6126

TRANSPLANTATION
  LIVER
    CIRCULATION, 6108, 6432
    TECHNIQUES, 6108

TRANSPORT
  CALCIUM
    GROWTH FACTORS, 6014
    VITAMIN D, 6016
  CECUM
    CALCIUM, 6016
  COLON
    CALCIUM, 6016
    OXALATES, 6020
  DIABETES
    PEPTIDES, 6008
  HEPATOCYTES
    AMINO ACIDS, 6024
  ILEUM
    CALCIUM, 6014
    GLUCOSE, 6011
    LYSOSOMES, 6023
    NEONATE, 6023

TRANSPORT (continued)
  ILEUM (continued)
    SODIUM, 6001*
    SULFATES, 6023
  INTESTINE, LARGE
    CALCIUM, 6016
  INTESTINE, SMALL
    CALCIUM, 6014
    GLUCOSE, 6011
    LYSOSOMES, 6023
    NEONATE, 6023
    SODIUM, 6009
    SULFATES, 6023
  JEJUNUM
    CALCIUM, 6014
    GLUCOSE, 6011

TRIGLYCERIDES
  SEE ALSO FATS, LIPIDS
  ABSORPTION
    MALABSORPTION SYNDROMES, 6162
  INTESTINES
    ABSORPTION, 6162

TRYPSIN
  GASTROINTESTINAL SYSTEM
    CHILD, 6621

TUBERCULOSIS
  ABDOMEN
    EPIDEMIOLOGY, 6608
  ACID SECRETION
    MILK, 6626
  INTESTINES
    DIAGNOSIS, 6588*
    DRUG THERAPY, 6588*
  MILK
    YEAST, 6626
  PERITONITIS, 6597

ULCER
  ANTRECTOMY
    GASTRIN, 6278
  ANTRUM
    VAGOTOMY, 6274
  CHILD
    PSEUDOTUMORS, 6279
  CLASSIFICATION
    ATROPINE, 6266
    TECHNIQUES, 6266
  DRUG-INDUCED
    AMINO ACIDS, 6050
  DUODENUM
    CLASSIFICATION, 6266
    HAPTOGLOBINS, 6284
    PERFORATION, 6276
    SURGERY, 6267
    VAGOTOMY, 6275, 6280, 6281, 6282
  INTESTINE, SMALL
    PERITONITIS, 6304
  JEJUNUM
    RECURRENCE, 6277
  MORPHOLOGY
    SURGERY, 6251
  PERFORATION
    ETHNIC FACTORS, 6276
    SURGERY, 6273
  PERITONITIS
    ETIOLOGY, 6304

- ULCER (continued)
  - STOMACH
    - AGE FACTORS, 6247
    - CHILD, 6279
    - DRUG-INDUCED, 6050
    - ETIOLOGY, 6041*
    - HEALING, 6286
    - HYPERTROPHY, 6247
    - JEJUNUM, 6277
    - MORPHOLOGY, 6251
    - RECURRENCE, 6277
    - SEX FACTORS, 6247
    - STRESS, 6041*
    - SURGERY, 6230, 6251
    - VAGOTOMY, 6258
  - STRESS
    - ETIOLOGY, 6041*
  - SURGERY
    - COMPLICATIONS, 6230, 6250
    - GASTRITIS, 6250
    - REFLUX, 6250
  - VAGOTOMY
    - ELECTROPHYSIOLOGY, 6282
    - GASTRIN, 6278
    - PROGNOSIS, 6272, 6280
    - REGENERATION, 6282

- ULCER, PEPTIC
  - ANTRUM
    - ACID SECRETION, 6261*
    - GASTRIN, 6261*
    - SECRETION, 6261*
  - BILIARY TRACT
    - ADOLESCENCE, 6268
    - CHILD, 6268
  - LIVER
    - ADOLESCENCE, 6268
    - CHILD, 6268
  - METABOLISM
    - CARBOHYDRATES, 6264
  - PAIN, 6232
  - RADIOTHERAPY
    - COMPLICATIONS, 6225*
  - RECURRENCE
    - VAGOTOMY, 6271
  - STOMACH
    - ACID SECRETION, 6261*
    - DRUG THERAPY, 6270
    - GASTRIN, 6261*
    - RECURRENCE, 6271
    - SECRETION, 6261*
    - VAGOTOMY, 6271
  - SURGERY
    - ABSORPTION, 6263*
  - THERAPY, 6269
    - OXIDATION, 6265
  - VAGOTOMY
    - REVIEW, 6271

- ULTRASONOGRAPHY
  - BILE DUCTS
    - DILATATION, 6410*, 6548*
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 6575*
  - CHOLESTASIS
    - JAUNDICE, 6574*
  - GALLBLADDER, 6193
  - GALLBLADDER DISEASES
    - DIAGNOSIS, 6575*

- ULTRASONOGRAPHY (continued)
  - HEPATOMEGALY, 6394*
  - JAUNDICE
    - DIAGNOSIS, 6548*, 6575*
  - LIVER, 6193, 6394*
  - LIVER DISEASES
    - DIAGNOSIS, 6575*
  - PANCREAS, 6151*, 6181, 6359*
    - NEOPLASMS, 6180
    - NEOPLASMS, MALIGNANT, 6361*
    - PSEUDOCYSTS, 6182, 6372
  - PANCREATIC DISEASES, 6181
    - DIAGNOSIS, 6151*, 6180, 6182, 6359*
  - PANCREATITIS
    - DIAGNOSIS, 6182
    - TOMOGRAPHY, 6382
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 6180
  - SALIVARY GLANDS
    - INFLAMMATION, 6635
    - NEOPLASMS, MALIGNANT, 6635

- UREMIA
  - ALBUMINS
    - METABOLISM, 6611
  - LIVER INJURY
    - DISEASES ASSOCIATED WITH, 6452*
  - PROTEINS
    - DEFICIENCY, 6611

- URIC ACID
  - LIVER
    - ALCOHOLS, 6079*
    - DRUG EFFECTS ON, 6079*
    - SYNTHESIS, 6079*

- URINARY SYSTEM
  - ENTERITIS, REGIONAL
    - COMPLICATIONS, 6677*

- URINE
  - CHOLAGOGUES AND CHOLERETICS
    - CHROMATOGRAPHY, 6098
    - METABOLISM, 6097, 6098
  - HEPATITIS
    - ENZYMES, 6464*
  - HEPATITIS, INFECTIOUS
    - ENZYMES, 6464*
  - LIVER DISEASES
    - DIAGNOSIS, 6431
    - ISOENZYMES, 6431
  - MALABSORPTION SYNDROMES
    - OXALATES, 6320

- UROGENITAL SYSTEM
  - INFLAMMATION
    - DIAGNOSIS, 6194
  - INFLAMMATORY BOWEL DISEASES
    - COMPLICATIONS, 6676*
    - OBSTRUCTION, 6676*
  - NEOPLASMS
    - COMPLICATIONS, 6595
    - SURGERY, 6595
  - PARASITES AND PARASITIC DISEASES
    - PATHOLOGY, 6668
  - SURGERY
    - INTESTINAL OBSTRUCTION, 6302

- VACCINES
  - HEPATITIS
    - REVIEW, 6480*
  - HEPATITIS, INFECTIOUS
    - REVIEW, 6480*

- VAGOTOMY
  - ANTRUM
    - ULCER, 6274
  - DUODENUM
    - ULCER, 6280, 6281
  - ELECTROPHYSIOLOGY
    - TECHNIQUES, 6243
  - ENDOSCOPY, 6154
  - HYPOGLYCEMIA
    - GASTRIN, 6285
  - LIVER
    - MITOCHONDRIA, 6105
  - PYLOROPLASTY
    - TECHNIQUES, 6245
  - STOMACH
    - ACID SECRETION, 6271
    - MORPHOLOGY, 6262*
    - NECROSIS, 6258
    - ULCER, 6258
    - ULCER, PEPTIC, 6271
  - TECHNIQUES
    - ANALYSIS, 6245
    - REVIEW, 6271
  - ULCER
    - DUODENUM, 6275, 6282
    - ELECTROPHYSIOLOGY, 6282
    - GASTRIN, 6278
    - PROGNOSIS, 6272, 6280
    - REGENERATION, 6282
  - ULCER, PEPTIC
    - RECURRENCE, 6271
    - REVIEW, 6271

- ARICES
  - CIRCULATION
    - OBSTRUCTION, 6291*
  - DUODENUM
    - ANGIOGRAPHY, 6291*
    - CIRCULATION, 6291*
    - OBSTRUCTION, 6291*
  - ESOPHAGUS
    - HEMORRHAGE, 6200*
    - HYPERTENSION, PORTAL, 6200*
    - PROGNOSIS, 6200*
  - HEMORRHAGE
    - HYPERTENSION, PORTAL, 6200*
    - PROGNOSIS, 6200*

- INS
  - CHEMICAL COMPOSITION
    - GASES, 6418*
  - LIVER DISEASES
    - GASES, 6418*
  - PANCREAS
    - FETUS, 5998
    - ULTRASTRUCTURE, 5998
  - SHUNT
    - CRYOPROBE, 6076*
    - TECHNIQUES, 6076*

- NEREAL DISEASES
  - AMEBIASIS, 6641*
  - ANTIBODIES, 6422*

- VENEREAL DISEASES (continued)
  - STOMACH
    - NEOPLASMS, 6240

- VILLI
  - JEJUNUM
    - COLON, 5990*

- VIRUSES
  - CROHN'S DISEASE, 6673*
  - HEPATITIS
    - REVIEW, 6456*
  - HEPATITIS, INFECTIOUS
    - EPIDEMIOLOGY, 6481*

- VITAMIN A
  - DEFICIENCY
    - ALCOHOLS, 6078*
  - LIVER
    - DEFICIENCY, 6078*

- VITAMIN B6
  - INTESTINE, SMALL
    - ABSORPTION, 6021
  - JEJUNUM
    - ABSORPTION, 6021

- VITAMIN B12
  - ANEMIA, PERNICIOUS
    - ABSORPTION, 6609
    - RADIONUCLIDES, 6609

- VITAMIN C
  - ESOPHAGEAL REFLUX
    - DEFICIENCY, 6208

- VITAMIN D
  - GASTRECTOMY
    - BONES, 6254
    - MINERALS, 6254
  - TRANSPORT
    - CALCIUM, 6016

- VITAMIN E
  - GASTRITIS
    - DRUG THERAPY, 6228

- WATER
  - ABSORPTION
    - CAFFEINE, 6025
    - DRUG EFFECTS ON, 6025
  - GASTROINTESTINAL DISEASES
    - TRANSMISSION, 6619
  - JEJUNUM
    - ABSORPTION, 6012, 6025

- WATER, ELECTROLYTE BALANCE
  - ILEUM, 6134
  - JEJUNUM, 6134

- WILSON'S DISEASE
  - BILE
    - COPPER, 6072*
  - COPPER
    - EXCRETION, 6072*
    - METABOLISM, 6072*

WOUNDS AND INJURIES
- INTESTINE, SMALL
  - ALKALINE PHOSPHATASE, 6135
- INTESTINES
  - LYSOZYMES, 6296
- LIVER
  - HEMORRHAGE, 6454*, 6455
  - LIVER FUNCTION TESTS, 6455
  - SURGERY, 6454*
  - THERAPY, 6454*
- PANCREAS
  - DIAGNOSIS, 6195
- STOMACH
  - BURNS, CHEMICAL, 6233

XYLOSE
- CELIAC DISEASE
  - DIAGNOSIS, 6163

YERSINIA
- EPIDEMIOLOGY, 6647
- SURGERY
  - COMPLICATIONS, 6648

ZINC
- HEPATITIS, INFECTIOUS
  - DIAGNOSIS, 6465*
- LIVER INJURY
  - CARBON TETRACHLORIDE, 6087*
  - PREVENTION, 6087*

ZOLLINGER-ELLISON SYNDROME
- AGE FACTORS
  - DIAGNOSIS, 6602
  - DISEASES ASSOCIATED WITH, 6602
  - THERAPY, 6602
- DIAGNOSIS
  - GASTRIN, 6591*
- ETHNIC FACTORS
  - DIAGNOSIS, 6602
  - DISEASES ASSOCIATED WITH, 6602
  - THERAPY, 6602
- SEX FACTORS
  - DIAGNOSIS, 6602
  - DISEASES ASSOCIATED WITH, 6602
  - THERAPY, 6602

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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CONTENTS

	Abstracts, Citations	Page
PRE-CLINICAL SCIENCES		
Morphology, Cellular Structure and Histochemistry	6679-6685	843
Absorption--Excretion--Transport	6686-6696	844
Motility	6697-6711	847
Secretion and Metabolism	6712-6721	848
Stomach	6722-6743	850
Pancreas	6744-6754	854
Hepatobiliary Tract	6755-6812	855
Intestine	6813-6827	864
General	6828-6849	867
DIAGNOSTIC PROCEDURES	6850-6861	871
GASTROINTESTINAL DISEASES		
Esophagus	6862-6873	874
Stomach	6874-6910	875
Peptic Ulcers	6911-6938	878
Small Intestine	6939-6976	882
Malabsorption	6977-6996	885
Large Intestine	6997-7061	887
Ulcerative Colitis	7062-7067	892
Pancreas	7068-7074	893
Pancreatitis	7075-7083	893
Liver and Biliary Tract	7084-7132	895
Hyperbilirubinemic States	7133-7135	905
Nonviral Hepatitis and Hepatic Injury	7136-7144	905
Acute Viral Hepatitis	7145-7164	908
Chronic Hepatitis	7165-7170	912
Alcoholic Liver Disease	7171-7176	913
Cirrhosis	7177-7194	914
Gallbladder and Biliary Tract Diseases	7195-7238	918
General	7239-7272	926
Parasitology	7273-7274	928
Regional Enteritis	7275-7287	928
AUTHOR INDEX		
SUBJECT INDEX		

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter	NADP	nicotinamide adenine dinucleotidephosphate
cm	centimeter(s)	NADPH	reduced nicotinamide adenine dinucleotidephosphate
dl	deciliter	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	nm	nanometer(s)
ED_{50}	median effective dose(s)	Pa	ambient pressure
EDTA	ethylenediamine tetraacetic acid	PAS	periodic acid - Schiff
e.g.	for example	pg	picogram (10^{-12})
EEG	electroencephalogram	pgEq	picogram equivalent(s)
ESR	erythrocyte sedimentation rate	p.o.	orally
g	gram(s)	ppb	parts per billion
µg	microgram(s)	ppm	parts per million
Hz	Hertz	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes), red blood count
Ig	immunoglobulin(s)	resp.	respectively
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kcal	kilocalorie(s)	SGPT	serum glutamic-pyruvic transaminase
kg	kilogram(s)	U	unit(s)
K_m	Michaelis constant	UV	ultraviolet
LD_{50}	median lethal dose(s)	V	volt
LDH	lactic acid dehydrogenase	WBC	white blood cells (leukocytes), white blood count
m	meter(s)	yr	year(s)
M	molar; mole(s)		
mM	millimolar; millimole(s)		
µM	micromolar; micromole(s)		
ma	milliampere(s)		
mCi, µCi	milli-, microcurie(s)		
mEq	milliequivalent(s)		
mg	milligram(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

6679 DISTRIBUTION OF GASTRIN IN HUMAN, CANINE AND CAT DIGESTIVE TRACT DEMONSTRATED BY DIRECT IMMUNOFLUORESCENCE.

(Eng.) Henmi, K. (Kyoto Univ. Medical Sch., Sakyo-ku, Kyoto, Japan). *Arch. Jpn. Chir.* 46(1):18-37; 1977.

A highly specific direct immunofluorescent technique was used to determine the distribution of gastrin-containing cells in the digestive systems of humans, dogs, and cats, and to compare it among the three species. In all species, gastrin-containing cells were found only in the antrum and in the duodenum. The distribution within the duodenum, however, differed in humans from that in dogs and cats. In the human duodenum, gastrin-containing cells were seen in all portions from the pylorus to the third portion, in gradually decreasing concentration, while in the jejunum no gastrin-containing cells were seen. In the dog and cat duodenum, gastrin-containing cells were found only in the duodenal bulb, and none were seen distal to papilla of Vater. No gastrin-containing cells occurred in the esophagus, cardia, body of the stomach, jejunum, ileum, colon, pancreas, parotid gland, or submandibular gland in humans, dogs, or cats. The limits of distribution between the antrum and body of the stomach were sharply demarcated in all three species.

6680 SCANNING ELECTRON AND LIGHT MICROSCOPY OF THE CECUM OF GERM-FREE AND CONVENTIONAL MICE.

(Eng.) Geissinger, H. D.; Abandowitz, H. M. (Dept. Biomedical Sciences, Univ. Guelph, Guelph, Ontario, Canada N1G 2W1). *Trans. Am. Microsc. Soc.* 96(2):254-257; 1977.

To compare the intestine of conventional and germ-free mice, the lumen of the cecum of mice was examined *en face* with the scanning electron microscope and cross-sections of certain areas were examined with the light microscope. Short stubby villi (not only crypts) were observed in the mouse cecum. These villi appeared shorter in germ-free than in conventional mice. The precise diagnosis of these findings was verified by light microscopy of the subsurface architecture of the intestinal segment. The microflora of the intestine of conventional mice contained some bacteria previously undescribed by scanning electron microscopy.

6681 ANGIOGRAPHIC RESEARCH ON COLONIC BLOOD SUPPLY WITH A VIEW TO ESOPHAGOPLASTY.

(Fre.) Popovici, Z. (15, rue Jutetului, bl. 17, sc. 2, ap. 41, Bucharest II, Rumania). *J. Chir. (Paris)* 113 (5/6):517-526; 1977.

For an angiographic study of colonic vessels, the colons (plus 15 cm of terminal ileum) of 34 cadavers were removed, and the arteries were injected with lead via the inferior mesenteric artery and the veins with a radiopaque barium suspension via the superior mesenteric vein. The 16 variants of the left colonic artery that were found were grouped into five main types. Variants of the sigmoid arteries and the left colonic veins were also identified. The colons were evaluated from the viewpoint of performing an esophagoplasty, and it was concluded that only 13/34 had good arterial vasculature for the procedure; 12/34 had fair vasculature. Of the 25 colon specimens with good or fair vasculature, the isoperistaltic transverse colon was better than the ileocolon in 64% and equivalent in 20%; the right ileocolon was preferable in 16%.

6682 ULTRASTRUCTURAL CHARACTERISTICS OF TUFT CELLS IN MOUSE GALLBLADDER EPITHELIUM.

(Eng.) Nevalainen, T. J. (Lab. Electron Microscopy, Univ. Turku, Turku, Finland). *Acta Anat. (Basel)* 98(2):210-220; 1977.

Tuft cells of mouse gallbladder epithelium were observed by electron microscopy after fixation in glutaraldehyde and/or osmium tetroxide, and the staining of thin sections with uranyl acetate and lead citrate. The tuft cells were infrequent and appeared triangular, with the broad base resting on the basal lamina and the apical surface reaching the gallbladder lumen. Uncomplicated lateral cell membranes and small, vertically oriented mitochondria differentiated the tuft cells from the columnar epithelial cells. The microvilli on the apical surface of the tuft cells were thicker and longer than the microvilli of the columnar cells. A heavy network of microfilaments extended from the core of the microvilli to the apical surface of the tuft cell and sometimes as far as the nuclear region near the basal cell surface. There were microtubules in the apical cytoplasm as well as many small vesicles. Only a few multivesicular bodies and dense bodies were observed throughout the cell. Unlike the columnar cells, tuft cells had sparse secretory organelles. Based on these results and the results of previous studies, possible roles for the tuft cells are discussed, particularly those of resorption and non-muscle cell organelle motility.

6683 EFFECTS OF CYTOCHALASIN B ON PANCREATIC ACINAR CELL STRUCTURE AND SECRETION.

(Eng.) Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Cell Tissue Res.* 179(4):453-466; 1977.

The structure and function of pancreatic fragments, isolated acini, and isolated acinar cells from White Swiss mice (18-22 g) fasted overnight were studied by using cytochalasin B (CB). Structural change was elucidated microscopically and function tested by measuring amylase release. Krebs Henseleit bicarbonate media, equilibrated with 95% O_2-5% CO_2, was used. An additional 1% albumin was utilized in the media with acini and cells. CB inhibited bethanechol (3×10^{-5} M)-stimulated amylase release by fragments at 1 μg/ml or more, but had no effect on ATP content in the presence or absence of bethanechol. Adding the metabolic substrates pyruvate (4.9 mM), glutamate (4.9 mM), or fumarate (2.7 mM) did not alter the CB inhibition. Enlarged lumina were found with CB (5 μg/ml) alone under light microscope visualization or with CB (5 μg/ml) and bethanechol (3×10^{-5} M) together, utilizing either the light or electron microscope. CB (5 μg/ml) also caused the disappearance of microfilaments from the pancreatic fragments. Secretin (0.5 U/ml) acted similarly to CB, while cerulein (10 ng/ml) and CB combined produced results like those of bethanechol. CB (5 μg/ml) did not affect amylase release by isolated cells before or after bethanechol (10^{-4} M) incubation; however, CB did elicit zymogen granule marginization. Isolated acini incubated with CB and bethanechol showed luminal swelling and loss of microfilaments. It is suggested that inhibition of stimulated release may be due to disruption of acinar microfilament structure, but that the microfilaments may not be involved directly in secretion.

6684 DEVELOPMENT OF THE PANETH'S CELL POPULATION IN THE RAT. (Ger.) Linss, W.; Klett, U. (Anatomisches Institut, Friedrich-Schiller-Universitat, Teichgraben 7, 69 Jena, E. Germany). *Anat. Anz.* 140(5):494-497; 1976.

6685 ENDOCRINE CELLS OF GASTRIC MUCOSA FROM HEALTHY VOLUNTEERS AND FROM PATIENTS WITH GASTRODUODENAL DISEASES. (Rus.) Uspensky, V. M.; Golofeevsky, V. Yu. (S. M. Kirov Military-Medical Acad., Leningrad, USSR). *Ter. Arkh.* 49(5):83-86; 1977.

See also, 6680, 6681, 6682, 6683, 6686, 6722, 6724, 6726, 6741, 6742, 6813, 6818, 6827, 6836, 6840, 6841, 6843, 6846, 6847, 6852, 6875, 6882, 6884, 6894, 7031, 7049, 7184, 7262, 7269.

ABSORPTION - EXCRETION - TRANSPORT

6686 A STUDY OF AMINO ACID ABSORPTION FROM SMALL INTESTINES OF VINBLASTIN-TREATED RATS WITH ALTERED MUCOSAL MORPHOLOGY. (Eng.) Sharma, R. K.; Nagchaudhuri, J. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi, India). *Indian J. Med. Res.* 64(8):1225-1234; 1976.

Mitosis in the rat small intestine was arrested for various intervals with the alkaloid, vinblastine sulfate (VS) to investigate the influence of mitotic arrest on mucosal morphology and amino acid transport functions. Preliminary studies indicated that repeated i.p. injections of VS (1 mg/kg body weight) at 4-hr intervals could inhibit mitosis up to 24 hr. Histological studies on the small intestine of the treated animals revealed gradual changes in mucosal morphology commensurate with the duration of mitotic arrest. The villi showed a gradual decrease in total height and an increase in the diameter of the intervillous region, the loss of height of villi being due to the continual loss of cells of the crest region. There was also hyperplasia of goblet cells, shortening of the small intestine, and thickening of the muscularis. Intestinal absorption of L-proline, alone or in the presence of equimolar amounts of L-methionine, was studied by an *in vivo* sac technique in rats given 1, 5, 10, and 25 mg/kg doses of VS i.p. Rats from each group were used for absorption studies at 0.5, 8, and 24 hr following the injections. L-proline and/or L-methionine solutions (200 mM) were employed. The rate of L-proline transport was significantly decreased after four injections of VS (1 mg/kg, i.p.), approximately 16-18 hr after the first injection ($p<0.05$). Equimolar concentrations of L-proline and L-methionine given together decreased the effect of VS on L-proline transport; no reason for this effect could be advanced. Single injections of VS (10 or 25 mg/kg, i.p.) reduced L-proline transport to 80 and 50% of control values, resp., within 30 min. The effect of 25 mg/kg VS on L-proline transport may have been due to a direct toxic effect on the enterocytes, as this dose was lethal within 2-4 hr after its administration. However, lower doses were not obviously toxic, and L-proline transport inhibition at these doses may have resulted from a decreased surface area for absorption and loss of the fully differentiated absorptive cells at the villus tips. These results may elucidate the effect of protein calorie malnutrition (PCM) on intestinal amino acid transport since PCM also severely affects the rate of mitosis and the mucosal morphology in the intestine.

6687 COMPARATIVE EFFECT OF FOOD ON ABSORPTION OF AMPICILLIN AND PIVAMPICILLIN. (Eng.) Neuvonen, P. J.; Elonen, E.; Pentikainen, P. J. (Dept. Clinical Pharmacology, Univ. Helsinki, Helsinki, Finland). *J. Int. Med. Res.* 5(1):71-76; 1977.

The effect of food on the absorption of simultaneously ingested ampicillin or pivampicillin was compared in a crossover study in eight healthy women. The patients received either ampicillin (500 mg) or pivampicillin (350 mg) with water or with a test meal. The absorption of both ampicillin and pivampicillin was delayed by simultaneous food intake as judged by serum concentration and urinary excretion of ampicillin. The total absorption of ampicillin, but not that of pivampicillin, was decreased by simultaneous food intake, as indicated by the area under the serum ampicillin concentration-time curves and by 24 hr urinary excretion of ampicillin. The excretion of ampicillin into urine was about 30% of the dose when ampicillin was ingested with water into an empty stomach and about 20% when ingested with food. The respective excretion of ampicillin following the ingestion of pivampicillin was about 60% of the dose taken either with or without food. The more complete absorption, the lack of interaction with food together with diminished risk of superinfections seems to make pivampicillin preferable to ampicillin when a p.o. broad-spectrum, acid-stable penicillin is clinically indicated.

6688 ANION TRANSPORT IN BRUSH BORDER MEMBRANES ISOLATED FROM RAT SMALL INTESTINE.

(Eng.) Liedtke, C. M.; Hopfer, U. (Sch. Medicine, Case Western Reserve Univ., Cleveland, OH 44106). *Biochem. Biophys. Res. Commun.* 76(2):579-585; 1977.

The rates of anion transport in brush border membranes from the rat small intestine were measured *in vitro*. The addition of 15 µl of 1 M sodium salt solutions to 285 µl of a suspension of brush border membrane vesicles (6-7 mg protein/ml) caused a rapid release of protons, followed by a gradual re-uptake of protons and a corresponding anion translocation. Anion transport rates were calculated from changes in medium pH during reequilibration. To distinguish between molecular coupling and anion and proton transport by separate conductance pathways, the vesicles were preincubated with the proton carrier, carbonyl cyanide *p*-trifluoromethoxyphenylhydrazone (CF_3-CCP, 3.4 nmol/mg protein). The relative rate constants of the uptake of acetate, chloride, nitrate, thiocyanate, and cyclamate in the absence of CF_3-CCP were 29.9, 9.8, 4.8, 3.9, and 0.08, resp. In the presence of CF_3-CCP, the rates of uptake of thiocyanate and nitrate were increased to 13.0 and 9.5, resp., which suggests that anions and protons are transported by separate conductance pathways. Since 49% of nitrate and 70% of thiocyanate transport occurred via a specific conductance pathway, the rate of thiocyanate transport in the absence of CF_3-CCP was considered the upper limit for endogenous proton conductance. The membrane appeared to be impermeable to cyclamate, since its slow uptake rate was not increased by CF_3-CCP. The rates of chloride and acetate transport without CF_3-CCP exceeded the limits for endogenous proton conductance, suggesting that 60% of chloride and 87% of acetate transport occurred via electroneutral transport systems with cations.

6689 TRANSMURAL IONIC FLUXES AND ELECTRICAL POTENTIAL DIFFERENCE IN THE HUMAN JEJUNUM DURING PERFUSION WITH A DIHYDROXY BILE ACID.

(Eng.) Oddsson, E.; Rask-Madsen, J.; Krag, E. (Herlev Hosp., Univ. Copenhagen, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(4):453-456; 1977.

Perfusion studies of the proximal jejunum were carried out in nine healthy subjects to define the influence of 2.5 mM glycochenodeoxycholic acid (GCDC) on the net movements of water and electrolytes, the bidirectional fluxes of ions, and the transmural electrical potential difference (PD). GCDC caused a significant ($p<0.01$) decrease in fluid absorption, the control net flux being +0.77 ± 0.13 ml/min, and the net flux after GCDC addition being -0.01 ± 0.16 ml/min. GCDC significantly decreased absorption or induced secretion of sodium, potassium, and chloride ($p<0.01$), but not bicarbonate; the levels before the addition of GCDC were +124 ± 20, +3.6 ± 0.6, and +31 ± 13 µmol/min, resp., and +5 ± 25, -0.3 ± 1.1, and -40 ± 16 µmol/min, resp., after the addition. In the control period sodium was absorbed against a small electrical gradient, while the chemical gradient was zero. The potential difference was 3 ± 1 mV, lumen negative, and was not influenced by GCDC. GCDC lowered the observed flux ratios (unidirectional flux from mucosa to serosa/unidirectional flux from serosa to mucosa) of sodium, potassium, and chloride. The results are consistent with a previously proposed model of the effect of GCDC, that is, inhibition of an active sodium pump at the basolateral membrane and a coupled, active sodium chloride influx process at the mucosal border.

6690 ACTIVITY OF CHLORIDE IN ABSORPTIVE CELLS OF Amphiuma SMALL INTESTINE.

(Eng.) White, J. F. (Dept. Physiology, Emory Univ., Atlanta, GA 30322). *Am. J. Physiol.* 232(6):E553-E559; 1977.

Double-barreled chloride-selective microelectrodes constructed by a new method were used to determine intracellular chloride activity (a^{i}_{Cl}) in the absorptive cells of isolated, stripped proximal and distal segments of *Amphiuma* small intestine. Chloride was passively distributed across the mucosal membrane in fall and winter animals and a^{i}_{Cl} is about 20 mM. In contrast, summer animals actively accumulated chloride in both proximal and distal segments. Parallel measurements of intracellular chloride concentration (C^{i}_{Cl}) revealed a very low apparent chloride activity coefficient (a^{i}_{Cl}/C^{i}_{Cl}), indicating that all of the chloride is not free in the cytoplasm. The chloride activity in the bath immediately adjacent to the mucosa was higher than in the bulk solution.

6691 ABSORPTION OF 'FORTIFICATION' IRON. BIOAVAILABILITY IN MAN OF DIFFERENT SAMPLES OF REDUCED Fe, AND PREDICTION OF THE EFFECTS OF Fe FORTIFICATION.

(Eng.) Bjorn-Rasmussen, E.; Hallberg, L.; Rossander, L. (Dept. Medicine II, Sahlgrenska Sjukhuset, S-413 45 Goteborg, Sweden). *Br. J. Nutr.* 37(3):375-388; 1977.

Absorption and bioavailability of "fortification" iron were studied to determine how well individuals on the borderline of Fe deficiency would absorb Fe from Fe-fortified meals and to define which physicochemical parameters predict the bioavailability of various forms of reduced Fe compounds. Dissolution rates of Fe compounds in HCl (pH 1), particle size in glycerol suspensions, and reactive surface area were measured. Two groups of 19 and 18 healthy volunteers (groups B and C) were fasted overnight and served two unfortified meals containing 2.4 mg intrinsic nonheme Fe(A) and two meals fortified with 4.0 or 11.3 mg ferrous sulfate (B and C, resp.) in the orders ABBA, BAAB, ACCA, and CAAC. ^{55}FeCl$_3$ (4 μCi) and ^{59}Fe (2 μCi) were added to the unfortified and fortified meals, resp. Retention of Fe at 2 weeks was measured in blood samples and by whole-body counting; the values were then compared to the retention 2 weeks later of ^{59}Fe from reference doses of ferrous ascorbate (3 mg Fe, 30 mg ascorbic acid). In addition, the absorption of four variants of a hydrogen-reduced, ^{55}Fe-labeled (3 μCi) Fe sample was studied by serving wheat rolls containing 0.5 mg of Fe compound and the extrinsic tracer ^{59}FeCl$_3$ (1 μCi) to four groups of healthy volunteers (2 rolls/subject). The dissolution rate and the reactive surface area of the various reduced Fe compounds were closely related, but the mean particle size was not always related to solubility. The ratios of Fe absorbed from fortified:unfortified meals increased from 0.26:0.13 mg to 0.87:0.17 mg for the meals fortified with 4.0 and 11.3 mg Fe, resp. The definite correlation between the amounts of Fe absorbed from the reference dose and the meal suggests that the effectiveness of Fe fortification in a population could be predicted by the knowledge of the population's Fe status. The amount of hydrogen-reduced Fe compound absorbed:amount of intrinsic Fe absorbed ranged from 0.13% to 0.90% and was directly related to the increasing dissolution rates. Dissolution rate and reactive surface are concluded to be better indicators of bioavailability than particle size.

6692 AN ANIMAL MODEL TO STUDY IRON AVAILABILITY FROM HUMAN DIETS.

(Eng.) Narasinga Rao, B. S.; Siva Prasad, J.; Vijaya Sarathy, C. (Indian Council Medical Res., Hyderabad-500 007, India). *Br. J. Nutr.* 37(3):451-456; 1977.

Iron retention from inorganic and organic sources was measured in guinea pigs, monkeys, and humans to determine whether guinea pigs or monkeys might provide a valid model for studying Fe absorption from human diets. Thirteen guinea pigs received, by stomach tube, 1 ml of a ferrous sulfate (^{55}FeSO$_4$) or a ferric chloride (^{59}FeCl$_3$) solution containing 0.5 mg Fe/m on 2 consecutive days. ^{55}FeSO$_4$ and ^{59}FeCl$_3$ were similarly administered to 12 monkeys in amounts that provided 1 mg Fe/kg body weight. Twelve days later, ^{59}Fe retention was measured by whole-body counting and by determining serum ^{59}Fe and ^{55}Fe activities. Rice- and wheat-based test meals containing tracer doses of ^{59}FeCl$_3$ (5 μCi, 10 μg Fe/μCi) were given to 29 humans and 12 monkeys. Fe retention was measured 12 days later by whole-body counting. The retention of ^{59}Fe from ferrous ascorbate at 3 mg Fe and 30 mg ascorbic acid was also determined after one of the diets was tested. The mean values of Fe retention (percentage administered dose expressed as the ratio ferric Fe: ferrous Fe were 7.0:8.6 in guinea pigs and 3.8:13.8 in monkeys. The ratio observed in monkeys was similar to that observed previously in humans. Monkeys absorbed less ^{59}Fe from ferrous ascorbate (12.2% administered dose) than humans (32.0%). ^{59}Fe retention from the rice- and wheat-based meals was lower in monkeys (1.9% and 0.98% administered dose, resp.) than in humans (6.1% and 1.50%, resp.). However, the absorption of Fe from food has been shown to be related to its absorption from inorganic sources. The retention ratios of food Fe:inorganic Fe (ferrous ascorbate) were similar in monkeys and humans (0.17% and 0.21%, resp., for the rice-based meal; 0.10% and 0.07%, resp., for the wheat-based meal). These results suggest that Fe retention values obtained with monkeys on human diets can be applied to humans after correcting for the differences in absolute amounts absorbed.

6693 EFFECT OF INTESTINAL MICROFLORA AND DIET ON SODIUM TAUROCHOLATE ABSORPTION IN THE RAT.

(Fre.) Riottot, M.; Sacquet, E.; Leprince, C.; Mejean, C. (Laboratoire des Animaux sans Germes du C.N.R.S., I.N.R.A., 78350 Jouy-en-Josas, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):621-624; 1977.

The gastrointestinal transit and ileal absorption rates of sodium taurocholate (NaTC) were measured in axenic and holoxenic rats fed either a commercial diet or a semisynthetic, semipurified diet consisting of 220 g casein, 580 g corn starch, 90 g corn oil, 50 g cellulose, and 45 g mineral salts. The gastrointestinal transit rate was lower (mechanical factor) and ileal absorption rate was higher in axenic rats than in rats with normal intestinal microflora. In both groups of rats, the quantity of intestinal NaTC was higher in rats fed the commercial diet than in those fed the semisynthetic diet of known composition. There was no significant difference in ileal absorption rate between axenic and holoxenic rats when both were fed the commercial diet. When lactose (10 parts/100 by weight) was added to the food or drinking water of holoxenic rats fed the semisynthetic diet, the ileal absorption of NaTC was increased along with the quantity of bile salts in the small intestine.

6694 INFLUENCE OF INTESTINAL MOTILITY ON WATER AND GLUCOSE ABSORPTION IN THE ANESTHETIZED RAT.

(Fre.) Legoux, M.; Lemaire, M. C.; Thouvenot, J. (Laboratoire de Physiologie, Faculte de Medecine, Universite de Tours, 2 bis bd Tonnelle, 37032 Tours Cedex, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):603-606; 1977.

The effect of intestinal motility on water and glucose absorption was studied in 31 anesthetized male rats. A tyrode solution containing glucose

(3 g/l) was infused into the stomach and duodenum of the rats by two methods: (1) the solution was pumped into stomach at a rate of 0.8 ml/min by a peristaltic pump or (2) the solution was kept in a reservoir under constant pressure (7 cm water), so that it entered the stomach at a spontaneous rate connected with intestinal motility. The amount of absorbed glucose relative to the total quantity introduced into the lumen was greater for the pumped infusion (0.30 ± 0.04% glucose; 0.12 ± 0.04% water) than for the spontaneous rate infusion (0.49 ± 0.10% glucose; 0.50 ± 0.08% water. It is concluded that mechanical conditions optimize intestinal absorption.

6695 FAT RESORPTION: CURRENT CONCEPTS AND MICROMORPHOLOGY. (Ger.) Gangl, A.; Pavelka, M.; Stockinger, L.; Grabner, G. (Ordinariat fur medizinische Computerwissenschaften und fur Gastroenterology, Universitat Wien, Garnisongasse 13, A-1090 Vienna, Austria). *Z. Gastroenterol.* 14(6):626-637; 1976.

6696 STUDIES ON UTILIZATION OF IRON FROM ENRICHED BREAD. PART II: RESULTS OF INVESTIGATIONS ON DIETARY ANEMIA IN LABORATORY RATS. (Pol.) Czarnowska-Misztal, E.; Rutkowska, U.; Rakowska, M.; Szkilladziowa, W. (Instytutu Zywnosci i Zywienia, Warsaw, Poland). *Rocz. Panstw. Zakl. Hig.* 28(1):15-23; 1977.

See also, 6710, 6803, 6948, 6982, 6987, 6989, 6993, 7262, 7283.

MOTILITY

6697 ELECTRICAL STUDY OF MYOTOMY OF THE SMALL INTESTINE. (Fre.) Champault, G.; Legout, J.; Pourriat, J. L.; Patel, J. C.; Leger, L. (35, rue Ampere, 94400 Vitry-sur-Seine, France). *J. Chir. (Paris)* 113(3):311-318; 1977.

The effect of myotomy on the electrical activity of the rabbit small intestine was investigated. Control rabbits were subjected to an enterotomy of the same dimensions as the myotomy (equal or double the intestinal caliber). Electrodes were attached above and below the oblique incisions in rabbits premedicated with i.m ketamine and diazepam; electrodes were also implanted in three nonoperated rabbits. After 24-48 hr of decreased electrical activity, the amplitude of the electrical recordings above the functional obstruction increased, indicating increased peristalsis. These changes were observed in five of six rabbits during the first week. Recordings made up to 21 days after myotomy showed a gradual decrease in electrical activity, perhaps as a result of the technical conditions of the study. In animals subjected to enterotomy, electrical activity above and below the incision was identical after 24-48 hr of decreased activity, and it was similar to that observed in the nonoperated rabbits.

6698 AN INHIBITORY INNERVATION AT THE GASTRODUODENAL JUNCTION IN ANESTHETIZED DOGS. (Eng.) Mir, S. S.; Mason, G. R.; Ormsbee, H. S., III. (Univ. Maryland, Sch. Medicine, Baltimore, MD 21201). *Gastroenterology* 73(2):432-434; 1977.

The possible existence of an inhibitory innervation at the gastroduodenal junction (GDJ) was investigated *in vivo* in dogs. Motility induced by vagal stimulation was monitored with strain gauge force transducers on the gastric antrum, pylorus, and duodenum. The experiments were carried out in two phases: the control phase following vagotomy (TV), and the treated phase where atropine sulfate (1 mg/kg) was injected i.v. (TV + A). After TV, antral, pyloric, and duodenal contractile activity was significantly increased ($p < 0.01$) during the period of vagal stimulation. After TV + A, spontaneous activity in the antrum and duodenum was abolished and vagal stimulation did not increase motility in these organs. Spontaneous pyloric activity present after atropine administration was inhibited by stimulation, and a concomitant relaxation of the pylorus was also demonstrated. Following the termination of the stimulus, a significant increase in contractions was noted on the pylorus. These experiments demonstrate the existence of an atropine-resistant inhibitory innervation at the GDJ in the anesthetized dog.

6699 INHIBITION OF THE INTERDIGESTIVE MYOELECTRIC COMPLEX (IDMEC) IN DOGS BY COMMERCIAL FOOD, PROTEINS, CARBOHYDRATES, FAT AND MCT [Abstract]. (Eng.) Hellemans, J.; Vantrappen, G.; Eeckhout, C.; De Wever, I. (Dept. Medical Res., Univ. Leuven, Leuven, Belgium). *Gastroenterology* 72(5, Part 2):1160; 1977.

6700 INTRACELLULAR STUDY OF ELECTRICAL ACTIVITY OF NEURONS IN GUINEA-PIG MYENTERIC PLEXUS [Abstract]. (Eng.) Wood, J. D.; Mayer, C. J. (Physiological Inst., Univ. Munich, Munich, W. Germany). *Gastroenterology* 72(5, Part 2):1152; 1977.

6701 ESOPHAGEAL MANOMETRY IN OPOSSUM [Abstract]. (Eng.) Schulze, K.; Dodds, W. J.; Christensen, J.; Wood, J. (Dept. Internal Medicine, Univ.

Iowa, Iowa City, IA). *Gastroenterology* 72(5, Part 2):1128; 1977.

6702 A NEW TRANSDUCER SYSTEM FOR INTRALUMINAL ESOPHAGEAL MANOMETRY [Abstract]. (Eng.) Weihrauch, T. R.; Foerster, C. F. (Dept. Medicine, Univ. Mainz, Mainz, W. Germany). *Gastroenterology* 72(5, Part 2):1147; 1977.

6703 IN VIVO MEASUREMENT OF ESOPHAGEAL TRANSMURAL POTENTIAL DIFFERENCE [Abstract]. (Eng.) Turner, K. S.; Powell, D. W.; Orlando, R. C.; Bozymski, E. M. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC). *Gastroenterology* 72(5, Part 2):1143; 1977.

6704 THE TEMPERATURE-DEPENDENCE OF RESPONSES OF ESOPHAGEAL SMOOTH MUSCLE TO ELECTRICAL FIELD STIMULATION [Abstract]. (Eng.) Christensen, J.; de Carle, D. J.; Szabo, A. C. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Fed. Proc.* 36(3): 462; 1977.

6705 METABOLIC FACTORS WHICH INFLUENCE ESOPHAGEAL SMOOTH MUSCLE [Abstract]. (Eng.) Weisbrodt, N. W.; Lee, S. J. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1148; 1977.

6706 THE MYOGENIC AND NEURAL CONTROL SYSTEMS FOR ESOPHAGEAL MOTILITY [Abstract]. (Eng.) Sarna, S. K.; Daniel, E. E.; Waterfall, W. E. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1126; 1977.

6707 EVIDENCE FOR POSSIBLE 5-HYDROXYTRYPTAMINE (5-HT) PARTICIPATION OF THE VAGAL INHIBITORY PATHWAY TO THE LOWER ESOPHAGEAL SPHINCTER [Abstract]. (Eng.) Rattan, S.; Goyal, R. K. (Univ. Texas Health Science Center at Dallas, Dallas, TX). *Gastroenterology* 72(5, Part 2):1116; 1977.

6708 EFFECT OF ORAL BETHANECHOL ON PARAMETERS OF ESOPHAGEAL PERISTALSIS: AN ADDITIONAL RATIONALE FOR USE IN REFLUX PATIENTS [Abstract]. (Eng.) Humphries, T. J.; Castell, D. O. (Naval Regional Medical Center, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1074; 1977.

6709 HUMAN LOWER ESOPHAGEAL SPHINCTER (LES) RESPONSE TO SUBMAXIMAL AND MAXIMAL EFFECTIVE DOSES OF SYNTHETIC HUMAN BIG GASTRIN (G-34) AND GASTRIN I (G-17) [Abstract]. (Eng.) Jensen, D. M.; McCallum, R. W.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1075; 1977.

6710 INTERRELATIONSHIPS BETWEEN MOTOR ACTIVITY AND TRANSMUCOSAL TRANSPORT IN THE HUMAN SMALL INTESTINE IN VIVO [Abstract]. (Eng.) Turnberg, L. A.; Morris, A. I.; Pimblett, K. A.; Hall, L. (Hope Hosp., Salford M6 8HD, England). *Gastroenterology* 72(5, Part 2):1142; 1977.

6711 INFLUENCE OF SOMATOSTATIN ON THE MYOELECTRICAL ACTIVITY OF THE SMALL BOWEL [Abstract]. (Eng.) Thor, P. J.; Krol, R.; Konturek, S. J. (Medical Acad., Krakow, Poland). *Gastroenterology* 72(5, Part 2):1169; 1977.

See also, 6694, 6832, 6848, 6869, 6908, 6909, 6953, 7033.

SECRETION AND METABOLISM

6712 RELATIVE UTILIZATION OF AMINO ACIDS IN VARIOUS DIETS. A STUDY IN GROWING RATS. (Fre.) Mendes-Pereira, E.; Pion, R.; Prugnaud, J. (Laboratoire d'Etude du Metabolisme Azote, I.N.R.A., Theix, Saint Genes Champanelle, 63110 Beaumont, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4): 625-631; 1977.

To determine the effects of diet on the digestibility of amino acids (AA), weanling male Sprague-Dawley rats were fed a standard diet of 20% nitrogenous material for 6 days followed by one of several experimental diets for 7 days. The diets contained different proportions of wheat starch and carbohydrates, and they were balanced by the addition of synthetic AA. One casein diet had been heated to 90 C for 24 hr. The relative amounts of dietary, bacterial, and endogenous AA and nitrogen in the rat feces were computed. Except for the heated casein diet, the results indicated that the apparent decrease in the coefficient of utilization of nitrogen (CU-N) in the various diets was due generally to an increase in the excretion of bacterial and endogenous nitrogen. The highest CU-N was obtained in the casein-based diets (91.2), but it dropped to 82.8 when the diet was heated. The coefficient of utilization of total organic matter (CU-OM) in the diet was also measured. Diets with a high carbohydrate content had a high CU-OM and a low CU-N, which was attributed to the effect of the carbohydrates on bacterial protein synthesis (it increased with increase in microbial proteins excreted in feces).

6713 FECAL AMINO ACID COMPOSITION IN GERMFREE AND CONVENTIONAL RATS AND LAMBS. (Fre.)

Combe, E.; Pion, R. (Lab. d'Etude du Metabolisme Azote, I.N.R.A., Theix, Saint Genes Champanelle, 63110 Beaumont, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):633-636; 1977.

The dry matter, nitrogen, and amino acid (AA) composition of the feces of germfree (gf) and conventional (cv) lambs and rats was compared to determine the role of intestinal microflora in the digestion of nitrogenous matter of dietary or endogenous origin. The gf lambs were fed high-temperature-sterilized cow milk; the gf rats were fed a casein-based autoclaved diet that was hard to digest. Excretion of fecal dry matter and nitrogen was lower in the gf lambs than in the cv lambs, indicating greater milk utilization by the gf lambs; however, the reverse was true for gf and cv rats on the casein diet. To determine the reasons for this difference between the species, the AA composition of the milk, the casein diet, and the feces of the animals was analyzed. Sterilization apparently had little effect on the digestibility of the milk, and the utilization rate was high in both gf and cv lambs. This was demonstrated by the great difference in the AA composition of the milk and the feces. In contrast, excretion of fecal nitrogen from rats fed the hard-to-digest casein diet was increased in gf rats. The microflora might contribute to the digestion of dietary protein, thereby increasing nitrogen and AA digestibilities. Apparently, the effect of the microflora depends on the digestibility of the dietary nitrogen. The poor digestibility of the casein was demonstrated by the similar AA contents in the casein and the rat feces.

6714 ENDOCRINE AND METABOLIC RESPONSE IN THE HUMAN NEWBORN TO FIRST FEED OF BREAST MILK.

(Eng.) Aynsley-Green, A.; Bloom, S. R.; Williamson, D. H.; Turner, R. C. (John Radcliffe Hosp., Oxford OX3 9DU, England). *Arch. Dis. Child.* 52(4):291-295; 1977.

The hormonal and metabolic response to the first feed of breast milk was studied in 12 infants at 4-6 hr of age. After the feed, there was an increase in blood glucose concentration (fasting concentration 3.67 ± 0.22 mmol/l; mean increment at 55 min, 0.84 mmol/l) but no changes in the concentrations of lactate, pyruvate, alanine, or ketone bodies. The feed was followed by an increase in the concentrations of plasma insulin (6.8 ± 1.3 mU/l before, 15.3 ± 3.2 mU/l 55 min after feeding), growth hormone (17.7 ± 3.2 versus 27.8 ± 5.4 μg/l), gastrin (10.9 ± 1.3 versus 26.1 ± 1.9 pmol/l), and enteroglucagon (145.0 ± 30.0 versus 305.5 ± 64.8 pmol/l), but no change in levels of plasma glucagon or gastric inhibitory peptide. Several hormone systems are functionally active at birth and are stimulated by the first feed of milk.

6715 THYROID HORMONE CONTROL OF CYCLIC NUCLEOTIDE PHOSPHODIESTERASES AND THE REGULATION OF THE SENSITIVITY OF THE LIVER TO HORMONES. (Eng.)

Gumaa, K. A.; Hothersall, J. S.; Greenbaum, A. L.; McLean, P. (Dept. Biochemistry, Univ. Khartoum, Khartoum, Sudan). *FEBS Lett.* 80(1):45-48; 1977.

Thyroid hormone control of cyclic nucleotide phosphodiesterases and the regulation of the sensitivity of the liver to hormones was studied in male Wistar rats. Thyroidectomy significantly increased the activity of both low and high Km cyclic AMP phosphodiesterases (the former to an appreciably greater extent) of both the particle- and membrane-bound forms of the enzyme while having no effect on the two soluble forms. Thyroidectomy significantly increased the activity of the two cyclic GMP-phosphodiesterases of the soluble fraction while leaving the particle-bound forms unaffected. Thus, the contrasting intracellular sites for the regulation of cyclic AMP and cyclic GMP hydrolysis by thyroid hormone is apparent. The adenylate cyclase activity of the membrane fraction was increased by 40% following thyroidectomy, but no alteration was observed in the activity of the total particulate fraction. The changes in cyclic AMP- and cyclic GMP-phosphodiesterases in the livers of thyroidectomized rats parallel those previously found in adipose tissue in this condition. The similarity between these results on different tissues may point to a unifying hypothesis for the action of thyroid hormone on two major insulin- and glucagon-responsive tissues, liver and adipose tissue.

6716 EFFECTS OF GK-101 (NMG) AND SODIUM HYPOCHLORITE ON SALIVARY AMYLASE ACTIVITY.

(Eng.) Habib, C. M.; Kronman, J. H.; Goldman, M.; Cushner, S. (Tufts Univ. Sch. Dental Medicine, 136 Harrison Ave., Boston, MA 02111). *J. Dent. Res.* 56(6):665-669; 1977.

The effects of the sodium salt of *N*-monochloroglycine (NMG) and sodium hypochlorite on the activity of salivary amylase were studied in human saliva. Concentrations of each agent were varied to determine the concentration at which the threshold and total inhibition of enzyme would be obtained. NMG at concentrations of 0.10% (weight/volume) did not affect amylase activity, whereas sodium hypochlorite at concentrations of 0.05% totally inhibited salivary amylase activity. The results suggest that the use of sodium hypochlorite in the oral cavity should be limited; NMG, however, seems to be innocuous at concentrations 20 times those of sodium hypochlorite.

6717 THE INFLUENCE OF FIXATION ON THE CARBOHYDRATE CYTOCHEMISTRY OF RAT SALIVARY GLAND SECRETORY GRANULES. (Eng.)

Simson, J. A. V. (Medical Univ. South Carolina, Charleston, SC 29401). *Histochem. J.* 9(5):645-657; 1977.

The optimum fixation conditions for staining of carbohydrate-containing constituents of rat salivary gland secretory granules were investigated. In the parotid and submandibular salivary glands of the rat, the reactivity of secretory granules at both the light and electron microscopic level, with routine stains and with cytochemical reagents, was highly dependent upon the nature of the fixative employed. At the light microscopic level, secretory granules in rat parotid gland were PAS-positive if fixed with buffered formalin fixatives. However, if the gland was fixed with lipid-solvent-containing fixatives or with formalin at a very acid pH (as in Bouin's fixative), the PAS reactivity of the granules was lost. In the submandibular gland of rats, the acinar cells and granular tubules behaved similarly after such fixation in terms of their PAS reactivity, particularly in males; acinar cells of the female submandibular gland stained only lightly with PAS. At the fine structural level, the morphology of secretory granule constituents depended on the buffer used (cacodylate, phosphate, or collidine) and whether tissue was postosmicated. Postosmication considerably reduced the reaction of secretory granule components with stains for carbohydrates. The data indicate that the carbohydrate-containing components of both parotid and submandibular gland secretory granules are not typical long-chain neutral or acidic mucins, but are rather glycolipids or lipophilic glycoproteins that are solubilized by lipid solvents or at acidic pH and are lost or destroyed in the presence of strong oxidants.

6718 THE APPLICATION OF TOPO-OPTICAL REACTIONS IN INVESTIGATION OF DIFFERENTIATION PROCESSES OF SALIVARY GLAND CELLS OF WHITE RATS [Abstract]. (Eng.) Hajac, T.; Modis, L. (Medical Acad., Wroclaw, Poland). *Folia Histochem. Cytochem. (Krakow)* 15(2):149; 1977.

6719 THE GOLGI ZONE IN SALIVARY GLAND SECRETORY CELLS UNDER THE INFLUENCE OF ACTH AND CORTISONE [Abstract]. (Eng.) Kostulak, A.; Koslowska, K. (Medical Acad., Gdansk, Poland). *Folia Histochem. Cytochem. (Krakow)* 15(2):153; 1977.

6720 LIPID COMPOSITION OF SALIVARY GLANDS OF RATS FED ESSENTIAL FATTY ACID DEFICIENT DIETS [Abstract]. (Eng.) Alam, S. Q.; Alam, B. S. (Louisiana State Univ. Sch. Dentistry, New Orleans, LA). *J. Dent. Res.* 56(B):113; 1977.

6721 INHIBITION OF IN VITRO PROTEIN SYNTHESIS DURING THE ACUTE DEGENERATIVE HEPATITIS PRODUCED BY FV_3 IN MICE [Abstract]. (Eng.) Elharrar, M.; Kirn, A. (INSERM U-74, Universite Louis Pasteur, Strasbourg, France). *Digestion* 15(3):231-232; 1977.

See also, 6679, 6699, 6738, 6819, 6837.

SECRETION AND METABOLISM

Stomach

6722 RELATIONSHIP BETWEEN GASTRIC ACID SECRETION, HISTOPATHOLOGY, AND CELL PROLIFERATION KINETICS IN HUMAN GASTRIC MUCOSA. (Eng.) Hansen, O. H.; Johansen, A.; Larsen, J. K.; Pedersen, T.; Svendsen, L. B. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Gastroenterology* 73(3):453-456; 1977.

Cell proliferation of gastric antral and fundic mucosa was studied in 44 patients with different gastric diseases. After *in vitro* incubation of endoscopic biopsy specimens with ^{3}H-thymidine, radioautographs were prepared by the dipping technique. The labeling indices were estimated, and the specimens were classified according to the degree of gastritis. The peak acid output after "maximal" stimulation with histamine (40 μg/kg, s.c.) was also determined. A highly significant inverse correlation between peak acid output and the labeling indices in both antral and fundic mucosa was demonstrated. The correlation between the degree of gastritis and the labeling indices in antral and fundic mucosa was also statistically significant. The results indicate that a significant inverse relationship exists between the acid secretory capacity of the gastric mucosa and the rate of cell proliferation of both antral and fundic mucosa. The data suggest that an increasing degree of gastritis in human gastric mucosa is followed by an increased rate of epithelial cell proliferation.

6723 RAT GASTRIC MUCOSAL cAMP AND cGMP AFTER ADRENERGIC STIMULATION AND BLOCKADE. (Eng.) Ruoff, H. J. (Dept. Pharmacology, Univ. Tubingen, Wilhelmstrasse 56, D-74 Tubingen, W. Germany). *Eur. J. Pharmacol.* 44(4):349-354; 1977.

The effect of adrenergic stimulation and blockade on the concentration of cyclic AMP (cAMP) and cGMP was studied in the rat gastric mucosa. Epinephrine (0.5-2.0 mg/kg) elevated the gastric mucosal cAMP and cGMP levels up to 100% in a dose-dependent manner. Blockade of the β-adrenoceptors with propranolol (4 mg/kg) suppressed the effect of epinephrine on the cAMP level and increased the effect on the cGMP concentration up to 500%. The opposite effect was found under α-adrenoceptor blockade. Phenoxybenzamine (4 mg/kg) prevented the effect of epinephrine on the cGMP level and increased the effect on the cAMP concentration up to 300%. Predominant stimulation of the β-adrenoceptors by isoproterenol, or of the α-adrenoceptors by phenylephrine, caused smaller changes in the cyclic nucleotide concentration than did epinephrine. Their effect was more pronounced when the nonstimulated receptor was blocked. The data indicate that the rat gastric mucosa contains α- and β-adrenoceptors. The effect of epinephrine on the gastric mucosal cAMP level is mediated by β-adrenoceptors, and that on the cGMP level is mediated by α-adrenoceptors.

6724 A GASTROSCOPIC AND HISTOLOGICAL DOUBLE-BLIND STUDY OF THE EFFECTS OF DICLOFENAC SODIUM AND NAPROXEN ON THE HUMAN GASTRIC MUCOSA.

(Eng.) Lehtola, J.; Sipponen, P. (Univ. Central Hosp. Oulu, Oulu, Finland). *Scand. J. Rheumatol.* 6(2):97-102; 1977.

The effects of diclofenac sodium and naproxen on the gastric mucosa were studied in a double-blind trial by gastroscopy, gastrophotography, and histological examination of the mucosa in six healthy volunteers. Detectable lesions were evident in the mucosa of four subjects after the administration of diclofenac sodium (25 mg x 3, daily, 8 days) and after naproxen (250 mg x 2, daily, 8 days). The lesions were more extensive after the ingestion of naproxen than after diclofenac sodium in all of these cases. The most serious lesions verified by both gastroscopy and histology always occurred after exposure to naproxen. The histology of the gastric mucosa of two subjects with severe lesions showed spotty to moderate chronic superficial gastritis, whereas the overall histological appearance of the mucosa was normal in subjects with slight or moderate lesions after drug administration. The maximal acid output was positively correlated with the severity of the lesions. Subjective symptoms occurred in one person during diclofenac sodium and in three during naproxen administration.

6725 CHARACTERIZATION OF TWO MAJOR NEUTRAL GLYCEROGLUCOLIPIDS OF THE HUMAN GASTRIC CONTENT.

(Eng.) Slomiany, B. L.; Slomiany, A.; Glass, G. B. J. (New York Medical Coll., New York, NY 10029). *Biochemistry* 16(18):3954-3958; 1977.

The isolation of two major glyceroglucolipids (A and B) from a lipid extract of human gastric contents is described. The procedure involved column fractionation on DEAE-Sephadex, silicic acid, and thin-layer chromatography. Both glycolipids contained glucose, glyceryl ethers, and fatty acids. The structures of these glycolipids were identified by mild alkaline methanolysis, oxidation with periodate and chromium trioxide, and permethylation studies. It is proposed that glycolipid A is a monoalkylmonoacylglyceryl hexaglucoside and glycolipid B is a monoalkylmonoacylglyceryl octaglucoside. The diglyceride portion of these glycolipids consists mostly of 1-*O*-alkyl-2-*O*-acylglycerol.

6726 EFFECT OF LYSOLECITHIN ON GASTRIC MUCOSAL STRUCTURE AND POTENTIAL DIFFERENCE.

(Eng.) Orchard, R.; Reynolds, K.; Fox, B.; Andrews, R.; Parkins, R. A.; Johnson, A. G. (Charing Cross Hosp., London, England). *Gut* 18(6):457-461; 1977.

The effect of lysolecithin (100 mg%) on the guinea pig gastric mucosa was studied by instilling a solution for 30 min, preceded and followed by 0.1 N HCl into a total of 10 gastric pouches. Ten controls were instilled with HCl throughout. Lysolecithin produced a significant change in transmucosal potential difference (+8.5 mV, 23.3%), macroscopic erosions, and mucosal damage on histology and electron scanning microscopy. Eight of 10 stomachs showed multiple erosions, including acute hemorrhagic ulcers, after lysolecithin administration. There was focal and diffuse desquamation of the superficial mucosa with marked edema and loss of normal architecture after this treatment. None of these changes was seen in the control animals. The results suggest that the reflux of lysolecithin from the duodenum is an important factor in causing active gastritis and gastric erosions.

6727 SYNTHESIS AND GASTRIC ANTISECRETORY PROPERTIES OF 15-DEOXY-16-HYDROXYPROSTAGLANDIN E ANALOGUES.

(Eng.) Collins, P. W.; Dajani, E. Z.; Driskill, D. R.; Bruhn, M. S.; Jung, C. J.; Pappo, R. (Searle Lab., Chicago, IL 60680). *J. Med. Chem.* 20(9):1152-1159; 1977.

The preparation and gastric antisecretory activity of a series of 15-deoxy-16-hydroxyprostaglandin analogues are described. The compounds were tested i.v. in histamine-stimulated Heidenhain pouch dogs in relation to the reference standard prostaglandin E_1 (PGE_1) and PGE_1 methyl ester (PGE_1ME). The parent compound of this series, (±)-15-deoxy-16α,β-hydroxyprostaglandin E_1 methyl ester (3), was found to be equipotent to the reference standard PGE_1ME. Methylation at C-16 of 3 produced 8, which was found to be 40 times more potent than PGE_1. In contrast, the addition of two methyl groups to 3 at C_{15} or C_{17} markedly reduced the antisecretory action. The 16-ethyl analogue of 3 also showed reduced potency. Removal or epimerization of the C-11 hydroxy group of 8 reduced the activity. Hydrogenation or changing the stereochemistry of the 13,14 double bond from *trans* to *cis* decreased the activity. On the other hand, ω-homologation of 8 or the introduction of a *cis*-5,6 double bond did not affect the potency. It appears that 8, 16, and 17 possess optimum gastric antisecretory effects in this series.

6728 SEROTONIN DISTRIBUTION IN THE CANINE GASTRIC MUCOSA: ACUTE RESPONSE TO FEEDING AND POUCH PREPARATION. (Eng.) Hohenleitner, F. J.; Linguiti, C. M. (Temple Univ. Health Sciences Center, 3223 N. Broad St., Philadelphia, PA 19140). *Digestion* 15(6):506-516; 1977.

The gastric mucosa of anesthetized dogs was examined for serotonin (5-HT) in all major stomach regions. In dogs examined immediately after anesthesia induction, the proximal corpus or antrum had substantially more 5-HT than the pyloric canal, with concentrations for the dorsal and ventral proximal corpus, the antrum, and the canal being 2.58 ± 1.85, 1.96 ± 1.03, 1.87 ± 1.15, and 0.44 ± 0.39 µg/g, resp. Histological studies of two fasted and two fed dogs (one meal-fed and the other corn oil-fed) revealed a general pattern of declining enterochromaffin cell populations from the proximal corpus to the pyloric canal. When antral distention or digestive activity (corn oil feeding) was induced in different groups of dogs, only the latter produced a demonstrable, albeit transient, change in 5-HT. A 90% increase in 5-HT at 5 hr after oil feeding was observed in the ventral corpus; however, there was no change in 5-HT content in the corpus at 1, 3, or 7 hr after corn oil feeding. The 90% increase in 5-HT at 5 hr after oil feeding does not represent a substantial increase when compared to its potential for change, i.e., the 243% increase observed in gastric pouch dogs. In dogs prepared with gastric fistulas, a uniform distribution of 5-HT was found throughout the stomach after 0.4 ml/hr of neutral gastric juice was secreted for 4 hr.

6729 THE ACTION OF SEROTONIN ON BASAL GASTRIC SECRETION IN THE CONSCIOUS RAT AFTER INTRAVENTRICULAR AND INTRAPERITONEAL ADMINISTRATION. (Eng.) Bugajski, J.; Hano, J.; Danek, L.; Wantuch, C. (Inst. Pharmacology, Polish Acad. Sciences, Cracow, Poland). *Arch. Int. Pharmacodyn. Ther.* 225(1): 29-38; 1977.

The effects of serotonin (5-HT) and atropine, administered either i.p. or into the lateral cerebral ventricle (i.c.), upon gastric secretion in unanesthetized rats were studied to investigate the mechanism of 5-HT-induced inhibition of gastric secretion. The drug was administered after an 18-hr fast to 360 Wistar rats with chronic fistulas. Acid and pepsin outputs were determined hourly for 4 hr. Basal gastric secretion decreased dose-dependently in response to 5-HT (0.01-10 mg/kg, i.p.); a 10 mg/kg dose of 5-HT inhibited acid secretion up to 82% for 4 hr ($p<0.001$), and all but the smallest dose significantly decreased pepsin output. 5-HT (5-500 µg/rat) injected i.c. decreased acid output as much as 81% during the first hour, and some degree of inhibition (10-67%) persisted for 2-4 hr; the 1.0-µg/rat dose decreased pepsin output by 44.5%. Atropine administered i.p. (0.00001-0.5 mg/kg) also produced a dose-dependent decrease in gastric secretion and pepsin output, but had a more potent effect, requiring only 0.5 mg/kg to almost completely inhibit acid secretion for 3 hr, and 0.1 mg/kg decreased pepsin output by 37%. Atropine given i.c. at 100 µg/rat inhibited acid secretion 86% and caused a significant decrease in pepsin output. Reduction of secretory volume was the main cause of reduced acid secretion and pepsin output with both 5-HT and atropine. Acid concentration was decreased by large doses of the drugs, probably as a result of the depression of parietal cells of the gastric mucosa; pepsin concentration was not decreased by the drug concentrations employed in these studies. Atropine produced identical antisecretory effects when given by the two routes, whereas 5-HT had a stronger and faster action after i.c. than after i.p. administration. The latter difference is probably due to the blood-brain barrier preventing 5-HT from reaching the brain via the i.p. route. At large doses, however, 5-HT would cross this barrier, suggesting that its antisecretory action is partly central--via inhibition of ventromedial and hypothalamic structures.

6730 MECHANISM OF STRESS ULCER: INFLUENCE OF SODIUM TAUROCHOLATE ON GASTRIC MUCOSAL ENERGY METABOLISM DURING HEMORRHAGIC SHOCK AND ON MITOCHONDRIAL RESPIRATION AND ATPase IN GASTRIC MUCOSA. (Eng.) Menguy, R.; Masters, Y. F. (Univ. Rochester Sch. Medicine, 224 Alexander St., Rochester, NY 14607). *Am. J. Dig. Dis.* 21(12):1001-1007; 1976.

The effect of sodium taurocholate, which is known to aggravate stress ulceration, on gastric mucosal oxidative phosphorylation, ATPase activity, and energy metabolism during hemorrhagic shock in rabbits was studied to elucidate the relation between stress ulceration complicating hemorrhagic shock and shock-induced mucosal ischemia and energy loss. Oxidative phosphorylation and respiration were measured with and without taurocholate (125-1,000 µM) in a mitochondrial suspension derived from the corpus mucosa. At concentrations greater than 250 µM, taurocholate uncoupled oxidative phosphorylation in the suspension as judged by the increased basal rate of respiration (substrate but no ADP), the decreased ADP:O ratio, and the decreased respiratory control ratio. Gastric mucosal Mg^{2+}-dependent ATPase activity in the superficial and deep layers of the corpus mucosa was studied in cell homogenates from each layer in the presence of taurocholate (0-8.0 mM) with and without NaCl (100 mM) and KCl (30 mM); consistent differences between the two layers were found. Energy metabolism in the gastric mucosa during hemorrhagic shock was studied in rabbits fasted for 16 hr and then pylorus-ligated. Fifty milliliters of a solution containing H^+ (80 mEq/1), Na^+ (50 mEq/1), K^+ (10 mEq/1), and Cl^- (140 mEq/1) were instilled into the stomach with and without 30 mM taurocholate. Hemorrhagic shock was induced 20 min later by lowering the blood pressure to 30 mm Hg. After 15 min of shock, the stomachs were harvested by a "stop-freeze" method and the levels of ATP, ADP, AMP, and glycolytic intermediates were measured. ATPase activity in the superficial mucosal layer was enhanced by Na^+ plus K^+ but not affected by taurocholate alone; it was significantly reduced ($p<0.01$) in the presence of Na^+ plus K^+ and 8.0 mM taurocholate. In the deep layer, Na^+ plus K^+ slightly inhibited the ATPase activity; taurocholate (2.0-8.0 mM) significantly inhibited ATPase activity both with and without Na^+ plus K^+. *In vivo* treatment of the mucosa with taurocholate prior to hemorrhagic shock enhanced shock-induced dephosphorylation of nucleotides in the corpus and fundus mucosa and decreased the shock-induced acceleration of the glycolytic flux. It is concluded that the uncoupling of oxidative phosphorylation by taurocholate caused the enhanced breakdown of mucosal high-energy phosphate during shock. The results indicate that hemorrhagic shock-induced ischemia and reduced mucosal energy levels may produce gastric stress ulceration.

6731 OBSERVATIONS ON THE BEHAVIOUR OF BARIUM SULPHATE SUSPENSIONS IN GASTRIC SECRETION. (Eng.) Roberts, G. M.; Roberts, E. E.; Davies, R. L.; Evans, K. T. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff, Wales). *Br. J. Radiol.* 50(595):468-472; 1977.

6732 EFFECTS OF THE GASTRIC JUICE INHIBITORY SUBSTANCE FROM Streptomyces bottropensis ON GASTRIC SECRETION AND EXPERIMENTAL ULCERATIONS IN RATS. (Eng.) Mimura, T.; Muto, N.; Tanaka, J.; Oshita, H.; Onishi, N.; Aonuma, S. (Faculty Pharmaceutical Sciences, Osaka Univ., 133-1, Yamadakami, Suita-shi, Osaka, Japan). *Chem. Pharm. Bull.* 25(5):897-903; 1977.

6733 CYANOACRYLATE GLUE (FLUCRYLATE) FAILS TO STOP BLEEDING FROM EXPERIMENTAL GASTRIC ULCERS [Abstract]. (Eng.) Protell, R. L.; Silverstein, F. E.; Gulacsik, C.; Martin, T. R.; Dennis, M. B. (Dept. Medicine, Univ. Washington, Seattle, WA). *Gastroenterology* 72(5, Part 2):1114; 1977.

6734 THE ENDOSCOPIC CONTROL OF GI BLOOD LOSS WITH A TISSUE ADHESIVE (MBR 4197) [Abstract]. (Eng.) Martin, T. R.; Silvis, S. E. (Veterans Admin. Hosp., Minneapolis, MN 55417). *Gastroenterology* 72(5, Part 2):1098; 1977.

6735 HISTAMINE-SENSITIVE ADENYLATE CYCLASE IN FUNDIC GASTRIC MUCOSA [Letter to Editor]. (Eng.) Simon, B.; Kather, H. (Medizinische Universitatsklinik, Bergheimerstrasse 58, 69 Heidelberg, W. Germany). *Am. J. Dig. Dis.* 22(8):746-747; 1977.

6736 HISTAMINE AND ACUTE HAEMORRHAGIC LESIONS IN RAT GASTRIC MUCOSA: PREVENTION OF STRESS ULCER FORMATION BY (+)-CATECHIN, AN INHIBITOR OF SPECIFIC HISTIDINE DECARBOXYLASE IN VITRO. (Eng.) Reimann, H. J.; Lorenz, W.; Fischer, M.; Frolich, R.; Meyer, H. J.; Schmal, A. (Div. Experimental Surgery, Univ. Marburg, Marburg/Lahn, W. Germany). *Agents Actions* 7(1):69-73; 1977.

6737 THE EFFECT OF ANTI-HISTAMINES AND ANTI-CHOLINERGICS ON STIMULATED ACID SECRETION IN THE RAT STOMACH [Abstract]. (Eng.) Hill, D.; Pollard, E.; Cowen, A.; Burnett, W. (Dept. Surgery, Univ. Queensland, Queensland, Australia). *Aust. N.Z. J. Surg.* 47(1):113; 1977.

6738 LACK OF CORRELATION BETWEEN OXYNTIC CELL CYCLIC AMP AND ACID SECRETION IN FROG GASTRIC MUCOSA [Abstract]. (Eng.) Chew, C. S.; Hersey, S. J. (Emory Univ., Atlanta, GA 30322). *Fed. Proc.* 36(3):456; 1977.

6739 ANTISECRETORY ACTIONS OF AMINOPHYLLINE IN THE RAT AND DOG [Abstract]. (Eng.) Jacoby, H. I.; Bonfilio, A. C.; Gray, S.; Thomas, C. (McNeil Lab., Fort Washington, PA 19034). *Fed. Proc.* 36(3):1020; 1977.

6740 GASTRIC SECRETORY RESPONSE TO INTRAVENOUS AMINO ACIDS IN EVISCERATED DOGS [Abstract]. (Eng.) Landor, J. H.; Elpidio, M. (Rutgers Medical Sch., Piscataway, NJ 08854). *Eur. Surg. Res.* 9 (Suppl. 1):140; 1977.

6741 IMMUNOCHEMICAL CHARACTERIZATION AND CELLULAR LOCALIZATION OF CANINE AND FELINE PEPSINOGENS [Abstract]. (Eng.) Liebman, W. M.; Samloff, I. M. (Dept. Pediatrics, Univ. California, Torrance, CA). *Gastroenterology* 72(5, Part 2):1089; 1977.

6742 MUCOSAL SURFACE MORPHOLOGY AND HISTOLOGICAL CHANGES IN THE DUODENUM OF THE RAT FOLLOWING ADMINISTRATION OF CYSTEAMINE. (Eng.) Poulsen, S. S.; Szabo, S. (Anatomy Dept. B, Univ. Copenhagen, 63, Norre Alle, DK-2100 Copenhagen O, Denmark. *Br. J. Exp. Pathol.* 58(1):1-8; 1977.

6743 GASTRIC SECRETORY RESPONSE TO GRADED DOSIS [sic] OF PENTAGASTRIN IN GASTRIC FISTULA DOGS FOLLOWING THREE TYPES OF VAGOTOMY [Abstract]. (Eng.) Ornsholt, J.; Jorgenson, H. S.; Amdrup, E. (Surgical Gastroenterological Dpt. L. Univ. Aarhus, Kommunehospitalet, 8000 Aarhus C. Denmark). *Eur. Surg. Res.* 9(Suppl. 1):149; 1977.

See also, 6685, 6714, 6829, 6834, 6835, 6843, 6844, 6884, 6885, 6896, 6915, 6925, 6935, 7178.

6744 THE CHARACTERISTICS OF AMYLASE ACTIVITY AND THE ISOAMYLASE PATTERN IN SERUM AND URINE OF INFANTS AND CHILDREN. (Eng.) Otsuki, M.; Yuu, H.; Saeki, S.; Baba, S. (Kobe Univ. Sch. Medicine, Kusunoki-cho 7 chome, Ikuta-ku, Kobe, 650, Japan). *Eur. J. Pediatr.* 125(3):175-180; 1977.

Amylase activity and isoamylase patterns were determined in the serum and urine of 320 normal newborns, infants, and children. In the serum of newborns, measurable amounts of amylase were present. The activity increased with age and reached the normal adult level by approximately 8 months of age. Isoamylase analysis revealed that the low level of serum amylase in infants was mainly due to a deficiency in the pancreatic-type isoamylase. The absence of the pancreatic isoamylase in newborns and young infants is a physiological and developmental phenomenon. Great caution is therefore necessary when amylase isoenzymes are used in the diagnosis of abnormal pancreatic function, and such results must always be interpreted in relation to the age of the child.

6745 EFFECTS OF 16,16 DIMETHYL PROSTAGLANDIN E_2 ON FOOD-STIMULATED PANCREATIC SECRETION AND OUTPUT OF BILE IN MAN. (Eng.) Ekelund, K.; Johansson, C.; Nylander, B. (Karolinska Sjukhuset, S-10401 Stockholm 60, Sweden). *Scand. J. Gastroenterol.* 12(4):457-460; 1977.

The effect of 16,16 dimethyl prostaglandin E_2 (PGE_2) on food-stimulated pancreatic and biliary response was studied in seven healthy subjects, using a multiple indicator dilution technique. Despite significantly enhanced gastric emptying rate after the intragastric administration of 140 μg of the methyl analogue (0-20 min, $p<0.02$), the pancreatic and biliary responses were significantly decreased; the initial output rate of bilirubin was significantly lower after the administration of prostaglandin than in control experiments (0-20 min, $p<0.02$; 20-40 min, $p<0.05$), and the initial lipase output was significantly decreased after prostaglandin administration (0-20 min, $p<0.05$). The influence of 16,16 dimethyl PGE_2-induced inhibition of pancreatic and biliary output on normal digestion and absorption should be further investigated if this hormone is to be introduced as a drug in peptic ulcer treatment.

6746 EFFECT OF SECRETIN ON PLASMA MOTILIN IN MAN. (Eng.) Mitznegg, P.; Bloom, S. R.; Domschke, W.; Haecki, W. H.; Domschke, S.; Belohlavek, D.; *et al.* (Dept. Pharmacology, Univ. Erlangen-Nurnberg, D-8520 Erlangen, Universitatsstrasse 22, W. Germany). *Gut* 18(6):468-471; 1977.

The effect of secretin on motilin release was studied in six healthy men. Graded doses of 0.1, 0.3, 0.9, and 2.7 clinical U/kg/hr of pure synthetic secretin were infused over 60-min periods. Duodenal bicarbonate output and pH were recorded, and plasma secretin and motilin levels were measured by radioimmunoassay. During the infusions plasma motilin fell in a dose dependent manner to a nadir of 35%. This fall was linearly correlated with pancreatic bicarbonate output, whereas a nonlinear correlation was observed between plasma motilin and both plasma secretin level and duodenal pH. It is suggested that plasma motilin levels are decreased by secretin-induced pancreatic bicarbonate juice flow. This may be important for the control of motilin secretion initiated by duodenal acidification and the concomitant delay in gastric emptying.

6747 ACINAR CELL RESPONSIVENESS TO URECHOLINE IN THE RAT PANCREAS DURING FETAL AND EARLY POSTNATAL GROWTH. (Eng.) Larose, L.; Morisset, J. (Gastrointestinal Res. Unit, Sherbrooke Univ., Sherbrooke, Quebec, Canada). *Gastroenterology* 73(3): 530-533; 1977.

Studies were carried out to determine when, during fetal or postnatal life, rat pancreatic acinar cells acquire their capacity to respond to cholinergic drugs. The release of amylase, lipase, and chymotrypsin from Sprague-Dawley rat pancreas in response to urecholine was measured *in vitro*. Fetal and newborn pancreas did not respond to 10^{-5} M urecholine; 3- to 15-day-old pancreas demonstrated an increasing response to this dose. Peak sensitivity when compared to adult pancreas was present between days 15 and 21. These results indicate that the exocrine pancreas acquires a responsiveness to urecholine on the third day of postnatal life and becomes more sensitive to stimulation from the 15th day onward.

6748 THE SECRETORY FUNCTION OF THE PANCREAS AND THE AGEING PROCESS. (Ger.) Korkuschko, O. W.; Tereschtschenko, W. P. (Institut fur Gerontologie, Akademie der Medizinischen Wissenschaften, 252 114 Kiew-114, Wul. Wyschgorodskaja 67, USSR). *Z. Alternsforsch.* 31(2):133-150; 1976.

6749 CHANGES IN THE PANCREAS IN MULTIPLE ACTION OF TRANSVERSE RADIAL ACCELERATIONS. (Rus.) Shenkman, N. S.; Klimenko, E. D. (Inst. General Pathology and Pathological Physiology, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 83(3):374-377; 1977.

6750 STUDIES OF THE EXOCRINE FUNCTION OF HUMAN PANCREAS. (Pol.) Bernacki, E.; Zalewski, J.; Rublewska, M.; Podkowicz, K. (Z Kliniki Chirurgii Gastroenterologicznej Instytutu Chirurgii AM, ul. Sienkiewicza 2 m. 20, 15-092 Bialystok, Poland). *Pol. Przegl. Chir.* 48(11):1351-1357; 1976.

6751 ROLE OF DUODENAL HUMORAL MECHANISMS FOR THE CORRECTION OF PANCREATIC ENZYME SECRETION. (Ukr.) Korot'ko, G. F.; Rozin, D. G. (Andizhan Medical Inst., Andizhan, USSR). *Fiziol. Zh.* 22(4):542-545; 1976.

6752 CHANGES IN PANCREATIC SECRETION AND LESIONS INDUCED BY LONG-TERM CORTICOTHERAPY IN THE RAT. (Fre.) Bourry, J.; Sarles, H. (U-31 INSERM, 46, chemin de la Gaye, F 13009 Marseille, France). *Gastroenterol. Clin. Biol.* 1(3):308-309; 1977.

6753 PHARMACOLOGICAL EFFECT OF PIPROZOLIN ON THE DOG EXOCRINE PANCREAS. (Ger.) Tauschel, H. D.; Herrmann, M. (Forschungsinstitut der Godecke AG, Biologische Forschung und Entwicklung, Mooswaldallee, 7800 Freiburg/Brsg., W. Germany). *Arzneim. Forsch.* 27(2b):489-493; 1977.

6754 COMPARATIVE STUDY OF PANCREATIC SECRETION BY PANCREATIC DUCT CATHETERIZATION AND BY DUODENAL CATHETERIZATION UNDER SECRETIN AND CERULEIN STIMULATION. (Fre.) Escourrous, J.; Louis, A.; Frexinos, J.; Cherkaoui, M.; Ribet, A. (CHU de Purpan, France). *Gastroenterol. Clin. Biol.* 1(4):404-405; 1977.

See also, 6822, 6929.

SECRETION AND METABOLISM

Hepatobiliary Tract

6755 MEASUREMENT OF LIVER BLOOD FLOW IN THE RAT USING AN ^{85}KRYPTON CLEARANCE TECHNIQUE. (Eng.) Rice, G. C.; Ryan, C. J.; Leiberman, D. P.; Mathie, R. T.; McGhee, E.; Harper, A. M.; *et al.* (Natalspruit Hosp., Transvaal, South Africa). *Br. J. Exp. Pathol.* 58(3):236-242; 1977.

A method for measuring liver blood flow (LBF) in rats was developed. The method involves recording the clearance of ^{85}Kr from the liver after the injection of a solution of the gas into the portal vein. This technique provides a measure of tissue perfusion at a cellular level. The animal preparation was maintained in a stable hemodynamic and respiratory state for up to 4.3 hr by careful fluid and anesthetic control. Stability of the model was reflected by relative constancy of the LBF measured throughout the experiment in all of the animals studied. The mean LBF determined in six rats was 2.41 ± 0.50 mg/g/min.

6756 THE EFFECT OF VASOPRESSIN ON HEPATIC ARTERIAL BLOOD FLOW. (Eng.) Simmons, J. T.; Baum, S.; Sheehan, B. A.; Ring, E. J.; Athanasoulis, C. A.; Waltman, A. C.; *et al.* (Massachusetts General Hosp., Boston, MA). *Radiology* 124(3):637-640; 1977.

The safety of directly infusing vasopressin into the hepatic artery was demonstrated by correlating changes in hepatic arterial blood flow with measurements of vasopressin blood levels in the canine hepatic vein, portal vein, and a systemic vein during the infusion of vasopressin into the hepatic artery, superior mesenteric artery, and into a systemic peripheral vein. The infusion of vasopressin (0.06 U/min) into the hepatic artery induced an average reduction in hepatic arterial flow of 75%. The flow increased rapidly after approximately 5 min, and it continued to rise, peaking at 45 ± 5.8% above base-line at 40 min. Superior mesenteric artery blood flow showed a prompt decline when the hepatic artery infusion was begun, stabilizing after approximately 15 min at 50% below the base line. The superior mesenteric artery blood flow increased as the infusion was terminated. When vasopressin was infused systematically and into the superior mesenteric artery, hepatic arterial flow showed a uniphasic rise. Infusion into the superior mesenteric artery resulted in the greatest rise in hepatic arterial flow (96.5%). The reduction in superior mesenteric artery blood flow was approximately the same with hepatic artery and systemic infusions, and 25% greater with direct superior mesenteric artery infusion. An inverse relationship was seen consistently between superior mesenteric and hepatic arterial blood flow. Superior mesenteric infusion produced a reduction in mesenteric blood flow of 70% and a rise in hepatic arterial blood flow of 96.5%. The results indicate that hepatic blood flow in the normal canine liver increases and is not compromised by a direct infusion of vasopressin into the hepatic artery.

6757 EFFECT OF STIMULATION OF HEPATIC NERVES ON HEPATIC O_2 UPTAKE AND BLOOD FLOW. (Eng.) Lautt, W. W. (Coll. Medicine, Univ. Saskatchewan, Saskatoon, Saskatchewan, S7N OWO, Canada). *Am. J. Physiol.* 232(6):H652-H656; 1977.

The effect of direct stimulation of the hepatic nerve trunk on oxygen uptake and hepatic hemodynamics was examined in cats. Acute denervation of the liver did not result in changes of oxygen uptake or hemodynamics in the intact liver. Stimulation of the hepatic nerves resulted in a marked reduction of vascular conductance of the hepatic artery and portal vein (intrahepatic) resulting in almost complete cessation of arterial flow and increased portal blood pressure. The hepatic artery showed a more complete escape from the neurogenic vasoconstriction than did the portal vein. During the stable "escape phase," oxygen delivery was 86% of control, but hepatic extraction of oxygen increased so that oxygen uptake was not altered from control values. The return of oxygen consumption to normal during nerve stimulation suggests that redistribution of hepatic blood flow did not occur. In spite of arterial and portal venous blood pressure changes and changes in gut conductance, oxygen extraction of the gut did not change.

6758 DIRECT MEASUREMENT OF ACTIVE TRANSPORT SYSTEMS FOR ALANINE IN FRESHLY ISOLATED RAT LIVER CELLS. (Eng.) Edmondson, J. W.; Lumeng, L.; Li, T. K. (Indiana Univ. Sch. Medicine, Indianapolis, IN 46202). *Biochem. Biophys. Res. Commun.* 76(3):751-757; 1977.

Alanine aminotransferase inhibitors, which block the metabolic utilization of alanine, were used in a method for the direct measurement of alanine transport in liver cells. Freshly isolated rat hepatocytes treated with 2 mM DL-cycloserine or 2 mM aminooxyacetate actively accumulated alanine in the medium by three neutral amino acid transport systems analogous to the Na-dependent alanine-preferring (A) and alanine-serine-cysteine (ASC) systems and the Na-independent leucine (L) system of Ehrlich ascites tumor cells. In a medium containing 1 mM alanine and 142 mM Na, cycloserine-treated hepatocytes accumulated alanine to a concentration six times that of the medium. Dinitrophenol (0.75 mM) inhibited this process totally. In Na-free medium containing 142 mM choline, intracellular alanine was only 1.5 times that of the medium. Thus, most of the active transport of alanine is Na-dependent. The contribution of the L system to alanine uptake was assessed by examining the effect of leucine on Na-independent alanine accumulation, and the contribution of the ASC system to hepatic alanine uptake was measured with the use of *N*-methyl-L-alanine, an amino acid solely transported by the A system. With 1 mM alanine in the medium, the contributions to total hepatic alanine accumulation of the A, ASC, and L systems were 60%, 20%, and 5%, resp. Passive influx accounted for the remainder of the hepatic alanine accumulation.

6759 ULTRASTRUCTURAL IMMUNOENZYMATIC STUDY OF α-FETOPROTEIN-PRODUCING CELLS IN THE HUMAN FETAL LIVER. (Eng.) Peyrol, S.; Grimaud, J. A.; Pirson, Y.; Chayvialle, J. A.; Touillon, C.; Lambert, R. (Centre de Microscopie Electronique et de Pathologie Ultrastructurale, Institut Pasteur de Lyon, 77, rue Pasteur, 69007 Lyon, France). *J. Histochem. Cytochem.* 25(6):432-438; 1977.

The ultrastructural characteristics of alpha fetoprotein (AFP)-producing cells were studied using an immunoenzymatic method. The cells in human fetal livers were stained using horseradish peroxidase. Ultrastructurally, three types of cells were identified: hepatocytes, biliary epithelial cells, and mesenchymatous cells. At low magnification, the AFP was seen in the cytoplasm of a small number of hepatocytes. These cells (type I hepatocytes) showed well-developed ergastoplasmic areas composed of numerous cisternae of rough endoplasmic reticulum arranged in parallel arrays. At higher magnification, the electron-dense AFP appeared to be localized on the membranes and on the ribosomes of this ergastoplasm. Glycogen was abundant in type I cells. Non-AFP-containing type II hepatocytes had poorly developed ergastoplasm. There was less glycogen in type II than in type I hepatocytes; the Golgi bodies were well developed, and numerous siderosomes and free ferritin particles were seen. The observations suggest that specific metabolic properties other than the presence or absence of AFP distinguish type I from type II hepatocytes.

6760 THE TRANSPORT OF BRANCHED-CHAIN AMINO ACIDS INTO ISOLATED RAT LIVER CELLS. (Eng.) McGivan, J. D.; Bradford, N. M.; Mendes-Mourao, J. (Dept. Biochemistry, Univ. Bristol, Bristol BS8 1TD, England). *FEBS Lett.* 80(2):380-384; 1977.

The uptake of L-leucine, L-isoleucine, and L-valine was studied in isolated rat liver cells. The strong temperature dependence of leucine uptake was showed by an arrhenius plot; at 0.5 mM leucine, the nonsaturable component accounted for less than 15% of the rate of uptake at 37 C. The plot showed a discontinuity at 18 C. The apparent activation energy in the range 4-18 C was 80.7 kJ/mol, while in the range 18-37 C the apparent activation energy was 32.6 kJ/mol. Leucine uptake was inhibited by the other two-branched chain amino acids and by methionine (each at 5 mM). The strong temperature dependence and the fact that leucine is inhibited by the other branched chain amino acids and by methionine indicates that at low concentrations, the kinetics of leucine uptake are mediated primarily by a specific transporting system in the inulin-impermeable cell plasma membrane. The uptake of isoleucine and of valine showed similar characteristics to that of leucine, and the apparent Km and Vmax values for the transport of all three amino acids were similar; the Km values for leucine, isoleucine, and valine were 5.5 ± 0.6 mM, 3.7 ± 0.8 mM, and 4.7 ± 0.8 mM, resp., and the Vmax values were 15.1 ± 2.3, 13.6 ± 3.2, and 13.5 ± 1.0 nmol/min/mg, resp. The data on the inhibition of the transport of these compounds were consistent with the postulate that leucine, isoleucine, and valine are transported with comparable facility on a common carrier system that is noncompetitively inhibited by methionine.

6761 UTILISATION OF AMINO ACIDS BY THE PERFUSED RAT LIVER. (Eng.) Hems, D. A.; Davies, M. G.; Thomas, A. J.; Whitton, P. D. (St. George's Hosp. Medical Sch., Cranmer Terrace, London SW 17 ORE, England). *Nutr. Metab.* 20(6):404-414; 1976.

Amino acid metabolism was studied in perfused Sprague-Dawley rat liver using a perfusate containing glucose; a mixture of glycerol, lactate, and pyruvate; and amino acids. Livers from fed rats utilized amino acids, especially when their initial concentration was higher than normal, despite the availability of carbohydrate in the perfusate and livers. Arginine, lysine, tyrosine, methionine, cystine, glycine, aspartic acid, histidine, and phenylalanine were rapidly removed by the liver; branched-chain amino acids were not released from the liver of fed rats. In perfusions of livers from starved or diabetic rats, amino acid uptake rates were generally faster than for fed rats. When perfusions were performed in which no amino acids were added to the medium, most of the amino acids normally occurring in blood appeared in the perfusion medium in the case of livers from normally fed animals; branched-chain amino acids appeared in the perfusate, indicating that lysis of endogenous protein was a major source of amino acids released into the perfusate. Livers from starved or diabetic rats released no significant quantities of amino acids, except branched-chain acids, which attained concentrations similar to those for fed rats. Thus, hepatic proteolysis in the absence of perfusate amino acids was not greatly increased by starvation or diabetes. Measurements of urea concentration in perfusate plasma revealed that in perfusions with four times the normal amino acid concentrations, the urea plasma concentration was 3.7 ± 0.5 mM for fed rats, compared with plasma urea concentrations of 6.1 ± 0.5 and 5.5 ± 0.6 for diabetic and starved rats, resp. From measurements of amino acids and urea in the perfusate, a balance of amino-nitrogen was calculated and showed that urea production exceeded amino acid uptake except in perfusions of livers of fed or starved rats where an excess of amino acids was present (four times normal levels, total initial amino-nitrogen concentration of about 16 mM). Thus, in the presence of an amino acid excess and an excess of available carbohydrate, livers from fed and starved rats maintained their protein content.

6762 INCREASED BILE ACID SYNTHESIS AFTER INTERRUPTION OF THE ENTEROHEPATIC CIRCULATION: EVIDENCE AGAINST HORMONAL MEDIATION. (Eng.) Hoffman, N. E.; Donald, D. E.; Hofmann, A. F. (Mayo Foundation, Rochester, MN 55901). *Proc. Soc. Exp. Biol. Med.* 154(1):49-52; 1977.

To determine whether a hormone is responsible for the striking increase in bile acid synthesis occurring after interruption of the enterohepatic circulation by ileal resection, experiments were carried out using an *in situ* perfused canine liver. Large dogs with ileal resections or sham operations were used as pump dogs to perfuse the livers from small dogs with sham surgery or ileal resection. Bile acid synthesis during 7 hr of observation was similar in livers in which sham-operated dogs and dogs with ileal resection were used for pumping. Since most known hormones act rapidly on the isolated perfused liver, the results suggest that a hormonal substance is not responsible for the increase in bile acid synthesis observed when the enterohepatic circulation is interrupted by removal of the ileum.

6763 REGULATION OF INTESTINAL UDP GLUCURONOSYLTRANSFERASE ACTIVITY BY FATTY ACIDS IN THE RAT. (Eng.) Hietanen, E.; Laitinen, M. (Dept. Physiology, Univ. Kuopio, PO Box 138, SF-70101 Kuopio 10, Finland). *Enzyme* 22(5):316-321; 1977.

The effect of individual fatty acids (elaidic and linoleic acids) on uridine diphosphate (UDP) glucuronosyltransferase (GT) activity was studied in the duodenal mucosa of adult male Wistar rats fed a standard diet, a fat-free diet, or a fat-free diet supplemented by 5% cholesterol. Elaidic and linoleic acids were administered i.p. at doses of 40 or 200 mg/kg every other day for 4 weeks. Mucosal UDP-GT activity was significantly increased by the fat-free diet (0.92 ± 0.06 nmol/min/mg protein, $2p<0.01$) and the fat-free, cholesterol-supplemented diet (1.01 ± 0.21 nmol/min/mg protein, $2p<0.05$) compared with the standard diet (0.55 ± 0.10 nmol/min/mg protein). Similar increases were noted when the diets were compared on a mucosal wet weight basis. At either dose level, elaidic or linoleic acid did not significantly alter the UDP-GT activity of rats fed the standard diet, but the administration of these unsaturated fatty acids to rats on the other two diets resulted in a lowering of mucosal UDP-GT activity to levels equal to or below those observed for rats fed the standard diet. It is suggested that essential fatty acids may control mucosal UDP-GT activity by regulating the microenvironment of the enzyme, since the protein content of a mucosal postmitochondrial supernatant remained constant during the experiment.

6764 BINDING OF BILIRUBIN AND LONG-CHAIN FATTY ACIDS TO HUMAN SERUM ALBUMIN WITH GENERAL REMARKS ON DISPLACEMENT OF FIRMLY BOUND LIGANDS. (Eng.) Brodersen, R.; Funding, L. (Inst. Medical Biochemistry, Univ. Arhus, Arhus, Denmark). *Scand. J. Clin. Lab. Invest.* 37(3):257-266; 1977.

Human albumin binding sites were evaluated to determine the effect of long chain fatty acids on primary and secondary affinities of bilirubin and to determine the parameters for the secondary binding of bilirubin to albumin. Free bilirubin concentration was quantitated by measuring its rate of oxidation with hydrogen peroxide and peroxidase monitored spectrophotometrically at 455 nm. Bilirubin/albumin complexes were studied by the shift in absorption at 470 and 430 nm at 25 C when bilirubin was bound to albumin. Studies with 0.5 mol bilirubin/mol albumin showed that oleate equal to 4 mol/mol albumin did not affect bilirubin binding to the high-affinity (first) site, while palmitate produced equivocal results. Marked spectrophotometric shift was noted with 2-3 mol bilirubin/mol albumin with saturation of secondary sites at approximately 4-5 mol. Most of the bilirubin was bound to the high-affinity site at a molar ratio of 0.5; when the ratio exceeded 1.0, the spectral change indicated binding to secondary sites. An equation was derived using the results obtained with human serum albumin containing natural fatty acids, with the defatted protein, and with 1 mol palmitate or oleate/mol albumin; it showed that secondary binding of 2 mol of bilirubin/mol albumin occurred with or without fatty acid addition. Spectrophotometric determinations of the secondary binding constants were carried out at 25 C, using the peroxidase method, relative measurements were made at 25 C and 37 C. The secondary binding of bilirubin to human serum albumin under physiological conditions may be described by two sites with an average binding constant of 5×10^{-5} l/mol. Free bilirubin concentration was calculated by an empirical equation that included the effects of various binding sites and that led to the suggestion that bilirubin may be displaced from the high-affinity site in icteric neonates, resulting in considerable increases in free bilirubin.

6765 IN VITRO EFFECT OF ASCORBIC ACID ON THE METABOLISM OF ADENINE NUCLEOSIDES AND NUCLEOTIDES IN THE LIVER OF RATS. (Eng.) Srivastava, U.; Theoret, G. (Departement de nutrition, Universite de Montreal, Montreal, Quebec, Canada). *Nutr. Rep. Int.* 16(1):81-88; 1977.

The *in vitro* effect of various concentrations of ascorbic acid on the metabolism of adenine nucleotides and nucleosides was studied in rat liver. A preincubation in the presence of ^{3}H-8-adenine allowed the labeling of a certain fraction of the cellular reserve of ATP. In the subsequent incubation, this radioactive nucleotide was hydrolyzed in part to give radioactive cyclic AMP (cAMP), 5'-AMP, and adenosine. Incorporation of radioactive adenine into ATP-ADP reached a maximum at two ascorbic acid concentrations (5 μg and 15-20 μg/ml incubation mixture). The accumulation of radioactive cAMP increased when the concentration of ascorbic acid was increased from 5 μg to 40 μg/ml. The accumulation of radioactive 5'-AMP increased considerably at 1-2.5 μg and at 20 μg ascorbic acid/ml. The accumulation of radioactive adenosine reached the maximum level at two concentrations of ascorbic acid (5 μg and 40 μg/ml). These results suggest that ascorbic acid stimulates the production of cAMP either by the enhanced protection in the formation of epinephrine, which potentiates adenyl cyclase to activate the formation of cAMP, or by direct competition for the active sites on cAMP phosphodiesterase. The data support the hypothesis that large quantities of vitamin C could be of value in the treatment of cancer, the common cold, hyperglycemia, and depressed mental state through the intervention of cAMP.

6766 METABOLISM OF 3α,7α,12α-TRIHYDROXY-5β-CHOLESTAN-26-OIC ACID IN NORMAL SUBJECTS WITH AN INTACT ENTEROHEPATIC CIRCULATION. (Eng.) Hanson, R. F.; Williams, G. C. (Dept. Internal Medicine, Univ. Minnesota, Minneapolis, MN 55455). *J. Lipid Res.* 18(5):656-659; 1977.

The formation of cholic acid from 3α,7α,12α-trihydroxy-5β-cholestan-26-oic acid (THCA) was studied in two normal subjects. [^{3}H]THCA and [^{14}C]cholic acid (6 μCi each) were administered i.v. by simultaneous injection, and the specific activities (percent injected amount/μmol) of [^{3}H]- and [^{14}C]cholic acid were measured in bile samples collected over a 5-day period. If the administered [^{3}H]THCA is rapidly and completely metabolized into cholic acid, the areas under the specific activity curves of [^{3}H]- and [^{14}C]cholic acid should be identical. In these two subjects, the area under the [^{3}H]cholic acid specific activity decay curves was only 18.4% and 9.0% less than the area under the [^{14}C]cholic acid specific activity decay curves. Thus, there is rapid and nearly complete metabolism of i.v. administered [^{3}H]THCA into cholic acid.

6767 EVIDENCE FOR THE LACK OF RESPONSE OF TYROSINE AMINOTRANSFERASE TO DIBUTYRYL CYCLIC AMP IN REGENERATING RAT LIVER. (Eng.) Hoshino, J.; Skiello, G.; Kuhne, U.; Kroger, H. (Robert Koch-Institut des Bundesgesundheitsamtes, Abt. Biochemie, Nordufer 20, 1000 Berlin 65, Germany). *FEBS Lett.* 79(2):409-412; 1977.

The response of tyrosine aminotransferase (TAT) to dibutyryl cyclic AMP (DBcAMP) was investigated in regenerating Wistar rat liver. The i.p. injection of DBcAMP (3 mg/100 g) 4 hr after 70% hepatectomy in nonadrenalized rats enhanced TAT activity 200% over the saline-treated control level. In contrast, DBcAMP elevated the TAT level only 60% in the adrenalectomized rats. After partial hepatectomy, TAT in the liver of adrenalectomized rats became entirely insensitive to the DBcAMP induction, although the basal enzyme level remained low. Administration of a noninducing dose of cortisone acetate (0.2 mg/100 g) together with DBcAMP markedly restored the response of TAT to the nucleotide inducer in the regenerating liver of adrenalectomized rats. TAT was readily induced by DBcAMP in nonregenerating liver slices from adrenalectomized rats. In contrast, TAT could not be induced at all by DBcAMP in slices from regenerating liver of adrenalectomized rats 18 hr after partial hepatectomy. The addition of a noninducing concentration of dexamethasone (1 nM) to the medium together with DBcAMP restored the response of the enzyme over the level of nonregenerating liver slices in a range of low DBcAMP concentrations. Since glucocorticoids do not affect the mitotic activity of the regenerating liver, the results suggest that the loss of the glucocorticoid-independent response of TAT to DBcAMP is characteristic of the proliferating cells or cells ready to proliferate.

6768 INHIBITION BY SOMATOSTATIN OF ADENOSINE-3', 5'-MONOPHOSPHATE STIMULATED HEPATIC RIBOSOMAL PROTEIN SYNTHESIS. (Eng.) Tragl, K. H.; Kinast, H.; Machanek, M. (I. Medizinische Universitats-Klinik, Lazarettgasse 14, A-1090 Wien, Austria). *Klin. Wochenschr.* 55(14):707-709; 1977.

The mechanism by which somatostatin inhibits ribosomal protein synthesis was studied in rat hepatocytes. Protein synthesis was unchanged when the liver cells were incubated with somatostatin (5 x 10^{-7} M) alone. However, cyclic AMP-stimulated ribosomal protein synthesis, polyU-directed polyphenylalanine synthesis, and polyribosome aggregation was prevented if somatostatin (1 x 10^{-7} M) was added to the incubation medium together with cyclic AMP. The results indicate that somatostatin inhibits the secretion of various pituitary and intestinal hormones by inhibiting AMP accumulation.

6769 ISOLATED RAT HEPATOCYTES AND 9000 g RAT LIVER SUPERNATANT AS METABOLIC SYSTEMS FOR THE STUDY OF THE PHARMACOKINETICS OF BARBITURATES. (Eng.) Yih, T. D.; van Rossum, J. M. (Dept. Pharmacology, Univ. Nijmegen, Netherlands). *Xenobiotica* 7(9):573-582; 1977.

Hepatocytes from overnight-fasted rats were isolated using collagenase, and a 9,000 x *g* supernatant of rat liver was used to study the pharmacokinetics and metabolism of barbiturates for comparison with published results based on isolated rat liver perfusion. Hepatocytes were incubated in 10 ml erythrocyte-Hanks Eagle solution (1:1, vol/vol), 15 ml hepatocyte suspension, and 5 ml barbiturate solution (10 mg/100 ml suspension buffer) at an oxygen tension of 60-80 mm Hg. Livers were homogenized and centrifuged (20 min) at 9,000 x *g* with incubation of the supernatant in 5 ml barbiturate solution plus 15 ml tris 0.05 M buffer, pH 7.4, containing an NADPH regenerating system. Barbiturates were analyzed using a gas chromatograph (GLC) with a nitrogen detector and metabolites were identified by GLC-mass spectrometry. Hepatocytes metabolized 5-ethyl-5-alkyl barbiturates at rates proportional to the length of the alkyl component, increasing up to the heptyl substituent. Only a few of the allyl and bromoallyl series barbiturates were metabolized. Barbiturates containing cyclic components were not significantly metabolized, while their *N*-methylated homologues were. Most of the 15 barbiturates investigated behaved similarly with respect to half-life and clearance rate when hepatocyte results were compared to liver perfusion investigations, except for methylheptabarbital. Barbiturate metabolism followed first order kinetics in the 9,000 x *g* supernatant assay system. Noctal, Talbutal, brallobarbital, methylbrallobarbital, and 5-ethyl-5-butyl barbituric acid were not appreciably metabolized. The data indicate that, for the majority of compounds tested, there are considerable differences in results between the 9,000 x *g* incubations on the one hand and the hepatocyte and liver perfusion incubations on the other. Samples from hepatocyte incubations could be resolved into hydroxy- and keto-metabolites, which was not possible with the 9,000 x *g* supernatant studies. The advantages of the hepatocyte suspension and liver homogenate preparation are compared. The isolated hepatocyte suspension appears to be an excellent system for the study of barbiturate metabolism.

6770 INHIBITION OF CARBON DIOXIDE FIXATION BY LEAD ACETATE IN RAT LIVER MITOCHONDRIA. (Eng.) Amatruda, J. M.; Staton, A. J.; Kiesow, L. A. (Naval Medical Res. Inst., Bethesda, MD 20014). *Biochem. J.* 166(1):75-79; 1977.

Studies were carried out in male Sprague-Dawley rats to determine the mechanism by which i.v. administered lead salts inhibit hepatic gluconeogenesis. Within 1 hr after the i.v. administration of lead acetate (10 mg), there was a 97% inhibition of CO_2 fixation in isolated rat liver mitochondria. This effect was concentration-dependent. The induction of phosphoenolpyruvate carboxykinase activity observed with starvation was also inhibited by i.v. administered lead acetate, but the activities of pyruvate kinase, glucose 6-phosphate dehydrogenase, and pyruvate carboxylase were unaffected, as was the oxidation of palmitate- and palmitoyl-coenzyme A by mitochondria from Pb^{2+}-treated animals. The addition of reduced glutathione to mitochondria from Pb^{2+}-treated animals had no effect on the inhibited CO_2 fixation. ATP concentrations in mitochondria from Pb^{2+}-treated animals were decreased, and the dose-response relationships for the effect of Pb^{2+} on CO_2 fixation and ATP concentrations corresponded. It is concluded that the decrease in mitochondrial ATP in Pb^{2+}-treated animals is probably responsible for the marked inhibition of CO_2 fixation, and hence the impairment of gluconeogenesis from alanine, lactate, and pyruvate observed by others.

6771 LACK OF TOXICITY OF CHENODEOXYCHOLIC ACID IN THE SQUIRREL MONKEY. (Eng.) Suzuki, H.; Yoshida, T.; Miki, H.; Sado, T.; Hashimoto, K. (Yamanouchi Pharmaceutical Co., Ltd., 1-8, Azusawa-1-chome, Itabashi-ku, Tokyo, Japan). *Gastroenterology* 73(2):310-313; 1977.

The toxicity of long-term administration of chenodeoxycholic acid was studied in squirrel monkeys of both sexes. The drug was administered p.o. to five groups of 26 animals each at a daily dose of 0, 10, 20, 40, and 80 mg/kg, resp., for a maximum of 52 weeks. No clinical symptoms that could suggest drug toxicity were observed. All laboratory studies (hematological; urinalysis for pH, protein, glucose, ketones, bilirubin, and urobilinogen; and liver function tests) were within normal limits. The proportion of lithocholic acid in biliary bile acids remained unchanged, whereas that of chenodeoxycholic acid was increased dose-dependently. No histopathological changes considered to be attributable to drug administration were observed.

6772 THE INCORPORATION OF Ga-67 INTO THE FERRITIN FRACTION OF RABBIT HEPATOCYTES IN VIVO.

(Eng.) Hegge, F. N.; Mahler, D. J.; Larson, S. M. (Veterans Admin. Hosp., Portland, OR). *J. Nucl. Med.* 18(9):937-939; 1977.

The relation between the metabolism of gallium and that of iron was studied on the subcellular level by comparing the incorporation of ^{67}Ga and ^{59}Fe into the ferritin fraction of rabbit hepatocytes *in vivo*. Twenty-four hours after the administration of ^{67}Ga citrate and ^{59}Fe citrate, the rabbits were killed and their livers removed and homogenized. Labile proteins in the filtered liver homogenates were denatured; ferritin was then crystallized from the supernatants by cadmium sulfate. Sephadex G-200 gel filtration of the ferritin fractions was carried out to determine the distribution of molecular weights in the substances associated with ^{67}Ga and ^{59}Fe. ^{67}Ga was found to be incorporated into the crystallizable ferritin fraction of rabbit hepatocytes with approximately one-sixth the uptake of simultaneously administered ^{59}Fe. Gel filtration chromatography confirmed that both the ^{67}Ga and the ^{59}Fe of the crystallizable ferritin fraction were associated with substances of the appropriate molecular weight for ferritin. Gallium appears to behave somewhat like iron in its interaction with ferritin, as it does in its interaction with transferrin and hemoglobin.

6773 EFFECT OF RETINOIC ACID UPON MEVALONIC ACID-2-^{14}C INCORPORATION INTO LIPIDS IN AN ISOLATED RAT LIVER FRACTION.

(Eng.) Erdman, J. W., Jr.; Elliott, J. G.; Lachance, P. A. (Dept. Food Science, 567 Bevier Hall, Univ. Illinois, Urbana, IL 61801). *Nutr. Rep. Int.* 16(1):37-46; 1977.

Methods were developed to study the effects of 400 μM retinoic acid (OIC) upon the timed incorporation of ^{14}C from 2-^{14}C-mevalonic acid into various lipids in the postmitochondrial supernatant fraction of rat liver. Liver fractions were incubated with various cofactors and mevalonic acid, with and without OIC, for up to 120 min. The reaction was stopped, lipids were separated with thin layer chromatography, the activities in bands were recorded, and Rf values were compared to various lipid standards. OIC depressed ^{14}C incorporation into cholesterol and cholesterol esters, while OIC increased ^{14}C accumulation into bands corresponding to fatty acids, mono-, di-, and triglycerides. OIC caused increased activity in squalene and in two other possible intermediates of cholesterol biosynthesis after 10 or 20 min incubation, suggesting that OIC initially inhibits cholesterol biosynthesis causing the build-up of intermediates. These results demonstrate that 400 μM OIC has a direct effect upon *in vitro* lipid synthesis in an isolated rat liver system.

6774 THE EFFECT OF THREE FORMS OF VITAMIN A UPON IN VITRO LIPOGENESIS FROM THREE CHOLESTEROL PRECURSORS.

(Eng.) Erdman, J. W., Jr.; Elliott, J. G.; Lachance, P. A. (Dept. Food Science, 567 Bevier Hall, Univ. Illinois, Urbana, IL). *Nutr. Rep. Int.* 16(1):47-57; 1977.

The effect of vitamin A on lipogenesis from ^{14}C-acetate (^{14}C-A), ^{14}C-mevalonic acid (^{14}C-M), and ^{14}C-isopentenyl pyrophosphate (^{14}C-IPP) was studied in perfused rat liver postmitochondrial supernatants. The incorporation of ^{14}C into lipid fractions after the addition of 4, 40, or 400 μM retinol (OL), retinyl acetate (YL), or retinoic acid (OIC) was monitored. All forms of vitamin A depressed ^{14}C incorporation of ^{14}C-A and ^{14}C-M into cholesterol. Only OIC depressed ^{14}C-IPP accumulation into cholesterol. OIC significantly increased incorporation of activity from ^{14}C-M and ^{14}C-IPP into the triglyceride fraction. Sodium deoxycholic acid increased ^{14}C-A but depressed ^{14}C-IPP incorporation into cholesterol. These results suggest that OL and YL act similarly, perhaps by inhibiting the conversion of ^{14}C-M to the ^{14}C-IPP. OIC may block a latter step such as the cyclization of squalene.

6775 ZONE ELECTROPHORESIS STUDY OF THE BILE LIPOPROTEIN COMPLEX.

(Eng.) Lafont, H.; Nalbone, G.; Lairon, D.; Dagorn, J. C.; Domingo, N.; Amic, J.; *et al.* (INSERM Groupe de Recherches sur le Transport des Lipides, 46, Bd de la Gaye, 13009 Marseille, France). *Biochemie* 59(5/6):445-452; 1977.

Bile was studied by zone electrophoresis to elucidate the interactions of phosphatidylcholines, bile salts, and polypeptides. Human bile was obtained from a T-tube in the common duct or by puncture of the gallbladder. The detergent form (biliary lipoprotein complex) was prepared using a gel column (Biorad A5m or Ultragel LKB ACA 34) equilibrated with taurocholate. Linear sucrose gradient electrophoresis was performed with a 5-30% (w/v) gradient. Isoelectric focusing was accomplished with 2% Ampholines, pH 3.5-10. Electrophoresis of native hepatic bile produced a single peak of phosphatidylcholines, two peaks of bile salts, and a cholesterol peak associated with the phosphatidylcholines. Four zones were found by isoelectric focusing. The first zone had many bands and contained 75% of the biliary albumin, while no protein was found in the second zone. The third zone was observed to contain 25% of the albumin, and the fourth zone possessed the phosphatidylcholines and little protein. The detergent form of the bile-lipoprotein complex gave a pattern on electrophoresis similar to native bile, except that the two intermediate peaks are sharply reduced. The electrophoretic pattern of a mixed micellar solution of bile salts was similar to that of native bile. Mixed micelles of phosphatidylcholines and bile salts produced an electrophoretically diffuse zone behind the bile salts. The detergent-free form, obtained without bile salt equilibration, showed on electrophoresis a single peak of phosphatidylcholines, which, on analysis, contained polypeptides (3% wt/wt). The delipidated polypeptides could be reassembled with deoxycholate and dilaurylphosphatidylcholine. It is suggested that the association of acidic polypeptides and phosphatidylcholines explains the high anodic migration of bile phosphatidylcholines.

6776 EFFECT OF DIETARY DI-2-ETHYLHEXYL PHTHALATE ON OXIDATION OF ^{14}C-PALMITOYL CoA BY MITOCHONDRIA FROM MAMMALIAN HEART AND LIVER. (Eng.) Bell, F. P.; Gillies, P. J. (The Upjohn Company, Diabetes-Atherosclerosis Res. Unit, Kalamazoo, MI 49001). *Lipids* 12(7):581-585; 1977.

The oxidation of 1-^{14}C-palmitoyl coenzyme A (CoA) by heart and liver mitochondria from male Sprague-Dawley rats fed dietary di-2-ethylhexyl phthalate (DEHP) was investigated *in vitro*. The oxidation of ^{14}C-palmitoyl CoA to $^{14}CO_2$ increased two- to threefold in hepatic mitochondria from rats fed 0.1% DEHP for 2-3 days; this increase appeared to be a maximum response, since similar data were obtained using hepatic mitochondria from rats receiving 0.5% or 1.0% DEHP in the diet. The response of hepatic mitochondria to DEHP continued throughout the duration of 35-day trials in which 1.0% DEHP was fed. In contrast to hepatic mitochondria, the oxidation of ^{14}C-palmitoyl CoA by heart mitochondria decreased approximately 40% upon addition of 0.1% or 0.5% DEHP to the diet; this effect of DEHP on heart mitochondria was not sustained beyond 8 days of DEHP feeding. Oxidation of ^{14}C-palmitoyl CoA was increased about twofold in hepatic mitochondria from rabbits fed 1% dietary DEHP for 12 days and in hepatic mitochondria from pigs that received 5 doses of DEHP (0.8 g/kg) at 12-hr intervals; the oxidation of ^{14}C-palmitoyl CoA by heart mitochondria from the same animals was unchanged in the rabbit but increased an average of 37% in the pig. DEHP feeding to rats was associated with increased yields of hepatic mitochondrial protein; standardized preparations of heart mitochondria were unaffected. The data emphasize the fact that phthalate esters are biologically active and capable of modifying lipid metabolism in mammalian systems.

6777 EFFECT OF DIETARY PROTEIN AND METABOLIC ACIDOSIS ON SERINE BIOSYNTHESIS IN THE KIDNEY AND LIVER. (Eng.) Nishida, T.; Fujisawa, Y.; Murakami, E.; Saito, M. (Ehime Univ. Sch. Medicine, Shigenobu, Ehime 791-02, Japan). *Nutr. Rep. Int.* 16(1):115-123; 1977.

The activities of enzymes involved in serine biosynthesis were assayed in the kidney and liver of Wistar rats that have been fed on diets containing various amounts of protein or starved for 2 days. The enzyme activities were also assayed in acidotic rat kidney and liver. The 3-phosphoglycerate dehydrogenase and phosphoserine phosphatase activities in the kidney were not affected by the protein content of the diet, whereas those in the liver were higher in rats on low-protein diets than in rats on high-protein diets. Starvation for 2 days did not affect 3-phosphoglycerate dehydrogenase activity in the kidney but decreased its activity in the liver about 50%. Metabolic acidosis decreased 3-phosphoglycerate dehydrogenase and phosphoserine phosphatase in the kidney but not in the liver. These results suggest that the phosphorylated pathway may play a role in serine biosynthesis in the kidney as it does in the liver, but that the regulations of this pathway in the kidney and liver may be different; in the kidney it may be regulated by acid-base balance, while in the liver it may be regulated by dietary stimuli.

6778 EFFECT OF ENDOTOXIN ON TRYPTOPHAN PYRROLASE AND δ-AMINOLAEVULINATE SYNTHASE: EVIDENCE FOR AN ENDOGENOUS REGULATORY HAEM FRACTION IN RAT LIVER. (Eng.) Bissell, D. M.; Hammaker, L. E. (Dept. Medicine, Univ. California, San Francisco, CA 94143). *Biochem. J.* 166(2):301-304; 1977.

Endotoxin was administered i.p. to rats at a dose shown previously to stimulate hepatic heme oxygenase activity and to block induction of δ-aminolevulinate synthase (1.5-2.0 mg/kg), apparently by causing redistribution of heme from cytochrome P-450 to a regulatory heme pool in the liver. Within 5 hr of the administration of endotoxin (at a time when the effect of the compound on cytochrome P-450 was maximal), the relative saturation of tryptophan pyrrolase with intrinsic heme rose, from a basal value of 50% to 90% indicating that "free" heme had become available. Concurrently, the activity of δ-aminolevulinate synthase was decreased to 25% of its basal value. Heme oxygenase reached peak activity 13 hr after endotoxin administration. These findings provide new evidence for the existence of an "unassigned" hepatic heme fraction, which exchanges with cytochrome P-450 heme and regulates these three enzyme functions.

6779 EXPERIMENTAL HEPATIC ENCEPHALOPATHY. CHANGES OF THE LEVEL OF WAKEFULNESS IN THE RAT WITH PORTACAVAL SHUNT. (Eng.) Beaubernard, C.; Salomon, F.; Grange, D.; Thangapregassam, M. J.; Bismuth, J. (Hopital Paul Brousse, 14, avenue Paul-Vaillant-Couturier, F. 94800 Villejuif, France). *Biomedicine* 27(4):169-171; 1977.

The level of wakefulness in Sprague-Dawley rats with portacaval shunt was evaluated by measuring the reactivity of the reticulocortical system by electrical stimulation of the brain stem reticular formation during slow wave sleep. The voltage level of stimulus necessary to provoke cortical awakening was significantly ($p<0.01$) decreased (by 30.7%) after portacaval shunt. The measurement of the reactivity of the reticulocortical system is a simple procedure that permits the quantitation of postshunt encephalopathy in the rat.

6780 REDUCTION OF GALLSTONE FORMATION BY ASCORBIC ACID IN HAMSTERS. (Eng.) Ginter, E.; Mikus, L. (Res. Inst. for Human Nutrition, nam. 4. aprilla 7, 88030 Bratislava, Czechoslovakia). *Experientia* 33(6):716-717; 1977.

The hypothesis that the formation of gallstones could be prevented by ascorbic acid was tested in hamsters. One hundred hamsters were fed a semi-purified, fat-free, high glucose, lithogenic diet containing 5 g ascorbic acid/kg for 6 weeks; 100 other animals received the same diet without ascorbic acid. Gallstone formation in the animals that received ascorbic acid (44%) was lower than that in the animals that received the lithogenic diet alone (88%). The animals on the ascorbic acid-containing diet also had a lower liver cholesterol concentration (582 ± 26 mg/100 g wet tissue) than did the controls (751 ± 49 mg/100 g, $p<0.01-0.001$) and a lower cholesterol half-life in the liver (16.3 versus 21.5 days, $p<0.01-0.001$) and in the plasma (15.7 versus 21.5 days, $p<0.01-0.001$). Cholesterol transformation to bile acids was increased in the animals fed ascorbic acid (2.53 ± 0.11 mg/14 hr/100 g) in comparison with the controls (2.16 ± 0.12 mg/24 hr/100 g, $p<0.05-0.02$). The results indicate that saturation of the liver with vitamin C significantly depresses the occurrence of gallstones in the hamster.

6781 EXPERIMENTAL INDUCTION OF HEPATITIS WITH CIRRHOTIC EVOLUTION IN THE RAT BY THE AMINO STEROID HOLAPHYLLAMINOL, OR AMINO-3-β-HYDROXY-20-β-PREGNENE-5.

(Fre.) Vu Ngoc Huyen; Choppin, J.; Desplaces, A.; Roux, G. (Centre de Recherche des Laboratoires Joullie, 20 bis, quartier Boildieu, 92800 Puteaux, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 284(13):1243-1246; 1977.

Holaphyllaminol (amino-3-β-hydroxy-20-β-pregnene-5) was administered by gastric intubation to male Wistar rats at doses of 50, 100, or 200 mg/kg/day for 10, 20, 40, or 80 days. Histologic examinations of the hepatic tissue revealed that all lesions originated in the periportal region. They started with cholestasis and canalicular proliferation, followed by a slowly progressing hepatocytic necrosis and parenchymatous fibrosis. These characteristic lesions, together with the absence of steatosis, mimic certain chronic active hepatites culminating in cirrhosis found in man. Since the severity of the lesions was linearly dependent on the dosage and duration of holaphyllaminol treatment, it may be possible to use this regimen to create a model for experimental chronic hepatitis.

6782 ALLEVIATION OF CARRAGEENAN-INDUCED HEPATOTOXICITY AND ACRONECROSIS BY APROTININ.

(Eng.) Fowler, E. F.; Thomson, A. W.; Horne, C. H. W. (Dept. Pathology, Univ. Medical Buildings, Foresterhill, Aberdeen AB9 2ZD, Scotland). *Br. J. Exp. Pathol.* 58(3):260-267; 1977.

The hepatotoxicity of carrageenan was studied in female LACA mice, and the effect of aprotinin on carrageenan-induced hepatotoxicity was investigated. Carrageenan (5 mg, i.p.) was found to be hepatotoxic. Raised serum transaminase activity after carrageenan administration was correlated with histopathological changes in the liver. These included necrosis of individual hepatocytes and focal areas of necrosis, with associated fibrin thrombi, 12 hr after carrageenan injection. Increased mitotic activity was observed at 72 hr and extramedullary hemopoiesis was noted at day 5. Acronecrosis, a further manifestation of intravascular coagulation, was evident within 24 hr of carrageenan injection, becoming clearly demarcated by day 5. Treatment with the anti-protease aprotinin (0.5 ml, i.p.) alleviated both the hepatotoxicity and the incidence and extent of acronecrosis induced by carrageenan. The possible mechanism underlying the *in vivo* toxicity of carrageenan and its alleviation by aprotinin is discussed in the light of these and other findings.

6783 ABNORMALITIES OF LIVER FUNCTION FOLLOWING EXTENSIVE JEJUNOILEAL BYPASS AND RESECTION IN RATS.

(Eng.) Hyland, G.; Stein, T.; Wise, L. (Washington Univ. Sch. Medicine, St. Louis, MO). *Surgery* 81(5):578-582; 1977.

Alterations in liver function and structure in the rat following a jejunoileal bypass were compared with those following jejunoileal resection to determine whether the retained excluded segment plays an etiological role in the deterioration of hepatic function in human patients who have undergone jejunoileal bypass. A greater than 90% jejunoileal bypass similar to the type performed in man for morbid exogenous obesity was performed in 70 adult female Wister rats; in an additional 70 rats, a greater that 90% jejunoileal resection was carried out. The control group consisted of 46 rats, which were not subjected to any experimental measures. Following operation, the bypass group demonstrated a significant ($p<0.02$) greater weight loss than did the resection group. Total plasma protein, albumin, and SGOT all decreased from the control in both the resection and bypass groups; the decrease, however, was more significant in the bypass than in the resected group ($p<0.05$ for protein, albumin, and SGOT in resected group; $p<0.001$, $p<0.005$, and $p<0.05$ for protein, albumin, and SGOT, resp., in the bypass group). These results suggest the possible production of a hepatotoxic factor in the excluded small bowel segment.

6784 BILE SALT SECRETION.

(Eng.) O'Maille, E. R. L. (Dept. Physiology, Univ. Liverpool, Liverpool L69 3BX, England). *Ir. J. Med. Sci.* 146 (7):190-198; 1977.

6785 ASSOCIATION BETWEEN INDUCTION OF ARYL HYDROCARBON HYDROXYLASE AND DEPRESSION OF UROPORPHYRINOGEN DECARBOXYLASE ACTIVITY.

(Eng.) Jones, K. G.; Sweeney, G. D. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada). *Res. Commun. Chem. Pathol. Pharmacol.* 17(4):631-637; 1977.

6786 HEPATOCELLULAR NECROSIS DURING FROG VIRUS 3-INDUCED HEPATITIS OF MICE: AN ELECTRON MICROSCOPIC STUDY.

(Eng.) Bingen, A.; Kirn, A. (Faculte de Medecine, Universite Louis Pasteur, 3 rue Koeberle, 67000 Strasbourg, France). *Exp. Mol. Pathol.* 27(1):68-80; 1977.

6787 SEX INFLUENCE ON THE EXPERIMENTAL FATTY LIVER INDUCED BY WHITE PHOSPHORUS AND Amanita phalloides IN THE RAT: CONSEQUENCES ON THE PROTECTIVE EFFECT OF SOME STEROIDS. (Eng.) Jacqueson, A.; Thevenin, M.; Warnet, J. M.; Claude, J. R.; Truhaut, R. (Faculte des Sciences Pharmaceutiques et Biologiques de l'Universite R. Descartes de Paris, France). *Acta Pharmacol. Toxicol.* 41 (Suppl. 2):322-329; 1977.

6788 EFFECTIVENESS OF URSODEOXYCHOLIC ACID IN GALLSTONE THERAPY [Letter to Editor]. (Eng.) Kutz, K.; Schulte, A. (Medizinische Poliklinik, Univ. Bonn, Bonn, W. Germany). *Gastroenterology* 73(3):632-633; 1977.

6789 CUPRIZONE-INDUCED MEGAMITOCHONDRIAL FORMATION AND MEMBRANE FUSION. (Eng.) Wakabayashi, T.; Asano, M.; Ishikawa, K.; Kishimoto, H. (Nagoya City Univ. Medical Sch., Nagoya 467, Japan). *J. Electron Microsc.* [*Tokyo*] 26(2):137-140; 1977.

6790 Schistosoma mansoni: IMPAIRMENT OF THE CELL-MEDIATED IMMUNE RESPONSE IN MICE. (Eng.) Araujo, F. G.; Coelho, P. M. Z.; Pereira, L. H.; Pellegrino, J. (Inst. Biological Sciences, Federal Univ. Minas Gerais, 30000-Belo Horizonte, Brazil). *Clin. Exp. Immunol.* 28(2):289-291; 1977.

6791 INVESTIGATION OF REGULATION OF MICROSOMAL HYDROXYMETHYLGLUTARYL COENZYME A REDUCTASE AND METHYL STEROL OXIDASE OF CHOLESTEROL BIOSYNTHESIS. (Eng.) Spence, J. T.; Gaylor, J. L. (Div. Nutritional Sciences, Cornell Univ., Savage Hall, Ithaca, NY 14853). *J. Biol. Chem.* 252(16):5852-5858; 1977.

6792 TRIGLYCERIDE ACCUMULATION IN THE LIVER OF MICE POISONED WITH LUTEOSKYRIN, A HEPATOTOXIC MYCOTOXIN FROM Penicillium islandicum SOPP. (Eng.) Asano, K.; Ueno, I. (Clinical Center Mishima Medicals, Mishima-shi, Shizuoka 411, Japan). *Jpn. J. Exp. Med.* 47(3):209-211; 1977.

6793 THE INFLUENCE OF INHALED KETONE SOLVENT VAPORS ON HEPATIC MICROSOMAL BIOTRANSFORMATION ACTIVITIES. (Eng.) Couri, D.; Hetland, L. B.; Abdel-Rahman, M. S.; Weiss, H. (Coll. Medicine, Ohio State Univ., Columbus, OH 43210). *Toxicol. Appl. Pharmacol.* 41(2):285-289; 1977.

6794 SYNTHESIS OF PROSTAGLANDIN $F_{2\alpha}$ IN RAT LIVER. (Eng.) Morita, I.; Chang, W. C.; Murota, S. I. (Tokyo Metropolitan Inst. Gerontology, Itabashi-ku, Tokyo-173, Japan). *Prostaglandins* 14(2):403-406; 1977.

6795 POSSIBLE SITES OF INTERACTION OF ACUTE RENAL FAILURE WITH AMINO ACID UTILIZATION FOR GLUCONEOGENESIS IN ISOLATED PERFUSED RAT LIVER. (Eng.) Frohlich, J.; Hoppe-Seyler, G.; Schollmeyer, P.; Maier, K. P.; Gerok, W. (Dept. Internal Medicine, Univ. Freiburg, Hugstetter Strasse 55, D-7800 Freiburg i. Br., W. Germany). *Eur. J. Clin. Invest.* 7(4):261-268; 1977.

6796 THE PRESENCE OF LACTOGEN BUT NOT GROWTH HORMONE BINDING SITES IN THE ISOLATED RAT HEPATOCYTE. (Eng.) Herington, A. C.; Veith, N. M. (Prince Henry's Hosp., St. Kilda Rd., Melbourne 3004, Victoria, Australia). *J. Endocrinol.* 74(2):323-334; 1977.

6797 EXPERIMENTAL CARCINOMA OF THE BILIARY TRACT INDUCED IN DOGS BY N-ETHYL-N'NITRO-N-NITROSOGUANIDINE. (Eng.) Nakazawa, S.; Naito, Y.; Yamamoto, Y.; Yamase, H.; Sobue, K.; Yamada, K.; *et al.* (Nagoya Univ. Sch. Medicine, 65, Tsuruma-cho, Showa-ku, Nagoya 466, Japan). *Gastroenterol. Jpn.* 12(2):47-50; 1977.

6798 METABOLIC EFFECTS AND LIVER DAMAGE AFTER PROLONGED ADMINISTRATION OF HIGH DOSES OF NICOTINAMIDE TO RATS. (Eng.) Jaus, H.; Sturm, G.; Grassle, B.; Romen, W.; Siebert, G. (Institut fur Biologische Chemie, Universitat Hohenheim, Postfach 106, D-7000 Stuttgart 70, W. Germany). *Nutr. Metab.* 21(Suppl. 1):38-41; 1977.

6799 CELL PROLIFERATION AND EXPERIMENTAL LIVER CANCER. (Eng.) Craddock, V. M. *In: Liver Cell Cancer.* Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (Amsterdam: Elsevier Scientific Publishing Co.): pp. 153-201; 1976.

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3888, 20161 Milan, Italy). *Arch. Int. Pharmacodyn. Ther.* 227(2):254-262; 1977.

6804 THE STIMULATORY EFFECT OF GLUCAGON AND DIBUTYRYL CYCLIC AMP ON UREOGENESIS AND GLUCONEOGENESIS IN RELATION TO THE MITOCHONDRIAL ATP CONTENT. (Eng.) Bryla, J.; Harris, E. J.; Plumb, J. A. (Inst. Biochemistry, Univ. Warsaw, Al. Zwirki i Wigury 93, 02-089 Warsaw, Poland). *FEBS Lett.* 80(2):443-448; 1977.

6805 DISTRIBUTION OF COPPER AND ZINC IN THE LIVER OF THE DEVELOPING FOETUS. (Eng.) Bremner, I.; Williams, R. B.; Young, B. W. (Rowett Res. Inst., Bucksburn, Aberdeen AB2 9SB). *Br. J. Nutr.* 38(1):87-92; 1977.

6806 POLYAMINES AND THEIR BIOSYNTHETIC DECARBOXYLASES IN VARIOUS TISSUES OF THE YOUNG RAT DURING UNDERNUTRITION. (Eng.) McAnulty, P. A.; Williams, J. P. G. (Strangeways Res. Lab., Wort's Causeway, Cambridge CB1 4RN, England). *Br. J. Nutr.* 38(1):73-86; 1977.

6807 PRECOCIOUS DEVELOPMENT OF URIDINE DIPHOSPHATE GLUCURONOSYLTRANSFERASE ACTIVITY DURING ORGAN CULTURE OF FOETAL RAT LIVER IN THE PRESENCE OF GLUCOCORTICOIDS. (Eng.) Wishart, G. J.; Goheer, M. A.; Leakey, J. E. A.; Dutton, G. J. (Dept. Biochemistry, Univ. Dundee, Dundee DD1 4HN, Scotland). *Biochem. J.* 166(2):249-253; 1977.

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6809 3-HYDROXY-3-METHYLGLUTARIC ACID AND OROTIC ACID INDUCED FATTY LIVER IN RATS [Letter to Editor]. (Eng.) Yousufzai, S. Y. K.; Siddiqi, M. (Dept. Chemistry, Aligarh Muslim Univ., Aligarh 202001, India). *Lipids* 12(8):689-690; 1977.

6810 DIVERSITY OF POLYADENYLATED MESSENGER RNA SEQUENCES IN NORMAL AND 12-HR REGENERATING LIVER. (Eng.) Colbert, D. A.; Tedeschi, M. V.; Atryzek, V.; Fausto, N. (Molecular Biology Inst., Univ. California, Los Angeles, CA). *Dev. Biol.* 59(2):111-123; 1977.

6811 LIVER ENDOPLASMIC RETICULUM: TARGET SITE OF HALOCARBON METABOLITES. (Eng.) Reynolds, E. S. (Peter Bent Brigham Hosp. and Harvard Medical Sch., Boston, MA 02115). *Adv. Exp. Med. Biol.* 84:117-137; 1977.

6812 BIOCHEMICAL DIFFERENTIATION OF THE LIVER. (Eng.) Greengard, O. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Prout's Neck, Maine, June 13-16, 1976.* Ross Laboratories. (Columbus, Ohio): pp. 29-35; 1977.

See also, 6696, 6715, 6721, 6745, 6839, 6848, 6947, 7091, 7093, 7105, 7174, 7184, 7189, 7212.

SECRETION AND METABOLISM

Intestine

6813 SPECIFIC INHIBITION OF CELL PROLIFERATION IN THE MOUSE INTESTINE BY AN AQUEOUS EXTRACT OF RABBIT SMALL INTESTINE. (Eng.) Sassier, P.; Bergeron, M. (Faculte de Medecine, Universite de Montreal, Montreal H3C 3T8, Quebec, Canada). *Cell Tissue Kinet.* 10(3):223-231; 1977.

Aqueous extracts from the mucosa of the rabbit small intestine were studied for their effect on DNA synthesis in the jejunum and proximal colon of rats *in vitro* and mice *in vivo*. The extracts were separated into two fractions by ammonium sulfate precipitation, the 0-50 fraction (F_1) and the supernatant (F_2). Everted rings of rat jejunum were incubated in the presence of ^{3}H-thymidine and F_1 or F_2 (protein content, 10 mg). Male mice were inoculated s.c. with 10 mg of F_1 or F_2 protein and then, at various intervals, with 4 μCi of ^{3}H-thymidine. The mice were killed 1 hr after thymidine injection, and 3-cm segments were removed from the jejunum and colon for analysis. The effect of the F_1 on cell-transit time in the mouse jejunum and colon was studied by inoculating mice s.c. with 4 μCi of ^{3}H-thymidine every 4 hr for 72 hr, and with 10 mg F_1 at 5, 9, and 13 hr after the initial thymidine injection. Three mice were killed 1 hr after each thymidine injection for analysis of DNA specific activity. The F_2 fractions did not have any inhibitory effect on DNA synthesis in either rats or mice. The Tris-HCl buffer and water F_1 fractions inhibited ^{3}H-thymidine incorporation into rat jejunal (66 ± 2.5% and 54 ± 3%, resp.), colonic, hepatic, and renal DNA. In mice, F_1 produced maximal inhibition of incorporation in the jejunal and colonic DNA within 2-4 hr. After 4 hr, F_1 reduced the specific DNA activity in the mouse jejunum and colon from control values of 27.6 ± 1.9 and 18.6 ± 1.9 disintegrations/min (dpm)/µg, resp., to 15.8 ± 2.4 and 10.4 ± 1.6 dpm/µg. This effect was reversible after 7 hr, which suggests that it was noncytotoxic. Cell-transit times were also increased by F_1. However, there was no significant inhibition of DNA synthesis in regenerating renal and normal adult testicular tissue. It is concluded that the F_1 fraction contains a chalone-like factor (or factors) that affects either DNA synthesis or the G_1-S transition of the cell cycle in the jejunum and colon of the mouse small intestine.

6814 INCREASED LEVEL OF cAMP IN THE RAT INTESTINAL MUCOSA CAUSED BY SODIUM LAURYL SULPHATE. (Eng.) Briseid, G.; Oye, I.; Briseid, K. (Inst. Pharmacy, Univ. Oslo, Blindern, Oslo 3, Norway). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(3):263-266; 1977.

The sodium lauryl sulfate (SLS)-induced increase in cyclic AMP in the jejunal mucosa of rats was studied. The level of cyclic AMP in the jejunal mucosa from tied loops of anesthetized rats was significantly increased (27-50%) when SLS (2-27 mM) was added to the loop fluid. Imidazole (25 mM) did not significantly alter the resting level of cyclic AMP, but reduced the increase caused by SLS (17 mM). Theophylline (25 mM) significantly ($p<0.001$) increased the intestinal level of cyclic AMP, and potentiated the increase caused by SLS. Ouabain (2.5 mM) did not alter the level of cyclic AMP in the presence or in the absence of SLS. The results of previous experiments on the increases in intestinal absorption caused by SLS or by dibutyryl cyclic AMP are discussed in light of the present data. It is concluded that the SLS effect on absorption can only partly be ascribed to its effect on the intestinal level of cyclic AMP.

6815 EFFECT OF DIETARY AMINO ACIDS AND FOOD INTAKE ON INTESTINAL SUCRASE AND LEUCINE-AMINOPEPTIDASE ACTIVITIES OF RATS. (Eng.) Kimura, T.; Shiosaka, S.; Sakakibara, A.; Matsuoka, A.; Yoshida, A. (Dept. Agricultural Chemistry, Nagoya Univ., Nagoya, 464 Japan). *Nutr. Rep. Int.* 14(6):657-670; 1976.

The effects of dietary amino acid deficiencies on intestinal sucrase (Su) and leucine aminopeptidase activities were studied by feeding male Wistar rats valine-, leucine-, lysine-, and protein-free diets, as well as 5% and 10% complete amino acid diets supplemented with sucrose, for 2 days. Rats were either force-fed three times daily at 4-hr intervals with 5 or 10 g of diet or fed *ad libitum*. The animals were sacrificed on the third day, their small intestines were removed, and the mucosa was scraped from the second 15-cm length of segment from the pylorus to the distal end. Force-feeding rats 10 g of the valine-free diet for 2 days decreased Su activity from 7.65 ± 0.78 U/mg protein (in rats force-fed 10 g of 10% complete amino acid) to 3.83 ± 0.66 U/mg. Su activities per unit weight of mucosa and per unit 15 cm length of segment were also significantly reduced. The protein-free diet also decreased Su activity, but to a lesser extent. Su activities per unit weight of mucosa or protein were significantly higher in groups receiving 5 g of valine-free, protein-free, or 10% complete amino acid diets than in those receiving 10 g. Changes in Su activities in rats force-fed the leucine- and lysine-free diets were intermediate between those in rats force-fed the valine-free and complete amino acid diets. There were no changes in Su activities per unit weight of mucosa or protein in rats fed the valine- and lysine-free diets *ad libitum*, but the segmental Su activities were significantly decreased from those observed in rats fed the 10% complete amino acid diet *ad libitum*. Changes in leucine aminopeptidase activity were similar but less-pronounced. Mucosal protein and segment weights of the small intestine, particularly that of the mucosa, were significantly reduced by the amino acid-deficient diets. The activities of intestinal enzymes are concluded to be influenced by the supply of amino acids to the mucosal cells.

6816 INFLUENCE OF BILE ACIDS ON THE (Na^+-K^+)-ACTIVATED- AND Mg^{2+}-ACTIVATED ATPase OF RAT COLON. (Eng.) Hafkenscheid, J. C. M. (St. Radboud Hosp., Univ. Nijmegen, Nijmegen, Netherlands). *Pfluegers Arch.* 369(3):203-206; 1977.

The influence of various bile acids on the (Na^+-K^+)-ATPase and Mg^{2+}-ATPase activity of rat colon was studied. At 0.6 mM, cholic acid (C) and taurocholic acid (TC) did not inhibit the (Na^+-K^+)-ATPase activity in contrast to glycocholic acid (GC). The taurine derivative taurochenodeoxycholic acid (TCDC), taurodeoxycholic acid and TC did not inhibit the (Na^+-K^+)-ATPase activity. All bile acids except C, TC, and chenodeoxycholic acid depressed the Mg^{2+}-ATPase activity. At higher concentrations, only C and TC did not influence the (Na^+-K^+)-ATPase activity. C, GC, and TC at 2.5 mM decreased the activity of the (Na^+-K^+)-activated phosphatase with ATP as substrate. All other substrates tested did not influence the enzymic activity significantly. The results indicate that bile acids can inhibit the Na^+-absorbing system in rat colon. This inhibition can cause diarrhea.

6817 ESTEROLYTIC ACTIVITIES OF RAT INTESTINAL MUCOSA. 1. CHARACTERIZATION, CELLULAR DISTRIBUTION AND SUBCELLULAR LOCALIZATION OF A GLYCEROL-ESTER HYDROLASE. (Eng.) Negrel, R.; Serrero, G.; Fernandez-Lopez, V.; Ailhaud, G. (Centre de Biochimie, Faculte des Sciences, Universite de Nice, Parc Valrose, F-06034 Nice-Cedex, France). *Eur. J. Biochem.* 71(1):249-258; 1976.

The cellular distribution and subcellular localization of a glycerol-ester hydrolase (GEH) isolated from the intestinal mucosa of male Sprague-Dawley, germ-free rats are described. The intestines were removed, the mucosal cells were collected, and subcellular fractions were prepared as required. The GEH (assayed titrimetrically with tributyrin) was not of pancreatic origin, as there was no cross-reaction between the hydrolase in a crude supernatant of intestinal cells and an immunoserum directed against the rat pancreatic juice. Contamination by pancreatic carboxyl-ester hydrolase or pharyngeal acidic lipase was excluded. A high level of GEH activity was found in the intestinal lumen. The cellular GEH activity decreased from 5,700 ± 500 mU/mg of protein at the villus tips to 3,000 ± 200 mU/mg in the crypt cells. Subcellular fractionation localized most of the activity in the endoplasmic reticulum. GEH activities with tributyrin and *p*-nitrophenylacetate as substrates were highest in the duodenum and jejunum; with palmityl-CoA (athcolester) as substrate, specific activity was highest in the ileum. A sharp decrease occurred in the ratio of GEH activity to thioester hydrolase (TEH) activity from the duodenum to the ileum (1,500 to 100). The presence of two distinct enzymes, GEH and TEH, was suggested by the different localization of these activities in the intestine, as well as by differential solubilization characteristics and by separation on a diethylaminoethyl-cellulose column. Gel electrophoresis showed that GEH and *p*-nitrophenylacetate hydrolase activities are coincident with hydrolytic activities against short and medium chain mono-, di-, and triglycerides. Mucosal GEH in neonatal rats was found to increase from about 1,000 mU/mg to 5,000 mU/mg over a 3-4 week period after weaning. The possible role of GEH in lipid degradation is discussed.

6818 THE RELATIVE FREQUENCIES AND DISTRIBUTION OF IMMUNOGLOBULIN-BEARING CELLS IN THE INTESTINAL MUCOSA OF NEONATAL AND WEANED PIGS AND THEIR SIGNIFICANCE IN THE DEVELOPMENT OF SECRETORY IMMUNITY.

(Eng.) Allen, W. D.; Porter, P. (Unilever Res. Lab., Colworth House, Sharnbrook, Bedfordshire, England). *Immunology* 32(5):819-824; 1977.

The proportions of cells containing IgM, IgA, or IgG and their distribution in the intestinal mucosa were studied in pigs ranging in age from 2 days to 12 weeks. Tissue blocks from the duodenum, jejunum, ileum, and spiral colon were stained for Ig's with fluorescein isothiocyanate and rhodamine isothiocyanate. All cell counts were expressed as the number or mean number of stained cells visible in 20 fields using x40 objective. Cells containing IgM (total, 1-9) were detected in the duodenal mucosa as early as 2 days of age. The duodenum was the main site of Ig proliferation, and even after 2 weeks, it contained 10 times the number of Ig-bearing cells than the other parts of the intestine. IgA cells (1-10) appeared in the duodenum at 4-5 days of age, and IgG cells (54-73) were found at 9 days. The Ig concentration was consistently higher in the duodenum than in the other sites. IgM cells appearing in the lamina propria suggest a local synthesis by immunocytes rather than derivation from serum. Weaning influenced the relative frequencies of IgM and IgA. In the duodenum, the lamina propria of 4-week-old suckling pigs contained a mean of 1,542 IgM cells and 1,039 IgA cells. However, IgA cells outnumbered IgM cells (1,433 to 1,117) in 4-week-old pigs that had been weaned for 1 week. At 12 weeks of age, nearly 90% of the cells in the weaned pigs contained IgA. These results and those of similar studies suggest that IgM is an important factor in the early development of the secretory immune response.

6819 PLASMA SECRETIN CONCENTRATION IN MAN: EFFECT OF INTRADUODENAL GLUCOSE, FAT, AMINO ACIDS, ETHANOL, HCl, OR INGESTION OF A MEAL.

(Eng.) Fahrenkrug, J.; Schaffalitzky De Muckadell, O. B. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Eur. J. Clin. Invest.* 7(3):201-203; 1977.

The effect of the intraduodenal infusion of isotonic saline, isotonic and hypertonic glucose, fat emulsion, amino acids, ethanol, and hydrochloric acid on the plasma concentration of immunoreactive secretin was studied in seven normal subjects. Only HCl (0.1 M) showed any effect. After acidification of the duodenum with HCl, a significant rise in plasma secretin concentration was observed from 1.3 ± 0.4 pM to a peak value of 13.0 ± 1.2 pM after 5 min. The concentration returned to the basal level within 15 min. In eight other normal subjects, the plasma secretin concentration was measured after the ingestion of a protein-rich meal. No significant changes were observed during the 2-hr postprandial period.

6820 VASOACTIVE INTESTINAL PEPTIDE (VIP): VARIATION OF THE JEJUNO-ILEAL CONTENT IN THE DEVELOPING RAT AS MEASURED BY RADIORECEPTORASSAY.

(Eng.) Laburthe, M.; Bataille, D.; Rosselin, G. (U-55, INSERM, 75571 Paris Cedex 12, France). *Acta Endocrinol. (Kbh.)* 84(3):588-599; 1977.

Variations in the amount of vasoactive intestinal peptide (VIP) in the rat jejunoileum (JI) with age were studied by measuring the binding of VIP to rat liver plasma membranes. The VIP were extracted from the JI of Wistar rats by 0.5 M acetic acid and then purified partially by adsorption on silicate. VIP content was measured by a radioreceptor assay in whic rat VIP competitively inhibited the binding of ^{125}I-labeled porcine VIP (pVIP) to rat liver plasma membranes at 30 C. Binding of ^{125}I-pVIP was inhibited 90% by 1 μg/ml rat VIP; the assay was sensitive to 0.5 ng/ml rat VIP. Synthetic derivatives of VIP and the structurally related hormone, glucagon, had no binding ability, and secretin had about 1% of the binding activity of native VIP. Native VIP content increased 340-fold from day 21 postcoitum (41 ± 4 ng/JI) to day 63 postpartum (14,110 ± 954 ng/JI). On a gut weight basis, VIP content increased slightly from day 2 postpartum (560 ± 36 ng/g gut) to day 14 (906 ± 109 ng/g) and then rose sharply until day 63 (2,672 ± 207 ng/g). Thus, the greatest increase in

VIP content began on day 14, coincident with an increase in gut weight and development. Both VIP content and gut weight reached a plateau level after 2 months. During this time, VIP content per milligram of JI protein also increased (10- to 12-fold). VIP content may be related to intestinal development or regulation of the digestive process.

6821 NITROGEN FIXATION IN THE INTESTINE [Abstract]. (Ita.) Lepidi, A. (Istituto di Microbiologia, Facolta di Agraria, Universita di Pisa, Pisa, Italy). *Ann. Sclavo* 18(6):869-870; 1976.

6822 RELEASE OF SMALL INTESTINAL ENZYMES AFTER PANCREATIC DUCT LIGATION. (Rus.) Pulatov, A. S.; Glushko, L. F. (Medical Inst., Andizhan, USSR). *Fiziol. Zh. SSR* 63(3):452-457; 1977.

6823 EFFECT OF THE GLUCOSE TRANSPORT SYSTEM ON SOME KINETIC CHARACTERISTICS OF MEMBRANE CARBOHYDRASES (γ-AMYLASES AND INVERTASES) OF THE SMALL INTESTINAL MUCOSA. (Rus.) Ugolev, A. M.; Gurman, E. G.; Koltushkina, G. G. (I. P. Pavlov Inst. Physiology, Acad. Sciences USSR, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 231(5):1267-1269; 1976.

6824 THE EFFECT OF HEAT AND COLD FACTORS ON THE AMYLOLYTIC AND INVERTASE ACTIVITY OF THE SMALL INTESTINE OF GROWING RATS. (Rus.) Rakhimov, K. R.; Sadykov, B. A. (Inst. Physiology, Uzbek SSR Academy Sciences, Tashkent, USSR). *Biull. Eksp. Biol. Med.* 82(10):1212-1215; 1976.

6825 EFFECT OF HISTAMINE AND ANTIBIOTICS (PENICILLIN AND STREPTOMYCIN) ON GLUCOSE AND GLYCINE ABSORPTION IN THE SMALL INTESTINE. (Ukr.) Faitel'berg, R. O.; Balan, M. M. (Dept. Human and Animal Physiology, Odessa Univ., Odessa, USSR). *Fiziol. Zh.* 22(4):510-517; 1976.

6826 PROTEIN DIGESTION BY SWINE: NOTE 1. (Ger.) Poppe, S.; Haussler, E. (Sektion Tierproduktion der Wilhelm-Pieck-Universitat, Rostock, E. Germany). *Wiss. Z. Wilhelm Pieck Univ. Rostock Math. Naturwiss. Reihe* 25(2):135-145; 1976.

6827 BEHAVIOR OF THE INTESTINAL GOBLET CELLS FOLLOWING APPLICATION OF OXIDATED WATER SOLUBLE TERPENES: A PILOT STUDY. (Ger.) Brunner, P.; Kaduk, B.; Gunselmann, W.; Husemann, B. (Pathologischens Institut, Universitat Erlangen-Nurnberg, Krankenhausstr. 8-10, 8520 Erlangen, W. Germany). *Arzneim. Forsch.* 27(3):635-637; 1977.

See also, 6689, 6690, 6693, 6695, 6712, 6713, 6741, 6746, 6751, 6763, 6829, 6830, 6833, 6838, 6839, 6840, 6841, 6844, 6884, 6948, 6996, 7271, 7280.

GENERAL

6828 PERTECHNETATE DISTRIBUTION IN MAN AFTER INTRAVENOUS INFUSION: A COMPARTMENTAL MODEL. (Eng.) Hays, M. T.; Berman, M. (Veterans Admin. Central Office [151], 810 Vermont Ave., N.W., Washington, DC 20420). *J. Nucl. Med.* 18(9):898-904; 1977.

Using a primed infusion technique, the distribution of pertechnetate was monitored in normal volunteers over an 8-hr period. Two groups of subjects were studied, during hours 0-4 (n=8) and hours 4-8 (n=7), resp., of the infusion. At 6.5 hr, a large dose of NaI (1,000 mg) was administered i.v. to the second group. Plasma, salivary, and urinary radioactivities were assayed, and external counts were made of radioactivities over the neck, thigh, and right upper abdomen. A kinetic model was developed for pertechnetate based upon the distribution data, the iodide perturbation, and known physiology for pertechnetate and iodide. The model has three major subsystems: (1) the thyroid trap, (2) a whole-body distribution, containing plasma and two extravascular compartments, and (3) the gastrointestinal tract, including the salivary, stomach (including upper small intestine), and two lower intestinal compartments. One of the latter, which turns over very slowly, is believed to represent bowel wall. The large NaI dose markedly reduced transport into the compartments of the thyroid trap, the saliva, and the stomach and small intestine. This study shows that pertechnetate is distributed qualitatively but not quantitatively like iodide; unlike iodide, large bowel distribution plays an important role with this substance, especially in long-term studies.

6829 IN VIVO AND IN VITRO ASSESSMENT OF BARIUM SULPHATE SUSPENSIONS. (Eng.) Roberts, G. M.; Roberts, E. E.; Davies, R. L.; Evans, K. T. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff, England). *Br. J. Radiol.* 50(596):541-545; 1977.

A comparison was made between *in vitro* and *in vivo* tests in the canine stomach and small intestine using several brands of barium sulfate. There was considerable variation in the behavior of these suspensions between the *in vitro* and *in vivo* tests, particularly in the stomach. The results suggest that *in vitro* tests of this sort are of little value for assessing the relative advantages and disadvantages of these suspensions in demonstrating mucosal detail.

6830 RADIOIMMUNOASSAY OF THE ANTIDIARRHOEAL LOPERAMIDE.

(Eng.) Michiels, M.; Hendriks, R.; Heykants, J. (Janssen Pharmaceutica, Research Laboratoria, B-2340 Beerse, Belgium). *Life Sci.* 21(3):451-459; 1977.

Using antiserum produced in rabbits against loperamide, a sensitive and specific radioimmunoassay procedure for this antidiarrheal was developed. The drug was assayed directly in plasma from three healthy subjects in amounts as low as 50 pg. None of the known *N*-dealkylated metabolites of loperamide interfered with the radioimmunologic determination of loperamide in biological fluids. Four hours after the administration of a single p.o. dose of loperamide (4 mg), peak plasma levels, corresponding to about 0.75 ng/ml, were reached, and drug plasma concentrations could be measured up to 24 hr after administration. It is concluded that the method described is very specific for the determination of loperamide in man.

6831 METABOLIC EFFECTS OF PROLONGED ETHANOL ADMINISTRATION IN RATS TREATED WITH CLOFIBRATE.

(Eng.) Hillbom, M. E.; Poso, A. R.; Eriksson, C. J. P.; Franssila, K.; Hakkinen, H. M. (Res. Lab. State Alcohol Monopoly [Alko], Box 350, SF-00101 Helsinki 10, Finland). *Acta Pharmacol. Toxicol. (Kbh.)* 39(3):365-373; 1976.

A study was carried out on the effect of prolonged exposure to ethanol (by stomach tube, 6 g/kg body weight per day for 2 weeks followed by 9 g/kg for 1 week) on rats also receiving the antilipemic agent ethyl-α-*p*-chlorophenoxyisobutyrate (clofibrate, 0.2 g/kg body weight/day, s.c., beginning 9 days before and also accompanying ethanol adminstration). A control group received an equal volume of saline solution in place of clofibrate. After the first dose of ethanol, blood glucose levels in controls increased from 7.2 ± 0.7 mM to 8.7 ± 0.6 mM ($p<0.001$) whereas, in the clofibrate-treated group, there was an insignificant increase in blood glucose (from 7.1 ± 0.4 to 7.6 ± 0.6 mM). The blood ethanol concentrations were high in both the control and clofibrate-treated groups, 21 ± 12 and 19 ± 8 mM, resp. Eight hours after the final dose of ethanol, blood glucose levels in the control and clofibrate-treated groups were not significantly different (6.1 ± 0.7 and 6.4 ± 1.0 mM, resp.). The absence of an initial hyperglycemic response in the clofibrate-treated group resulted in decreased liver glycogen in these animals. The mean blood ethanol level in the clofibrate-treated group after prolonged ethanol exposure (16 ± 10.5 mM) was significantly lower than that in the control group (39.6 ± 11.3 mM, $p<0.005$). The rate of ethanol elimination in controls was approximately 70% of that in the experimental group. The mean liver-to-body ratio (g/100 g) in the clofibrate-treated animals (4.72 ± 0.27) was significantly lower than that in the controls (3.79 ± 0.31, $p<0.005$) 16 hr after the final dose. Rats eliminated ethanol more rapidly in the presence of clofibrate. There were no signs of ketoacidosis, hypoglycemia, or histological indications of inflammation of the liver in the clofibrate-treated group, indicating that ethanol was no more toxic to this group than to the controls. The controls showed a slight but insignificant increase in liver lipid content. The possibility that the adverse effects of alcohol in man may be prevented or alleviated by clofibrate treatment is discussed.

6832 THE SIGNIFICANCE OF SYMPATHETIC NERVOUS ACTIVITY FOR THE DEVELOPMENT OF THE INTESTINAL MUCOSAL LESIONS IN SHOCK.

(Eng.) Haglund, U.; Lundgren, O. (Dept. Physiology, Univ. Goteborg, Goteborg, Sweden). *Acta Chir. Scand.* 143(3):139-143; 1977.

The importance of sympathetic nervous activity in the development of intestinal mucosal lesions in hypotensive shock was studied in the feline gut. The extent of mucosal damage produced by lowering intestinal inflow pressure to 30-35 mm Hg for 2 hr was compared in acutely denervated intestines and in intestines in which the regional sympathetic vasoconstrictor fibers were electrically stimulated. Regional hypotension was produced by partial occlusion of the superior mesenteric artery. In one series of animals, the sympathetic fibers in the splanchnic nerves were stimulated bilaterally at 6 Hz throughout the hypotension. Mucosal damage was observed in both series. No statistically significant difference was demonstrated between the two series of experiments with regard to mucosal damage or blood pressure fall. It is concluded that sympathetic nervous activity does not contribute to any measurable extent to the development of mucosal damage and cardiovascular deterioration observed in connection with regional intestinal hypotension.

6833 PROTECTION OF MOUSE INTESTINE AGAINST GAMMA IRRADIATION BY 2-MERCAPTOPROPIONYLGLYCINE (MPG).

(Eng.) Devi, P. U. (Radiation Biology Lab., Univ. Rajasthan, Jaipur-302004, India). *J. Radiat. Res.* 18(2):160-163; 1977

In a preliminary attempt to investigate the protective action of 2-mercaptopropionylglycine (MPG) on the tissues of mammals exposed to high doses of ionizing radiation, adult Swiss albino mice were subjected to 1,200 r of gamma rays from a ^{60}Co MPG (20 mg/kg). The histopathological changes in th small intestinal villi were studied at postirradiation intervals of 2, 5, 14, and 28 days and were compared with observations from mice irradiated in the absence of MPG. Severe damage was observed in the villi of the animals receiving no protective drug, whereas, in the MPG-injected group, the villi were protected to some extent. An early recovery was effected in the MPG group, with the result that the normal structure was restored by the last interval studied.

6834 THE ROLE OF HISTAMINE RECEPTORS IN THE PATHOPHYSIOLOGY OF GASTRIC MUCOSAL DAMAGE.

(Eng.) Ress, W. D. W.; Rhodes, J.; Wheeler, M. H.; Meek, E. M.; Newcombe, R. G. (Univ. Hosp. Wales, Cardiff, Wales). *Gastroenterology* 72(1):67-71; 1977.

The effects of the H_1 and H_2 histamine receptor antagonists, mepyramine maleate and metiamide, resp., on the sensitivity of the gastric mucosal barrier to sodium taurocholate was studied to investigate the role of histamine in the pathophysiology of bile-induced damage to the mucosa. Two months prior to the experiments, gastric Heidenhain pouches were prepared in four mongrel dogs. In each experiment a solution was instilled into the pouch and changes in the volume and flux of H^+ and Na^+ were monitored during five 30-min periods. A standard acid solution (100 mM HCl, pH 1.2) was used during periods I, II, IV, and V, and a sodium taurocholate solution with an equimolar H^+ concentration was used in period III. Four sets of experiments were conducted: (1) constant infusion of metiamide (200 μg/50 ml/hr, i.v.), (2) injection of mepyramine (10 mg/kg, i.m.), (3) a combination of (1) and (2), and (4) constant infusion of normal saline (50 ml/hr, i.v.). The results of the control experiments and of those in which either mepyramine maleate or metiamide were given did not differ significantly. During periods I and II, there was a small loss of fluid from the pouch (overall mean, -0.2 ml). During period III (bile in the pouch), the volume recovered was consistently increased (overall mean, +0.7 ml); the absolute increase relative to period II was +0.9 ml ($p<0.001$). In period IV, there was a small overall gain of +0.2 ml, but there was a reversion to prebile values in period V. A decrease in the H^+ concentration and an increase in the Na^+ concentration occurred in each period, with the largest changes occurring during periods III and IV ($p<0.001$ and $p<0.005$ for H^+ and Na^+, resp.). Hence the overall H^+ flux was negative ($p<0.025$) and the overall Na^+ flux was positive ($p<0.005$) when compared to controls. In the experiment in which mepyramine maleate and metiamide were given together, there was no significant change in gastric fluid volume; the change in H^+ concentration in period III, although significantly greater than in period II ($p<0.03$), was much smaller ($p<0.001$) than in the first three types of experiments. The H^+ and Na^+ fluxes in periods III, IV, and V were not significantly different from those of periods I and II. The results indicate that changes in the ionic permeability of the gastric mucosal barrier are mediated through both H_1 and H_2 sites.

6835 STRESS DURATION, GASTRIC EMPTYING, AND ULCER DEVELOPMENT IN THREE STRAINS OF RATS.

(Eng.) Glavin, G. B.; Mikhail, A. A. (Dept. Psychology, Brock Univ., St. Catharines, Ontario, Canada). *Biochem. Med.* 18(1):58-63; 1977.

The effects of restraint, shock, and starvation on gastric emptying and ulcer development in Sprague-Dawley, Wistar, and Long-Evans rats were examined. In general, rumenal pathology increased over time, while glandular ulcers decreased. Sprague-Dawley rats were the most ulcer-susceptible strain ($p<0.0001$) in comparison with the other two strains, particularly in response to restraint stress ($p<0.0003$). Forty-eight hours of prestress food deprivation was found to ensure an empty stomach at autopsy. The pattern of interactions between strains and treatments suggested that differences in ulcer susceptibility were a treatment-specific phenomenon, and should be considered when designing experimental ulcer studies.

6836 EFFECT OF DIFFERENT FACTORS MODIFYING THE ACTIVITY OF SOME ENZYME SYSTEMS OF THE ENDOPLASMIC RETICULUM ON THE SENSITIVITY OF CELL ORGANELLES AGAINST THE DAMAGING ACTION OF CHEMICAL AGENTS. I: INTERRELATIONS BETWEEN THE ACTIVITY OF SOME ENZYME SYSTEMS LOCATED IN ENDOPLASMIC RETICULUM AND HEPATOTOXICITY OF CARBON TETRACHLORIDE.

(Eng.) Popov, Ch. S.; Yantchev, I.; Georgiev, G.; Geneva, L. (Higher Inst. Zootechnics and Veterinary Medicine, 6000 Stara Zagora, Bulgaria). *Br. J. Exp. Pathol.* 57(5):593-603; 1976.

The stability and activity of the hepatic lysosomal and microsomal enzyme systems of Wistar rats were studied to determine the protective effects of stress against the hepatotoxicity of carbon tetrachloride (CCl_4) and its free-radical metabolites. The animals were divided into several groups and subjected to various stresses: tumor growth (Guerin ascites tumor or Pliss lymphosarcoma), sleep deprivation (40 hr), partial immersion in 70 C water for 10 sec 24 hr prior to sacrifice (burning), dehydration (4 days), two 30-min exposures to temperatures of 38-41 C (overheating), or injections 3 hr prior to sacrifice of lanthanum (40 mg/100 g) or ruthenium red (2.5 mg/100 g, i.p.). Rats from each group were then given CCl_4 (0.2 ml/100 g) by stomach tube 6 hr before sacrifice. A delay in the increase of "free" acid phosphatase and a reduction in the increase of "free" acid phosphatase and malate dehydrogenase released from the large-granule fractions by CCl_4 indicated a stabilizing effect of tumor growth, burning, and dehydration on liver lysosomes and mitochondria. Burning also prevented some of the ultrastructural changes produced by CCl_4. Sleep deprivation and the lymphosarcoma clearly inhibited the activity of the microsomal peroxidase system, which is thought to be at least partially responsible for the transformation of CCl_4 into a free-radical form. Dehydration, burning, overheating, and the ascites tumor had variable effects on this system. Burning and overheating inhibited the aniline hydroxylase system, but the other stresses activated it. There was a frequent lack of correlation between strong antagonism to CCl_4 and a strong inhibitory effect on the microsomal peroxidase system. However, based on other studies, it is suggested that many antagonists of CCl_4 act by inhibiting its transformation into a free-radical form.

6837 NEW ASPECTS OF GASTROINTESTINAL HORMONES. (Ger.) Domschke, W.; Domschke, S. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95(14):967-971; 1977.

6838 SPECIFIC DYNAMIC EFFECT OF FOOD ON THE INTESTINAL HORMONAL SYSTEM. (Rus.) Ugolev, A. M. (I. P. Pavlov Inst. Physiology, USSR Acad. Sciences, Leningrad, USSR). *Ter. Arkh.* 48(5):66-73; 1976.

6839 THE FUNCTIONAL ACTIVITY OF MITOCHONDRIA AND THE INTENSITY OF NUCLEIC ACIDS AND PROTEIN SYNTHESIS IN MUCOSA OF RAT SMALL INTESTINE AND IN LIVER TISSUE UNDER CONDITIONS OF VARIOUS SUPPLIES OF VITAMIN D. (Rus.) Adrianov, N. V.; Shuppe, N. G.; Blazhevich, N. V.; Spirichev, V. B. (Inst. Nutrition, Acad. Medical Sciences USSR, Moscow, USSR). *Vopr. Med. Khim.* 23(4):537-545; 1977.

6840 ANEROBIC INTESTINAL FLORA IN NORMAL HUMANS [Abstract]. (Ita.) Bonomi, U. (Servizio di Microbiologia, Virologia e Immunologia, Istituti Ospitalieri, Verona, Italy). *Ann. Sclavo* 18(6):873; 1976.

6841 FORMATION OF INTESTINAL BACTERIAL FLORA AND CONSEQUENCES OF ITS CHANGES. (Ita.) Fesce, A. (Istituto di Microbiologia e Immunologia, Facolta di Medicina Veterinaria, Universita di Milano, Milan, Italy). *Ann. Sclavo* 18(6):867-868; 1976.

6842 EXPERIMENTAL STUDIES ON CHOLERA IN BABOONS. (Ita.) Ivanoff, B.; Nis, G.; Robert, D.; Fontanges, R. (Division de Microbiologie du Centre de Recherches du Service de Sante de Armees, 108, boulevard Pinel, 69272 Lyon Cedex 1, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 284(22):2309-2311; 1977.

6843 DYNAMICS OF "REVERSE DEVELOPMENT" OF DYSTROPHIC CHANGES IN THE EPITHELIUM OF THE FUNDAL GASTRIC GLAND. (Rus.) Morozov, I. A.; Aruin, L. I.; Miniailenko, M. I. (USSR Acad. Medical Sciences, Moscow, USSR). *Arkh. Patol.* 38(10):44-51; 1976.

6844 INFLUENCE OF DUODENAL JUICE ON GASTRIC EROSION IN DOGS. (Pol.) Karwowski, A. (Klinika Chirurgii Ogolnej i Plastycznej, Instytutu Chirurgii AM, ul. Cieszkowskiego 1/3 m. 39, 01-636 Warsaw, Poland). *Pol. Tyg. Lek.* 31(42):1809-1810; 1976.

6845 GASTRIN AND THE BLOOD PROTEINS. (Rus.) Klimov, P. K.; Polosatov, M. V. (Pavlov's Inst. Physiology, Acad. Sciences USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(2):313-319; 1977.

6846 ANTIGENIC STRUCTURE OF MOUSE LIVER CELL PLASMA MEMBRANES. III. LIPID HAPTENS. (Rus.) Yakimenko, E. F.; Khramkova, N. I.; Rudinskaya, T. D. (Inst. Epidemiology and Microbiology, Acad. Medical Sciences USSR, Moscow, USSR). *Tsitologiia* 19(5):545-551; 1977.

6847 COMBINED ULTRASTRUCTURAL MORPHOMETRIC AND BIOCHEMICAL INVESTIGATIONS ON THE RAT LIVER AFTER LIGATION OF THE BILE DUCT. (Ger.) Roessner, A.; Uchida, Y.; Van Husen, N.; Gerlach, U.; Witting, U.; Themann, H. (Pathologisches Institut der Westfalischen Wilhelms-Universitat, Westring 17, D-4400 Munster, W. Germany). *Z. Gesamte Exp. Med.* 169(1):9-20; 1976.

6848 PHARMACODYNAMIC DATA ON NEUROENDOCRINE INFLUENCE ON THE TONUS OF ODDI'S SPHINCTER IN VAGOTOMIZED DOGS. (Ger.) Schumann, Z.; Darup, K.; Rittmann, K. (Chirurgische Klinik der Universitat Erlangen-Nurnberg, D-8520 Erlangen, W. Germany). *Z. Exp. Chir.* 10(4):192-196; 1977.

6849 TOXICOLOGICAL STUDY ON PIPROZOLIN. (Ger.) Wiegleb, J.; Herrmann, M.; Leuschner, F. (Forschungsinstitut der Godecke AG, Biologische Forschung und Entwicklung, Mooswaldalle 1-9, 7800 Freiburg/Brsg., W. Germany). *Arzneim. Forsch.* 27(2b):493-499; 1977.

See also, 6755, 6818, 6953, 7092.

DIAGNOSTIC PROCEDURES

6850 A NEW ENZYMATIC METHOD FOR DETERMINATION OF SERUM CHOLINE-CONTAINING PHOSPHOLIPIDS. (Eng.) Takayama, M.; Itoh, S.; Nagasaki, T.; Tanimizu, I. (Res. Lab., Nippon Schoji Kaisha, Ltd., 24-3, Sho 2-chome, Ibaraki-city, Osaka, Japan). *Clin. Chim. Acta* 79(1):93-98; 1977.

A new enzymatic method was developed for the determination of serum choline-containing phospholipids with a combined enzymatic method using phospholipase D (from *Streptomyces* species), choline oxidase (from *Arthrobacter* species), and peroxidase. The method is reproducible, and the results correlate well with those obtained by a conventional digestive method. The method affords better specificity, requires a smaller quantity of the sample and shorter time than those previously reported, and has excellent precision.

6851 AN IN VITRO INVESTIGATION OF BARIUM MEALS. (Eng.) Simmonds, R. J.; James, A. M. (Dept. Chemistry, Bedford Coll., Univ. London, Regent's Park, London NW1 4NS, England). *Cytobios* 15(60):191-200; 1976.

A technique is described for the *in vitro* study of the interaction of various barium sulfate suspensions, used as radiopaques, with a rat ileum. The technique allows close approximation to the *in vivo* situation if there is accurate control of certain experimental conditions: (a) the animal must be fasted for 24 hr before the experiment, (b) tissue slices must be removed from the same region of the intestine (5-20 cm from stomach), (c) the mucosal surface of the ileum must not be disturbed during cutting or washing, (d) during exposure to the radiopaque the glass cells must be gently agitated, (e) freezing must be instantaneous, and (f) tangential sections must not be taken from the extreme edges of the frozen tissue. The thickness of the radiopaque retained at the gut surface was directly related to the particle concentration of the suspension (50%, 25%, and 12.5% w/v), while the uniformity of the layer showed the reverse trend. There was no significant difference in either the thickness or the uniformity of the adhering layer over the pH range 3-8. Less stable suspensions produced thicker but not uniform adhering layers of the radiopaque, and less viscous suspensions gave better coating of the gut surface. The nature of the stabilizing agent or the surface charge carried by the particles did not affect the adhesion of the particles to the ileal mucus. The technique is convenient, quick, economical, and reproducible, and its usefulness in comparing the properties of various radiopaques could be greatly improved if a better method of assessing the adhering layer of radiopaque were available.

6852 GALLIUM-67 DEPOSITION IN THE HUMAN GASTRO-INTESTINAL TRACT. (Eng.) Newstead, G.; Taylor, D. M.; McCready, V. R.; Bettelheim, R. (Royal Marsden Hosp., Sutton, Surrey, England). *Int. J. Nucl. Med. Biol.* 4(2):109-112; 1977.

The relative distribution of ^{67}Ga between the intestinal walls and contents was studied. Concentrations of ^{67}Ga in the normal human gastrointestinal tract were measured in samples obtained at operation 5-72 hr after the administration of 300-500 μCi of ^{67}Ga citrate. The concentrations in stomach, ileum, colon, and rectum were about 2.5-15% dose/kg wet tissue, and no clear evidence of a change in concentration with time after injection was seen. These values are comparable with those previously observed in liver and spleen. Studies in 25 samples of colorectal tumors showed a mean tumor:normal tissue concentration ratio of 3.7:1. A comparison of ^{67}Ga and DNA concentrations in small pieces of tumor and normal tissue suggested a good correlation between ^{67}Ga uptake and the cellularity of the tissue for normal tissues but not for tumors. Samples of gallbladder bile obtained from four patients at operation at 5, 24, and 48 hr after ^{67}Ga administration contained about 2% dose/l, and gel filtration studies showed that the nuclide was present as a low molecular weight complex. Assuming a bile flow of about one liter per day, this would correspond to a biliary excretion of between 2% and 3% per day, which, if there is no reabsorption of ^{67}Ga is sufficient to account for reported values for the fecal excretion of ^{67}Ga. These results suggest that the concentrations of ^{67}Ga occurring in the intestinal walls are probably higher than those in the intestinal contents. It seems worthwhile to reassess the value of ^{67}Ga citrate as an agent for the localization of intestinal tumors after the colon and rectum have been emptied by a suitable regimen.

6853 RETROSPECTIVE COMPARISON OF RADIONUCLIDE SCANS AND COMPUTED TOMOGRAPHY OF THE LIVER AND PANCREAS. (Eng.) MacCarty, R. L.; Wahner, H. W.; Stephens, D. H.; Sheedy, P. F.; Hattery, R. R. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Am. J. Roentgenol.* 129(1):23-28; 1977.

Computed tomography (CT) and radionuclide examinations of the liver and pancreas were compared retrospectively in 50 patients to evaluate their value as diagnostic tests. CT was superior to ^{75}Se-selenomethionine in evaluating pancreatic disease. Both ^{99m}Tc-sulfur colloid scans and CT scans were sensitive indicators of liver masses; however, there were more false-positive ^{99m}Tc-sulfur colloid scans (16%) than false-positive CT scans (4%). CT was superior in detecting biliary obstruction and ascites, in assessing diseases that involved the liver extrinsically, and in evaluating the status of adjacent organs. ^{99m}Tc-sulfur colloid scans were more sensitive in detecting diffuse non-neoplastic liver diseases (cirrhosis, hepatitis, and cholangitis). Simultaneous interpretation of CT and radionuclide scans was often more helpful than independent interpretation, and the two techniques are therefore complementary.

6854 DEFINITIVE ROLE OF CT SCANNING OF THE PANCREAS. (Eng.) Haaga, J. R.; Alfidi,

R. J.; Havrilla, T. R.; Tubbs, R.; Gonzales, L.; Meaney, T. F.; *et al.* (Cleveland Clinic, 9500 Euclid Ave., Cleveland, OH 44106). *Radiology* 124 (3):723-730; 1977.

The diagnostic accuracy of angiography, ultrasonography, and computed tomography (CT) for detecting neoplasia and inflammation of the pancreas was compared. In a group of 188 patients, 192 Ct scans of the pancreas were done. The patients were divided into two groups: those with surgical confirmation and those with clinical correlation. CT was the most effective method of detecting neoplastic (28/32 surgically confirmed and 94/106 clinically confirmed cases) and inflammatory disease (13/19 surgically confirmed and 8/9 clinically confirmed acute pancreatitis cases). Ultrasound correctly diagnosed 4 of the 7 neoplasms, and angiography was correct concerning 7 of 12 neoplasms in the surgically confirmed group of cases. The overall accuracy for both groups (surgical and clinical) of CT was 83% and of ultrasound was 68%. CT was the most accurate means of detecting the primary disease. Inflammatory disease of the pancreas was amenable to CT evaluation if there were morphologic changes such as enlargement or if any alteration in the attenuation numbers was produced by deposition of calcium or collections of fluid. The full extent of the disease process, including involvement of the retroperitoneum and metastasis to the liver, was visualized by CT in one examination only. All three methods for the evaluation of the pancreas have definite diagnostic roles.

6855 COMPUTED TOMOGRAPHIC EVALUATION OF THE PANCREAS. (Eng.) Stanley, R. J.; Sagel, S. S.; Levitt, R. G. (Washington Univ. Sch. Medicine, 510 South Kingshighway, St. Louis, MO 63110). *Radiology* 124(3):715-722; 1977.

A large number of patients (352) were studied in attempts to clarify the diagnostic role of computed body tomography (CT). A CT diagnosis of normal pancreas was made in 218 cases. The majority of cases (10 of the 14 patients) that could not be confirmed as normal correlated with a subsequent benign clinical course. The size, shape, and position of the normal pancreas was highly variable. Specific abnormality, diagnosed by CT in 88 cases, was categorized as either cancer (50 patients), acute or chronic pancreatitis (27 patients), pseudocysts (9 patients), or miscellaneous (2 patients, lymphoma posterior to the body and tail of pancreas). Another 20 patients were considered "indeterminate" and had surgery even though no other sign of malignancy was present apart from smooth focal enlargement of pancreas. Although there was no operative or histologic confirmation in 18 of 27 cases diagnosed as acute or chronic pancreatitis, the history, serum chemistry studies, and clinical course were consistent in all but 3 patients (in whom adequate follow-up was lacking). CT and ultrasound examinations were compared in 45 patients, and the interpretations were in agreement. However, when the results of the two techniques varied, CT was correct 81% of the time in the confirmed cases. CT and ultrasound techniques are complementary to each other. CT is useful in following the clinical course of patients to determine their response to radiation therapy, chemotherapy, or surgical intervention.

6856 COMPUTED TOMOGRAPHY OF THE NORMAL PANCREAS. (Eng.) Kreel, L.; Haertel, M.; Katz, D. (Div. Radiology, Clinical Res. Center, Harrow, Middlesex HA1 3UJ, England). *J. Computer Assisted Tomography* 1(3):290-299; 1977.

The normal anatomy of the pancreas was demonstrated by computed tomography (CT) with the EMI general purpose scanner in 50 patients without pancreatic disease and in 15 normal postmortem pancreas. The problems of optimal demonstration of the pancreas in CT and the possible causes of misinterpretation of the pancreatic axial tomography are considered. The ventrodorsal diameter of the normal pancreas was found to be 23 ± 3.0 mm for the head, 19 ± 2.5 mm for the neck, 20 ± 3.0 mm for the body, and 15 ± 2.5 mm for the tail. In assessing these values, it is important to be sure that adjacent structures such as the portal vein, splenic vein, and duodenum are not included in the measurement; that the measurements are taken on scans of maximum resolution without movements; and that the measurements are strictly related to the arteroposterior or ventrodorsal diameter. A close correlation between the ventrodorsal diameter and craniocaudal diameter of approximately 1:2 is reported. In the majority of patients, the pancreas appeared to have smooth contours, but in 20% of the patients, it appeared as a lobulated organ. It is reported that gantry tilt will distort the diameter measured. Careful preparation of the patient with a low residue diet, injection of anticholinergic drugs, breath-holding during the exposure time, and avoidance of dense gastrointestinal contrast medium during the period of CT examination are suggested.

6857 THE ROLE OF ERCP IN THE DIAGNOSIS AND INDICATION FOR SURGICAL TREATMENT OF DISEASES IN THE REGION OF THE PAPILLA OF VATER. (Ger.) Soehendra, N.; Werner, B. (Chirurgische Universitatsklinik, Martinistr. 52, D-2000 Hamburg, W. Germany). *Zentralbl. Chir.* 102(14):839-843; 1977.

6858 MISLEADING ROENTGENOLOGICAL FINDINGS IN THE DIAGNOSIS OF INTESTINAL DISEASES. (Cze.) Novak, B.; Horak, J.; Halek, J. (250 01 Brandys n. L., Brazdimska 1000, Prague, Czechoslovakia). *Cesk. Radiol.* 31(2):136-140; 1977.

6859 CLINICAL EVALUATION OF SUPPLEMENTARY METHODS ENLARGING THE DIAGNOSTIC POSSIBILITIES OF GASTRODUODENOFIBROSCOPY. (Rus.) Tsimmerman, Ya. S.; Artemov, O. T. (Perm Medical Inst., Perm, USSR). *Vrach. Delo* (3):33-38; 1977.

6860 ENDOSCOPY OF BILE DUCTS. (Pol.) Popiela, T.; Karcz, D. (31-202 Krakow, ul. Pradnicka 37, Poland). *Pol. Przegl. Chir.* 49(5):499-504; 1977.

6861 INTRAOPERATIVE CHOLANGIOGRAPHY IN THE DIAGNOSIS OF BENIGN DISEASES OF BILE DUCTS. (Pol.) Poltorak, J. L. (01-640 Warszawa, ul. Paska 9, Poland). *Przegl. Chir.* 49(4):411-417; 1977.

See also, 6731, 6744, 6828, 6829, 6868, 6870, 6874, 6883, 6887, 6895, 6899, 6912, 6919, 6925, 6926, 6935, 6940, 6949, 6950, 6952, 6959, 6971, 6973, 6976, 6984, 6997, 6998, 6999, 7002, 7003, 7010, 7012, 7024, 7025, 7039, 7042, 7054, 7065, 7069, 7071, 7073, 7082, 7083, 7086, 7087, 7088, 7120, 7123, 7125, 7127, 7129, 7130, 7195, 7196, 7197, 7199, 7201, 7214, 7219, 7222, 7227, 7229, 7233, 7235, 7246, 7254, 7263, 7270.

GASTROINTESTINAL DISEASES

ESOPHAGUS

6862 ADENOCARCINOMA IN THE COLUMNAR-LINED (BARRETT) ESOPHAGUS: CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Poleynard, G. D.; Marty, A. T.; Birnbaum, W. B.; Nelson, E. R.; Reilly, R. R. (Naval Regional Medical Center, 7500 E. Carson St., Long Beach, CA 90882). *Arch. Surg.* 112(8):997-1000; 1977.

Three patients with adenocarcinoma arising in the columnar-lined lower esophagus are described. The patients were three men, aged 47, 54, and 25 yr, the latter being the youngest man reported with adenocarcinoma in Barret's esophagus. Barium swallow revealed a stricture in all cases, and the diagnoses were confirmed by endoscopic biopsy. Hiatal hernia was present in two patients. All patients survived esophagogastrectomy and radiotherapy, but each had metastatic disease and a guarded prognosis. A review of the literature revealed a male/female ratio of 3:1 for this disorder, with a mean age for men and women of 53 and 61 yr, resp. Columnar-lined lower esophagus is seen in up to 11% of patients with reflux esophagitis; adenocarcinoma later develops in 2.4-8.5%. Patients with documented hiatus hernia and/or significant reflux symptoms or both should undergo esophagoscopy. If columnar-lined esophagus is found, an antireflux procedure should be performed. All patients with columnar-lined esophagus should be closely followed up. In cases of adenocarcinoma in which curative resection is contemplated, complete extirpation of all columnar-lined lower esophagus is desirable.

6863 GASTRO-OESOPHAGEAL ACID REFLUX IN PATIENTS WITH SYMPTOMATIC HIATUS HERNIA AND EFFECT OF A MODIFIED BELSEY MK IV REPAIR ON ACID REFLUX. (Eng.) Boesby, S. (Odense Sygehus, Sdr. Boulevard 29, DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12(5):553-569; 1977.

Twelve-hour continuous recording of pH at the distal end of the esophagus was carried out in 59 patients with sliding hiatal hernia and symptoms suggestive of gastroesophageal reflux, and the results were compared with those obtained in normal subjects. The patients were grouped into those with heartburn (group A) and those with heartburn and pain (group B). The mean duration of pH ≤ 2.3, pH ≤ 3, pH ≤ 4, and pH ≤ 5, expressed in percentages of the total time of recording was longer in patients than in normal subjects. There was no difference in mean number of reflux episodes between patients and normal subjects. The clearest separation between the two groups was obtained by the variable duration of pH ≤ 5 (group A compared to normal subjects, $p < 0.0002$; group B compared to normal subjects, $p < 0.00006$). Irrespective of the variable used, the results did not seem to be related to the degree of severity of the symptoms. Individual sensitivity of the esophageal mucosa, the content of bilious components in the refluxed material, and the semiquantitative character of the investigation may, in part, account for the results. Furthermore, the same investigation was carried out before and three months after a modified Belsey MK IV repair in 39 patients with hiatal hernia and symptoms indicating surgical treatment. The operation was followed by a reduction in the tendency to acid reflux (pH ≤ 5, $p < 0.00006$), probably as a result of an increase in the competence of the gastroesophageal region.

6864 MALLORY-WEISS SYNDROME: A CHANGING CLINICAL PICTURE. (Eng.) Todd, G. J.; Zikria, B. A. (Presbyterian Hosp., Columbia-Presbyterian Medical Center, New York, NY). *Ann. Surg.* 186(2):146-148; 1977.

The records of 16 patients with upper gastrointestinal hemorrhage secondary to endoscopically or surgically documented Mallory-Weiss syndrome were reviewed. The patients ranged in age from 26-68 yr (9 men), and a history of chronic heavy alcohol consumption was present in 14 patients. In 13 of 18 bleeding episodes, retching and regurgitation of food or clear material occurred prior to the onset of hematemesis. Painless hematemesis was reported in 17 of the 18 episodes. The diagnosis was made endoscopically in 16 of 17 instances. Surgery was performed in six bleeding episodes. Among the surgically treated cases, there was one death from hepatic failure 16 days after oversewing both a gastric mucosal tear and a bleeding varix in a 62-yr-old man with cirrhosis. A review of the literature reveals that the clinical spectrum, prognosis, and opinion regarding the etiology and treatment of the syndrome have changed in the last decade. Increased awareness of gastroesophageal lacerations secondary to emesis, as well as other causes of significantly increased intraesophagogastric pressures, and widespread use of fiberoptic endoscopy have resulted in the identification of this syndrome with increasing frequency. It is recommended that endoscopy be carried out in all cases of upper gastrointestinal hemorrhage, and that patients with Mallory-Weiss syndrome be managed medically unless hemorrhage is massive or persistent.

6865 OESOPHAGEAL STRICTURES. (Eng.) Bennett, J. R. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):109-116; 1976.

6866 SOME SURGICAL ASPECTS. (Eng.) Belsey, R. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):117-125; 1976.

6867 COURSE AND PROGNOSIS. (Eng.) Bremner, C. G. *In: Topics in Gastroenterology.*

Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):127-146; 1976.

6868 ESOPHAGODUODENOSCOPY. (Ita.) Spotti, D.; Visconti, G. P.; Marini, W. (Ospedale S. Carlo Borromeo, Italy). *Terapia* 61(439):90-93; 1976.

6869 ABNORMAL PASSAGE OF CONTRAST MEDIUM DURING THE EXAMINATION OF THE ESOPHAGOGASTRIC TRANSIT (REPORT OF THREE CASES). (Fre.) Bret, M.; Hullo, A.; Perrot, E. (Hotel-Dieu, 69288 Lyon, Cedex 1, France). *J. Med. Lyon* 57(1306):583-591; 1976.

5870 EXPERIENCE IN THE APPLICATION OF LARGE-FRAME FLUOROGRAPHY FOR DETECTION OF CAR-CINOMA OF THE ESOPHAGUS IN MASS EXAMINATION OF THE POPULATION. (Rus.) Turganbaev, A. (Dept. x-ray Diagnostics, Kazakh Scientific Res. Inst. Oncology and Radiology, Alma-Ata, USSR). *Vestn. Rentgenol. Radiol.* (6):32-35; 1976.

6871 ESOPHAGEAL ANASTOMOSIS WITH MAGNETIC BUTTON. (Dut.) Jansen, A. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(33):1309; 1977.

6872 LATE RESULTS OF TREATMENT OF MEGAESOPHAGUS. (Fre.) Loygue, J. (Hopital St-Antoine, 184, faubourg St-Antoine, 75012 Paris, France). *J. Chir. (Paris)* 111(4):491-500; 1976.

6873 INCOMPLETE AORTIC RING (ARCUS AORTAE CIRCUMFLEXUS); COMPRESSION OF ESOPHAGUS AND TRACHEA. (Ger.) Schubel, B.; Evers, G.; Oldag, D.; Bartel, J.; Munster, W. (Chirurgische Klinik des Bereichs Medizin [Charite] der Humboldt-Universitat, DDR-104 Berlin, Schumannstr. 20/21, E. Germany). *Zentralbl. Chir.* 102(8):495-499; 1977.

See also, 6681, 6708, 6736, 6874, 6943, 7185, 7186, 7239, 7242, 7247, 7260.

STOMACH

5874 ANGIOGRAPHIC MANAGEMENT OF GASTROINTESTINAL BLEEDING WITH VASOPRESSIN. (Eng.) Kadir, .; Athanasoulis, Ch. A. (Massachusetts General osp., Boston, MA 02114). *Fortschr. Roentgenstr.* 27(2):111-119; 1977.

elective arteriography and infusions of vasopressin 0.2-0.4 U/min for 20-30 min) have become valuable ools for localization and therapy of acute gastro-ntestinal hemorrhage. These procedures are best pplicable to those patients in whom conservative easures are unsuccessful and in those who are poor urgical risks. Gastric mucosal hemorrhage can be reated successfully in about 84% of the cases. astric ulcer can be treated successfully in about 5-70% of cases. Acute colorectal bleeding is con-rolled in about 90% of patients. Caution is sug-ested in the use of vasopressin under anesthesia or imultaneously with ganglionic blocking agents or in atients with ischemic heart disease. Careful fluid nd electrolyte monitoring and occasional use of di-retics is suggested to avoid retention of water and lectrolyte imbalance.

375 ELECTRON MICROSCOPIC STUDY OF SIGNET-RING CELLS IN DIFFUSE CARCINOMA OF THE HUMAN TOMACH. (Eng.) Yamashiro, K.; Suzuki, H.; Nagayo, (Pathology Lab., Aichi Cancer Center, Res. Inst., ikusa-ku, Nagoya 464, Japan). *Virchows Arch. athol. Anat.*] 374(4):275-284; 1977.

The signet-ring cells seen in six cases of gastric carcinoma of the diffuse type were studied by light and electron microscopy to develop new methods for differentiating diffuse gastric carcinoma. These cells were classified into three main types (A, B, and C) based on intracellular mucous granules, nuclei and cellular organelles, and their reactions to PAS and Alcian-blue staining. Type A signet ring cells had round nuclei in the center, abundant cell organelles, sparsely distributed dense mucous granules (0.3-0.5 μ), and PAS-staining only. The type B cells had eccentric, elliptical nuclei, fewer cell organelles, moderate-density medium mucous granules (0.5-1 μ), and mainly PAS-staining. The type C cells had peripherally compressed nuclei, markedly decreased cell organelles, low-density large mucous granules (2 μ), and stained mainly with Alcian-blue. The gradual transition of type A cells to type B and the subsequent change of type B to type C suggest successive stages in maturation of these cells that arise from the same cell system. These cells, especially those of type B, resemble the mucous neck cells of the corpus and the glands of the pylorus. The appearance of type A signet-ring cells can be regarded as an initial malignant change in the nonmetaplastic gastric mucosa.

6876 AN IN VIVO STATHMOKINETIC STUDY OF CELL PROLIFERATION IN HUMAN GASTRIC CARCINOMA AND GASTRIC MUCOSA. (Eng.) Wright, N. A.; Britton, D. C.; Bone, G.; Appleton, D. R. (Radcliffe Infirmary, Oxford, England). *Cell Tissue Kinet.* 10(5):429-436; 1977.

Cell production rates (CPR) were studied in 11 patients with carcinoma of the stomach using an *in vivo* technique (determination of mitotic indices using 3 μm paraffin sections) with vincristine (0.045 mg/kg body weight), to find a kinetic parameter in individual human tumors that could be used to predict therapeutic responses to a specially designed radiotherapeutic and chemotherapeutic regimen. The adjacent normal mucosa and hyperplastic and metaplastic gastric mucosa were also studied. The CPR for normal mucosa varied from 8-16 cells/1,000 cells/hr, and for carcinomas it varied from 3 to 24 cells/1,000 cells/hr. The CPR appeared elevated in hyperplastic mucosa (22.5-30.5 cells/1,000 cells/hr) and in mucosa displaying intestinal metaplasia (21.5-33.0 cells/1,000 cells/hr). Because of the very large variation in the data, comparison between individual tumors and normal mucosa is not regarded as worthwhile at the present stage of development of this procedure.

6877 TREATMENT OF GASTRIC CANCER, WITH SPECIAL REFERENCE TO THE SURVIVALS OF THE CANCER PATIENTS TREATED WITH MULTIPLE COMBINATION MFC THERAPY OR IMMUNOCHEMOTHERAPY OF MFC PLUS OK-432 (NSC B116209).

(Eng.) Suga, S.; Tsunekawa, H.; Washino, M.; Makino, N.; Tamura, Z.; Goto, S. (Natl. Nagoya Hosp., Naka-ku, Nagoya, 460 Japan). *Gastroenterol. Jpn.* 12(2):20-29; 1977.

Comparative study of the survival of 81 patients (35-80 yr old) with advanced gastric cancer is reported. Fifty-five patients were treated with a combination chemotherapy (MFC therapy) of mitomycin C (0.08 mg/kg), 5-fluorouracil (10 mg/kg), and cytosine arabinoside (0.8 mg/kg) administered i.v. twice a week for the first 2-3 weeks and then once a week until the patient's leukocyte count became less than 2,000-3,000/mm^3 or until the patient's platelet count dropped to less than 7-10 x $10^4/mm^3$. Twenty-six patients were treated with an immunochemotherapy of MFC plus OK-432 (i.m.) given in increasing doses (0.2-2.0 mg) four times per week for 2 weeks, 2.0 mg/kg doses three times a week for 6 weeks, and 2.0 mg/kg doses once a week thereafter. Fifty-percent survival times were 5.4 months for the MFC group, and 7.5 months for the MFC plus OK-432 group. One-year survival rates of each group were 13 and 35%, resp. The 2-yr survival was null for the MFC group, and 13% for the MFC plus OK-432 group. Thus, the patients treated with MFC plus OK-432 showed significantly longer survival compared to the patients treated with MFC alone ($p<0.05$). The case report of a 38-yr-old man with primary gastric cancer and skin metastasis is presented to illustrate a remarkable improvement of the stomach lesions and eventual complete remission on MFC plus OK-432 therapy. Two patients showed remarkable improvement initially on MFC plus OK-432 therapy, but, though still living, have developed recurrence of tumors. Because of the toxicity and/or the ineffectiveness of MFC during long-term administration, 5-fluorouracil *per os* plus OK-432 is recommended as a maintenance therapy for gastric cancer.

6878 CHRONIC EROSIVE (VERRUCOUS) GASTRITIS: A STUDY OF 108 PATIENTS.

(Eng.) Green, P. H. R.; Fevre, D. I.; Barrett, P. J.; Hunt, J. H.; Gillespie, P. E.; Nagy, G. S. (Royal North Shore Hosp. Sydney, St. Leonards N.S.W., 2065 Australia). *Endoscopy* 9(2):74-78; 1977.

One hundred and eight cases of chronic erosive gastritis diagnosed from 3,800 upper gastrointestinal endoscopies, during a 6-yr period, were reviewed. Gastritis occurred together with gastric ulceration in 11 patients, with duodenal ulceration in 23, with gastric malignancies in 4, and with esophagitis in 1. There was a significant ($p<0.01$) relation between the existence of duodenal ulcer together with chronic erosive gastritis. Chronic erosive gastritis occurred most frequently in men aged 60-69 yr. In 18 patients, gastritis was observed during emergency endoscopy for gastrointestinal bleeding; 11 had associated lesions that were thought to be responsible for the bleeding.

6879 PROGNOSIS OF MEDICALLY TREATED GASTRIC ULCER: A PROSPECTIVE ENDOSCOPIC STUDY.

(Eng.) Halse, S. A.; Kristensen, E. M.; Moller Jensen, O.; Morkbak, N. K. (Copenhagen County Hosp., S. Elisabeth, DK 2300 Copenhagen S, Denmark). *Scand. J. Gastroenterol.* 12(4):489-495; 1977.

Fifty-four patients with endoscopic evidence of gastric ulcer (greater than 1.5 cm in 6 patients and less than 1.5 cm in 48 patients) in the antrum (63%) and the body (37%) were studied. Patients with ulcer showing incipient healing, superficial erosions, manifest or suspected malignancy, or indication for surgery were excluded. The study was comprised of a treatment phase and a follow-up phase. The treatment phase covered the time from diagnostic gastroscopy until complete healing of the ulcer. During this period the patients were treated with antacids and anticholinergics and were advised to abstain from alcohol and smoking. If indicated by their clinical condition, the patients were admitted to hospital. During the treatment phase, endoscopy was performed at intervals of 3-6 weeks until healing. During the follow-up phase, endoscopy was carried out in the event of dyspeptic complaints that might indicate recurrent ulcer. The healing and recurrence rates for various periods were calculated by the aid of the life-table method. After 1 month of treatment, 13% of the patients exhibited healing, after 2 months 29%, after 3 months 41%, and after 12 months 79%. In 1 month, 9% of the primarily healed ulcers had recurred, in 2 months 15%, in 3 months 22%, and in 12 months 43%. The healing rate is appreciably lower than results previously reported in the literature, whereas the recurrence rate is in closer agreement with that found in previous studies.

6880 TREATMENT OF CHRONIC GASTRIC ULCER: A STUDY OF THE TREATMENT RECEIVED BY 135 GASTRIC ULCER PATIENTS IN A WESTERN COMMUNITY.

(Eng.) Piper, D. W.; Greig, M.; Shinners, J.; Coupland, G. A. E. (Royal North Shore Hosp., St. Leonards, New South Wales 2065, Australia). *Aust. N.Z. J. Med.* 7(3):238-242; 1977.

6881 ON THE AETIOLOGY OF GASTRIC CANCER: MUTAGENICITY OF FOOD EXTRACTS AFTER INCUBATION WITH NITRITE. (Eng.) Marquardt, H.; Rufino, F.; Weisburger, J. H. (Naylor Dana Inst. Disease Prevention, Valhalla, NY 10595). *Food Cosmet. Toxicol.* 15(2):97-100; 1977.

6882 PHYSIOLOGY AND PATHOPHYSIOLOGY OF THE CARDIAC SPHINCTER. (Fre.) Tournut, R. (Service de Gastroenterologi, C.H.U. Purpan, F 31052 Toulouse Cedex, France). *Arch. Fr. Mal. App. Dig.* 65(5):409-420; 1976.

6883 CEA CONTENT IN THE GASTRIC JUICE AND ITS RELATION TO THE HISTOLOGICAL AND MACROSCOPIC ASPECT OF THE GASTRIC MUCOSA. (Ger.) Bosseckert, H.; Muller, M.; Kuhne-Heid, R. (Medizinischen Klinik, Friedrich-Schiller-Universitat, Bachstr. 18, DDR-69 Jena, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):141-142; 1976.

6884 EFFECTS OF COATED ACETYLSALICYLIC ACID (ENTROPHEN) AND PLAIN ACETYLSALICYLIC ACID ON THE GASTRIC MUCOSA: COMPARATIVE ENDOSCOPIC STUDY. (Fre.) Giroux, Y.; Archambault, A.; Farley, A.; Gosselin, D.; Orr, J. M.; Marier, G.; Schipper, H. L. (Centre de gastro-enterologie et d'endoscopie de la Rive Sud). *Union Med. Can.* 106(6):841-847; 1977.

6885 FUNCTIONAL ACHLORHYDRIA. (Ger.) Kinzlmeier, H.; Freitag, H. (Innere Abteilung, St. Rochusstift, D-6990 Bad Mergentheim, W. Germany). *Z. Gastroenterol.* 14(4):480-486; 1976.

6886 GASTRIC CARCINOMA IN THE STUMP AFTER RESECTION ON ACCOUNT OF PEPTIC ULCER ON THE LATE DIAGNOSIS OF GASTRIC TUMORS. (Cze.) Krysl, I. (Chirurgicka klinika lekarske fakulty hygienicke KU, Prague, Czechoslovakia). *Rozhl. Chir.* 55(6):396-398; 1976.

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6889 GASTRIC LOCALISATION OF MALIGNANT LYMPHOGRANULOMATOSIS. CASE REPORT. (Fre.) Furnemont, E. (Clinique Saint-Anne, Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(7/8):251-260; 1976.

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6891 CHRONIC GASTRITIS AND LIFE EXPECTANCY. (Ger.) Wolff, G. (Regierungskrankenhaus, Scharnhorststr. 36, DDR-104 Berlin, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):223-224; 1976.

6892 CHOICE OF THE METHOD OF SURGICAL TREATMENT OF THE DUMPING SYNDROME. (Rus.) Ananyev, V. G.; Spivak, V. P.; Shevchenko, B. F.; Bondarenko, P. G. (Dept. Digestive Surgery, Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Klin. Khir.* (11):32-36; 1976.

6893 INVESTIGATION OF BLAST TRANSFORMATION OF LYMPHOCYTES IN PATIENTS WITH CHRONIC GASTRITIS AND PEPTIC ULCER. (Rus.) Chumakova, A. V.; Vainshtein, S. G. (V. I. Lenin Kazan Inst. Advanced Medical Studies, Kazan, USSR). *Ter. Arkh.* 49(2):16-18; 1977.

6894 ULTRASTRUCTURAL STUDY OF CHRONIC GASTRITIS. (Spa.) Jorge, A. D.; Picatoste, R.; del Valle, A.; Diaz Flores, L. (Hospital Espanol, Mendoza, Argentina). *Acta Gastroenterol. Latinoam.* 7(1):5-15; 1977.

6895 STUDY OF THE HISTOMORPHOLOGICAL CHANGES IN VARIOUS TOPOGRAPHIC SECTIONS OF THE GASTRIC MUCOUS MEMBRANE BY GASTROSCOPIC BIOPSY. (Rus.) Gvantseladze, V. I. (Tbilisi State Medical Inst., Tbilisi, USSR). *Bull. Acad. Sci. Georgian SSR* 84(1):197-200; 1976.

6896 ACID-SECRETING PARIETAL CELL MASS, GASTRINEMIA DURING CHRONIC GASTRITIS [Abstract]. (Fre.) Giacosa, A.; Turello, V.; Icardi, A. (Ospedale S. Martino, Genoa, Italy). *Gastroenterol. Clin. Biol.* 1(5):490-491; 1977.

6897 THE SURGEON'S DIAGNOSTIC AND THERAPEUTIC TACTICS IN ACUTE GASTRIC HAEMORRHAGE. (Cze.) Moravec, R.; Ohradka, B.; Lukac, M.; Simek, L.; Labas, P. (Katedra Chirurgie I, Lekarskej fakulty Univerzity Komenskeho, Bratislava, Czechoslovakia). *Cas. Lek. Cesk.* 115(38):1167-1170; 1976.

6898 COMPARISON OF MEDICAL AND SURGICAL TREATMENT OF DIGESTIVE TRACT HEMORRHAGES DUE

TO ACUTE POSTOPERATIVE GASTRITIS [Abstract]. (Fre.) Flamant, Y.; Elman, A.; Montariol, T.; Maillard, J. N. (Hopital Louis-Mourier, 92700 Colombes, France). *Gastroenterol. Clin. Biol.* 1(5):483; 1977.

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6901 LINITIS PLASTICA OF THE STOMACH. A STUDY BASED ON 25 CASES. (Fre.) Faivre, J.; Moulinier, B.; Berthezene, M.; Lesbros, F.; Lambert, R. (Hopital Edouard-Herriot, Place d'Arsonval, F 69374 Lyon Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 65(4):277-285; 1976.

6902 INTRAGASTRIC LOSS AND INTESTINAL MALABSORPTION OF FOLIC ACID IN MENETRIER'S DISEASE [Abstract]. (Fre.) Belaiche, J.; Matuchansky, C.; Zittoun, J.; Rambaud, J. C.; Bernier, J. J.; Cattan, D. (Hopital de Villeneuve-Saint-Georges, Villeneuve-Saint Georges, France). *Gastroenterol. Clin. Biol.* 1(5):492; 1977.

6903 RUPTURE OF THE STOMACH AND INTESTINES IN TRAFFIC ACCIDENTS. (Ger.) Thoma, R.; Cadalbert, M.; Simeon, B. (Kantonales Spital, CH-8880 Walenstadt, Switzerland). *Helv. Chir. Acta* 44(1/2):123-127; 1977.

6904 SUCCESSFUL TREATMENT OF ULCER WITH HISTAMINE ANTAGONISTS. (Ger.) Blum, A. L. (Stadtspital Triemli, Birmensdorferstrasse 497, CH-8063 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(43):1457-1459; 1976.

6905 HIGHLY SELECTIVE VAGOTOMY WITHOUT GASTRIC DRAINAGE IN THE TREATMENT OF DUODENAL ULCER (PRELIMINARY RESULTS IN 100 CASES) [Abstract]. Saubier, E. C.; Beretvas, G.; Partensky, C.; Minaire, Y.; Descos, L. (Hopital E.-Herriot, Pavillon O, Lyon, France). *Gastroenterol. Clin. Biol.* 1(5):481-482; 1977.

6906 A NEW PROCEDURE OF GASTROPLASM AFTER TOTAL GASTRECTOMY. (Fre.) Moricca, F. (Hopital "L. Parodi-Delfino" de Colleferro, Rome, Italy). *J. Chir. (Paris)* 111(5/6):617-620; 1976.

6907 STOMA DYSFUNCTION FOLLOWING PARTIAL GASTRIC RESECTION [Abstract]. (Dut.) Bijleveld, R. Th. (No affiliation given). *Ned. Tijd.-schr. Geneeskd.* 121(33):1310; 1977.

6908 MOTOR-EMPTYING GASTRIC DISORDERS EARLY AFTER PARTIAL GASTRECTOMIES. (Rus.) Bachev, I. I. (Surgical Clinic, Ivanovo Medical Inst., Ivanovo, USSR). *Khirurgiia (Mosk)* 4:70-73; 1977.

6909 MOTOR-EVACUATION FUNCTION AND BIOELECTRICAL ACTIVITY OF THE STOMACH FOLLOWING SELECTIVE PROXIMAL VAGOTOMY. (Rus.) Postolov, P. M.; Baido, V. P.; Kitaev, V. V.; Kuzin, N. M.; Kiselev, Yu. I. (N. N. Burdenko Surgical Clinic, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (11):13-17; 1976.

6910 SOME PROTEIN METABOLISM CHANGES IN PATIENTS ON LONG-TERM PERIOD AFTER GASTRECTOMY. (Cze.) Beno, I.; Chorvathova, V.; Cerven, J. (Vyskumny ustav vyzivy Iudu, Bratislava, Czechoslovakia). *Cas. Lek. Cesk.* 115(37):1129-1132; 1977.

See also, 6730, 6732, 6733, 6736, 6832, 6835, 6859, 6863, 6864, 6868, 6869, 6913, 6915, 6916, 6918, 6919, 6921, 6930, 6934, 6936, 6937, 6938, 6943, 7113, 7185, 7231, 7239, 7242, 7247, 7260.

STOMACH

Peptic Ulcers

6911 HLA-B5 ASSOCIATED WITH DUODENAL ULCER. (Eng.) Rotter, J. I.; Rimoin, D. L.; Gursky, J. M.; Terasaki, P.; Sturdevant, R. A. L. (Harbor General Hosp., 100 W. Carson St., Torrance, CA 90509). *Gastroenterology* 73(3):438-440; 1977.

In search for further genetic factors contributing to ulcer diseases, the frequency of histocompatibility antigens (HLA) was studied in 77 men with duodenal ulcer. The patients were typed for the HLA-A and -B loci. Thirteen of 54 Caucasian men had the B5 antigen, compared to 10% of 3,895 controls; this was significant ($p<0.0016$) even when the p value was multiplied by the number of antigens tested (28). In 23

Negro patients, three antigens were increased in frequency: A10--30%, A11--9%, and Bw22--26%; the values in 330 controls were 12%, 1%, and 10%, resp. ($p<0.03$, $p<0.03$, and $p<0.05$, resp.), but were not significant when the p values were multiplied by the number of antigens tested. A significant association was demonstrated between duodenal ulcer and HLA-B5 in Caucasian men, with a relative risk of 2.9, greater than that associated with the combination of blood group O and nonsecretor status.

6912 AUGMENTED HISTAMINE TEST--DIAGNOSTIC AND PROGNOSTIC VALUES.

(Eng.) Sun, D. C. H.; Mirza, A. H.; Mitchell, C. S., Jr. (Good Samaritan Hosp., Box 2989, Phoenix, AZ 85062). *Am. J. Gastroenterol.* 67(4):338-344; 1977.

The diagnostic and prognostic values of the augmented histamine test were assessed in 107 controls, 48 patients with gastric ulcer, and 141 patients with duodenal ulcer. The mean basal acid secretion and maximal acid output (MAO) were significantly higher in duodenal ulcer patients than in normal subjects (0.344 versus 0.155 mEq). Ulcers of the body of the stomach were associated with lower than normal levels of secretion, whereas ulcers of the prepyloric region were associated with higher than normal levels. Among the patients with duodenal ulcer, 101 patients had an MAO above the upper limit of normal (20.4 mEq/hr). Conversely, a patient with an MAO of less than 12.4 mEq/hr was unlikely to have duodenal ulcer disease. The use of the ratio of MAO to actual body weight did not increase the diagnostic discrimination between normal subjects and those with duodenal ulcer. Duodenal ulcer patients with complications had a significantly higher MAO to histamine ratio than those without complication. The finding of an MAO greater than 40 mEq/hr is highly suggestive of the presence or the imminence of a complication.

6913 CLINICAL PICTURE OF PEPTIC ULCERATION DIAGNOSED ENDOSCOPICALLY.

(Eng.) Sheppard, M. C.; Holmes, G. K. T.; Cockel, R. (Selly Oak Hosp., Birmingham, England). *Gut* 18(7):524-530; 1977.

Clinical features and laboratory data are presented for 100 patients with benign gastric ulcers and 150 patients with duodenal ulcers confirmed endoscopically. Abdominal pain was the commonest indication for endoscopy (93% for gastric ulcer, 87% for duodenal ulcer) but examinations for acute gastrointestinal hemorrhage were performed in 32% of the gastric ulcer patients and 31% of the duodenal ulcer patients. There were no clinical features that clearly distinguished gastric from duodenal ulceration. However, younger gastric ulcer patients (<40 yr old) had only mid-lesser curve (50%) or distal stomach (50%) ulcers, whereas elderly gastric ulcer patients were more likely to have high lesser curve ulcers (66% of those 70-79 yr of age). Elderly patients presented more commonly with hemorrhage, with those >80 yr old showing 60% and 100% incidences of acute bleeding in cases of gastric and duodenal ulcer, resp. Younger patients tended to present with pain more often, with patients <40 yr of age showing 75% and 60% incidences of pain in gastric and duodenal ulcer, resp. All women presenting with hemorrhage were >50 yr old, while 6% of the men bleeding from gastric ulcer and 40% of the men bleeding from duodenal ulcer were under this age. When anemia (hemoglobin <13 g/dl in men and <12 g/dl in women) was present, it was almost always associated with a history of a recent acute gastrointestinal hemorrhage in both gastric and duodenal ulcer patients.

6914 HEALING OF DUODENAL ULCER WITH AN ANTACID REGIMEN.

(Eng.) Peterson, W. L.; Sturdevant, R. A. L.; Frankl, H. D.; Richardson, C. T.; Isenberg, J. I.; Elashoff, J. D.; *et al.* (Veterans Admin. Hosp., 4500 S. Lancaster Rd., Dallas, TX 75216). *N. Engl. J. Med.* 297(7):341-345; 1977.

To determine whether a large-dose antacid regimen is effective in promoting duodenal ulcer healing, 74 patients with endoscopically-proved duodenal ulcer completed a 28-day double-blind clinical trial in which the results of this regimen were compared with those of placebo. The ulcer healed completely in 28 of the 36 antacid-treated as compared with 17 of the 38 placebo-treated patients ($p<0.005$). The antacid regimen was not more effective than placebo in relieving ulcer symptoms. Presence or absence of symptoms during the fourth treatment week was a poor predictor of presence or absence of an ulcer crater. Ulcers of placebo-treated patients who smoked cigarettes were less likely to heal than those of nonsmokers ($p=0.03$). Except for mild diarrhea, no side-effects of the antacid regimen were observed. It is concluded that a large-dose antacid regimen hastens the healing of duodenal ulcer.

6915 EFFECTS OF CIMETIDINE AND POLDINE ON NOCTURNAL GASTRIC SECRETION.

(Eng.) Saunders, J. H. B.; Cargill, J. M.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Digestion* 15(5):452-456; 1977.

In view of the importance of persistent exposure of the duodenal bulb to acid and pepsin in the pathogenesis of duodenal ulceration, the effects of cimetidine and of a combination of cimetidine with poldine on 12-hr nocturnal gastric secretion were compared in six patients with duodenal ulcer. Cimetidine at 200 and 400 mg p.o. inhibited nocturnal secretion of acid to 29% and 34% of the control values, resp., but only slightly inhibited the nocturnal secretion of pepsin (to 60% and 90% of the control values at the two doses, resp.). The administration of cimetidine (200 or 400 mg) together with poldine (4 mg, p.o.) augmented the inhibition of the nocturnal secretion of acid (to 13% of control with 200 mg cimetidine amd to 23% of control with 400 mg) and of pepsin (to 25% and 57%, resp.). The combination of an H_2-receptor blocking drug with an anticholinergic drug will have therapeutical application in the management of duodenal ulceration.

6916 TRANSIENT NEUTROPENIA IN A PATIENT RECEIVING CIMETIDINE. (Eng.) Ufberg, M. H.; Brooks, C. M.; Bosanac, P. R.; Kintzel, J. E. (Allentown General Hosp., Allentown, PA 18102). *Gastroenterology* 73(3):635-638; 1977.

The case of a patient who developed transient neutropenia while receiving cimetidine is reported. The patient, a 62-yr-old man, was being treated with cimetidine for an intractable duodenal ulcer while on maintenance hemodialysis. The patient had received propranolol and hydralazine prior to cimetidine therapy, but these were discontinued 7 days prior to the start of cimetidine therapy. He received 300 mg of cimetidine p.o. every 12 hr; on the days of dialysis, he received an extra dose of 300 mg 2 hr before the procedure. An upper gastrointestinal series 17 days after the beginning of this regimen demonstrated complete ulcer healing. Liver function tests throughout the treatment period remained normal. The patient was anemic throughout treatment. On the 15th day of cimetidine therapy, a total WBC count of 3,000 cells/mm^3 was observed with 33% granulocytes, and the cimetidine was stopped on this day. On the second and third post-therapy days, the total counts were 1,800 and 1,300, resp., and there were only 2% neutrophils. A bone marrow aspiration 18 hr after cimetidine withdrawal indicated a moderate left shift in the myeloid series consistent with a drug-induced granulocytopenia with peripheral destruction of the granulocyte series. By the fourth day after the drug was discontinued, the granulocyte count was normalizing, and neutropenia did not recur. This case represents the first hematologic complication of cimetidine therapy. The probable mechanism was peripheral destruction of the granulocyte series.

6917 A PRAGMATIC TRIAL OF CIMETIDINE IN DUODENAL ULCER PATIENTS. (Eng.) Gudmand-Hoyer, E.; Frost, F.; Jensen, K. B.; Krag, E.; Rask-Madsen, J.; Rahbek, I.; *et al.* (Glostrup Univ. Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12 (5):611-613; 1977.

The use of cimetidine in the treatment of duodenal ulcer was assessed in a double-blind randomized trial in 58 patients. The patients in the treatment group received cimetidine (1 g/day) for 4 weeks, while the controls received inactive tablets. During the last 9 days, 18 of 30 cimetidine-treated patients were asymptomatic, in comparison with 5 of 28 controls ($p<0.005$). The antacid consumption, the number of days with pain, and the number of hours with pain also differed significantly in the two groups. Apart from a transient rash in one patient, no significant clinical side-effects were noted. The serum creatinine rose slightly in the cimetidine-treated patients.

6918 A PROSPECTIVE RANDOMIZED COMPARATIVE STUDY OF PROXIMAL SELECTIVE VAGOTOMY VS. SELECTIVE GASTRIC VAGOTOMY AND PYLOROPLASTY. (Eng.) Sawyers, J. L. (Nashville Metropolitan General Hosp., Nashville, TN). *Chir. Gastroenterol.* 11(1): 77-79; 1977.

A prospective randomized study was carried out in 63 men with chronic duodenal ulceration to compare proximal selective vagotomy with selective gastric vagotomy and Finney pyloroplasty. Only men with an ulcer intractable to medical therapy and without evidence of obstruction were admitted to the study. In follow-up periods of up to 2.5 yr, there was no operative mortality. No proven recurrent ulcer was found, but one patient with symptoms of recurrent duodenal ulcer 1 yr following proximal selective vagotomy was subjected to antrectomy. No recurrent ulcer was found in this patient at reoperation. Mild to moderate dumping occurred in 8 of 31 patients with selective vagotomy and pyloroplasty, in 1 of 32 patients after selective vagotomy and pyloroplasty, and in no patients with proximal selective vagotomy. This preliminary report suggests that proximal selective vagotomy is accompanied by less postgastrectomy sequelae than selective vagotomy and pyloroplasty and is equally effective in controlling the ulcer diathesis.

6919 OPERATIVE TREATMENT OF RECURRENCE AFTER VAGOTOMY AND DRAINAGE FOR DUODENAL ULCER, GASTRIC ULCER, AND ACID DYSPEPSIA WITHOUT ULCER. (Eng.) Johnson, J. A.; Giercksky, K. E. (Inst. Clinical Medicine, Univ. Tromso, 9000 Tromso, Norway). *World J. Surg.* 1(4):493-499; 1977.

Operative treatment to avoid recurrence of peptic ulcer was investigated, and the role of the insulin test for the evaluation of the completeness of the vagotomy was studied. Fifty-two operations were carried out in 44 patients with recurrent disease after vagotomy and drainage (38) or vagotomy without drainage (6). The initial vagotomy was done for duodenal ulcer (23), gastric ulcer (17), and acid dyspepsia without ulcer (4). The reoperations were 31 revagotomies, 11 Billroth II gastric resections, 2 gastrojejunostomies, and later, 4 gastric resections for another recurrence, 2 gastrojejunostomies for retention, and 2 operations for the dumping syndrome. After an observation period of 1-6 yr (mean 2.5 yr), the results were good in 22 patients, satisfactory in 20, and unsatisfactory in 2 patients. Of 42 patients with recurrent disease, 41 showed a significant increase of acid output during insulin stimulation before operative treatment of the recurrence. Of 31 revagotomized patients, 26 were insulin-test negative without later signs of recurrence. Five patients remained insulin-test positive, and four of these required gastric resection for another recurrence. This series demonstrates the therapeutic significance of complete vagotomy, and emphasizes the value of the insulin test for evaluation of the completeness of the vagotomy.

6920 LATE RESULTS OF PERFORATED DUODENAL ULCER TREATED BY SIMPLE SUTURE. (Eng.) Skovgaard, S. (Stenrosevej 19, 8330 Beder, Denmark). *World J. Surg.* 1(4):521-526; 1977.

To evaluate factors that influence ulcer diathesis after simple suture of perforated duodenal ulcer, a retrospective study was carried out in 156 patients who underwent follow-up evaluations 3-23 yr (mean 13 yr) after simple closure. Subsequent definitive ulcer surgery was indicated in 111 patients for severe recurrent dyspepsia. Bleeding, reperforation, or pyloric obstruction occurred in 14 patients. Among 33 patients with an ulcer history of less than 3 months prior to perforation, only 4 required further surgery while a subsequent operation was indicated in 107 of 123 patients with a longer ulcer history. Immediate definitive surgery is indicated for perforated duodenal ulcer in patients with ulcer symptoms for more than 3 months before perforation. Simple suture of the perforation is sufficient treatment for patients with a shorter ulcer history.

6921 PATHOPHYSIOLOGY OF UNCOMPLICATED GASTRODUODENAL ULCER AND ITS TREATMENT. (Fre.) Girard, M. (No affiliation given). *J. Med. Lyon* 57 (1303):335-346; 1976.

6922 SOME PROBLEMS OF THE PATHOGENESIS OF PEPTIC ULCER. (Rus.) Ryss, E. S. (First Leningrad Medical Inst., Leningrad, USSR). *Ter. Arkh.* 49(2):135-141; 1977.

6923 HEREDITY OF DUODENAL ULCER. (Cze.) Vesely, K. T.; Kubickova, Z. (Institu Klinicke a experimentalni mediciny, Prague 4-Krc, Czechoslovakia). *Cas. Lek. Cesk.* 115(38):1170-1173; 1976.

6924 CLINICAL GENEALOGICAL INVESTIGATION OF PEPTIC ULCER IN CHILDREN. (Rus.) Mazurin, A. V.; Doletskii, S. Ia.; Al'tshuler, B. A.; Kurchatov, M. K.; Kachaeva, L. N. (N. I. Pirogov II. Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 22(2):22-25; 1977.

6925 THE LEVELS IN GASTRIC PEPSIN SECRETION IN RELATION TO THE CLINICAL COURSE OF DUODENAL ULCER. (Jpn.) Seki, H.; Kitamura, Y.; Kishi, S. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Jpn. J. Gastroenterol.* 73(1):77-83; 1976.

6926 PRACTICAL INTEREST OF GASTRIC INTUBATION DURING PEPTIC ULCER. ANALYSIS OF 410 CASES AFTER STIMULATION WITH HISTALOG. (Fre.) Cornet, A.; Terris, G. (Hopital Laennec, 42, Rue de Sevres, 75340 Paris Cedex 07, France). *Sem. Hop. Paris.* 52(36):1981-1989; 1976.

6927 UNDESIRABLE SIDE-EFFECTS OF CARBENOXOLONE TREATMENT OF PATIENTS WITH GASTRIC ULCERATION. (Dan.) Henrichsen, L.; Pedersen, H.; Birger Jensen, K.; Wulff, H. R. (Kobenhavns amts sygehus Gentofte, medicinsk afdeling B, Gentofte, Denmark). *Ugeskr. Laeger* 138(51):3265-3267; 1976.

6928 ANTI-ULCER AGENT PIRENZIPENE (L-S 519)--A TRICYCLIC COMPOUND WITH PARTICULAR PHYSICOCHEMICAL PROPERTIES. (Ger.) Eberlein, W.; Schmidt, G.; Reuter, A.; Kutter, E. (Abt. Chem. Forschung der Dr. Karl Thomae GmbH, Postfach 720, 7950 Biberach an der Riss, W. Germany). *Arzneim. Forsch.* 27(2): 356-359; 1977.

6929 CHANGES IN THE EXOCRINE PANCREATIC FUNCTION AND RESULTS OF SECRETIN TREATMENT FOR DUODENAL ULCER. (Ger.) Brailski, C.; Mendisova, A.; Dimitrov, B. (Institut fur Gastoenterology, ul. Belo More 8, Sofia 27, Bulgaria). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):245-247; 1976.

6930 RESULTS WITH SULGLYCOTIDE IN 30 CASES OF GASTRODUODENITIS AND PEPTIC ULCER. (Ital.) De Ciutiis, D.; Verrengia, L.; Sagliocco, M.; Guadagnino, V.; Carchietti, E. (Caserta Provincial General Hosp., Caserta, Italy). *Minerva Gastroenterol.* 22(4): 323-328; 1976.

6931 DUODENAL ULCER: III. SURGICAL MANAGEMENT. (Fre.) Lambert, R.; Partensky, C. (Hopital Edouard Herriot, 5, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Nouv. Presse Med.* 6(9):743-746; 1977.

6932 FIRST CLINICAL RESULTS AFTER SELECTIVE PROXIMAL VAGOTOMY FOR DUODENAL ULCER. (Ita.) Bianca, T.; Bonfiglio, S.; Vadala, G.; Donati, A. (Istituto di I^a Clinica Chirurgica Generale e Terapia Chirurgica dell'Universita di Catania, Catania, Italy). *Chir. Ital.* 28(2):120-135; 1976.

6933 AIR STASIS SYNDROME WITH DISTENSION-DILATION OF THE PROXIMAL GASTRIC PORTION AND THE LEFT HEMIDIAPHRAGM FOLLOWING SUPRASELECTIVE VAGOTOMIES. (Spa.) Diez Cascon, A.; Gemar Antunez, E.; Nadal, A.; Diez-Cascon Menendez, E.; Masferrer Sala, L. (Departamento De Chirurgia, Residencia General "Francisco Franco" de la Seguridad Social, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(4):485-502, XVII; 1977.

6934 COMPARISON OF THE CLINICAL COURSES OF PATIENTS WITH DUODENAL ULCER SUBMITTED TO TRUNCULAR VAGOTOMY ASSOCIATED TO EITHER CONSERVATIVE GASTRIC RESECTION OR TO PARTIAL GASTRECTOMY. (Por.) de Mello, J. B.; Garrido, A., Jr.; Moreira, A.; Matsuda, M.; Lopasso, F.; Raia, A. A. (Hosp. Clinicas da Fac. Medicina da Univ. de Sao Paulo, Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 31(4):321-328; 1976.

6935 STUDY OF BEHAVIOR OF THE GASTRIC SECRETORY FUNCTION AFTER PROXIMAL SELECTIVE VAGOTOMY FOR DUODENAL ULCER. (Ita.) Giovinetto, A.; Cali, R.; Ossino, C.; Giardina, N.; Rinella, P. (Istituto di I^a Clinica Chirurgica e Terapia Chirurgica dell'

Universita di Catania, Catania, Italy). *Chir. Ital.* 28(4):283-297; 1976.

6936 A RARE COMPLICATION FOLLOWING PYLOROPLASTY AND VAGOTOMY TREATED SURGICALLY. (Pol.) Bader, O.; Grzebieniak, Z.; Szklarz, E.; Polak, L. L. (II Klinika Chirurgii Ogolnej Instytutu Chirurgii AM, ul. M. Sklodowskiej-Curie 68, 50-369, Wroclaw, Poland). *Wiad. Lek.* 30(6):489-492; 1977.

6937 EARLY POSTOPERATIVE COMPLICATIONS DUE TO PARTIAL GASTRECTOMY (WITH THE EXCEPTION OF ANASTOMOTIC BREAKDOWN). (Fre.) Francillon, J.; Baudet, B.; Tissot, E.; Pasquier, Ph.; Vignal, J. (Hopital Edouard Herriot, 69003 Lyon, France). *Chirurgie* 102(6):377-389; 1976.

6938 POST-OPERATIVE PEPTIC ULCERS. ANALYSIS OF A SERIES OF 26 CASES. (Fre.) Baudet, B.; Tissot, E.; Pasquier, Ph.; Grandjean, J. P.; Vignal, J.; Francillon, J. (Hopital Ed.-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 72(5):309-314; 1976.

See also, 6734, 6859, 6869, 6874, 6886, 6904, 6905, 6909, 7266.

SMALL INTESTINE

6939 FOUR CASES OF POTASSIUM ENTEROPATHY. (Fre.) Diserens, H.; Gertsch, Ph.; Schneider, S.; Mosimann, R. (Service de chirurgie B, CHUV, CH1011 Lausanne, Switzerland). *Schweiz. Med. Wochenschr.* 107(34):1195-1198; 1977.

Stenosing ulceration or perforation of the distal and median small intestines occurred in four hypertension/coronary disease patients following p.o. potassium treatment. Three of the patients took enteric-coated KCl (2 g/day), and one took slow-release KCl. The KCl-induced symptoms appeared 3 weeks, 3 months, and 1 and 2 yr after the start of therapy. Clinically, the patients presented with colic symptoms, nausea, vomiting, and epigastralgia. All were subjected to surgery. Macroscopically, three patients had stenoses with ulceration of the small intestines. In one patient, the mucosa was amputated abruptly, and the richly vascularized submucosa was dissociated by a fibroblastic proliferation. The serosa was irregular and was infiltrated by lymphocytes, plasmacytes, and polynuclear cells. In another patient, the mucosa was not altered; however, fundic ulceration, vascular neoformations, and lymphoplasmacytic infiltrations were noted, and the entire wall was fibrotic. The patient who took slow-release KCl had generalized peritonitis caused by perforation of a distal jejunal loop that was fixed by two large adhesions to the mesosigmoid. The adhesions slowed intestinal transit, which led to KCl deposits, which in turn caused the lesions to develop.

6940 DIFFUSE CHRONIC ULCERATIVE JEJUNOILEITIS. USE OF JEJUNOSCOPY FOR DIAGNOSIS. (Fre.) Cerf, M.; Gouerou, H.; Marche, C.; L'Hirondel, C.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75018 Paris, France). *Gastroenterol. Clin. Biol.* 1(6/7):571-576; 1977.

Diffuse chronic ulcerative jejunoileitis developed in a 51-yr-old man who was hospitalized for malabsorption with protein loss. The patient had recurrent diarrhea for 2 yr. Radiographs of the colon were normal, and an esogastroduodenal transit revealed only a small hiatal hernia; the small intestine appeared atrophic. A biopsy specimen of the small intestine contained villi that were much shorter than normal. The squamous epithelium was normal, pseudostratified, atrophic, and dissociated by inflammatory cells, with a thick and irregular brush border. The mucosa was interrupted by zones of superficial gastric metaplasia made up of mucous cells containing PAS-positive mucins. The chorion was thickened, and it contained lymphoplasmacytes and some eosinophilic polynuclear cells. Overall, the histological features of fibroinflammatory jejunitis with subtotal or partial villous atrophy were present. A 2-week treatment with ampicillin (2 g/day) and folic acid (40 mg/day) resulted in temporary improvement. After the patien was rehospitalized, a jejunoscopy was performed. Discrete inflammation of the gastric mucosa was seen The second half of the duodenum contained zones of patchy inflammation among thick, edematous folds. These zones were numerous, and they were found along the entire length of the segment of small intestine examined. Further biopsies during jejunoscopy showed that these inflammatory ulcerations did not have a specific character. An exploratory laparoto performed later revealed no macroscopic abnormaliti The patient finally improved after parenteral nutrition. A second jejunoscopy demonstrated improvemen of the intestinal mucosa with almost total disappea ance of the erosions. The diarrhea regressed after treatment with a gluten-free diet, antibiotics, and vitamin D.

6941 NONSPECIFIC CHRONIC ULCERATIVE JEJUNOILEITIS. REPORT OF A NEW CASE. (Fre.)

Belaiche, J.; Modigliani, R.; Modigliani, E.;
Galian, A.; Bernier, J. J. (Hopital Saint-Lazare,
107 bis, rue du Foubourg-Saint-Denis, F 75010,
Paris, France). *Gastroenterol. Clin. Biol.* 1(6/7):
553-560; 1977.

Nonspecific chronic ulcerative jejunoileitis
occurred in a 28-yr-old man with an 18-yr history
of severe malabsorption syndrome. Upon examination,
distinct exudative enteropathy was found. Duodenal
and jejunal biopsies were normal; small intestinal
transit revealed total disappearance of the mucosal
folds. Selective arteriography of the celiac trunk
and superior mesenteric artery was normal. A sub-
sequent exploratory laparotomy revealed numerous
mesenteric ganglia and induration along the mesen-
teric edge of the ileum. The patient was released,
but persistent cachexia and diarrhea required that
he be rehospitalized. Radiological examinations of
the gastrointestinal tract showed no stenoses, dilata-
tions, or ulcerations; duodenal and jejunal biopsies
were normal. The patient regained weight with paren-
teral nutrition, but the malabsorption syndrome con-
tinued. A second exploratory laparotomy revealed a
pathological small intestine, especially the second
half, and induration along its mesenteric border.
There were areas of marked stenoses near the median
part of the ileum. Resection with a 90-cm termino-
terminal anastomosis of the ileum was performed. The
specimen showed linear ulceration situated exclusive-
ly along the mesenteric border. These ulcerations
were surrounded by a dystrophic mucosa. Certain
crypts had a pseudoantral appearance. The lamina pro-
pria contained increased numbers of plasmacytes,
acrophages, and polynuclear cells. Despite therapy
ith prednisone (40 mg/day for 2 months) and tetra-
ycline (2 g/day for 6 weeks), no appreciable results
ere seen, and the exudative enteropathy persisted.

942 FECAL FAT, BILE ACID, AND STEROL EXCRETION
AND BILIARY LIPID CHANGES IN JEJUNOILEOS-
OMY PATIENTS. (Eng.) Faloon, W. W.; Rubulis, A.;
nipp, J.; Sherman, C. D.; Flood, M. S. (Highland
osp., South Ave., Rochester, NY 14620). *Am. J.
lin. Nutr.* 30(1):21-31; 1977.

ecal fat, bile acid, neutral sterol excretion,
iliary acid, phospholipid, and cholesterol were
tudied in 36 patients 6-12 months after jejuno-
leostomy for obesity to determine their interrela-
ionships. During the postoperative revaluation
dmission, all patients received a constant diet
ontaining 1,100 cal, 500 mg cholesterol, 65 g fat,
0 g carbohydrate, and 500 mg sodium. No relation
as observed between the degree of steatorrhea and
eight loss, although fecal fat excretion (range,
0.9-50.7 g/day) had increased in 34 of the 36
atients. Mean neutral sterol excretion in feces
as unchanged except in cholecystectomized patients.
o relationship was demonstrated between the observed
erum cholesterol decrease and fecal bile acid
ncrease (mean value 621 ± 96 mg/day from a control
lue of 206 ± 34 mg/day) or between serum cholesterol
evel and the sum of fecal fat and neutral sterol.
ecal excretion of cholic and deoxycholic acid
gether increased more than the total excretion of
chenodeoxycholic and lithocholic acid. Two major types of fecal excretion patterns were demonstrable; moderate fecal fat (24 g/day or less) was associated with a predominance of secondary bile acids (deoxycholic and lithocholic) in feces and in bile; high fecal fat (>24 g/day) was associated with predominantly primary bile acids (cholic and chenodeoxycholic). Thirty-six percent of the patients either had gallstones or had had a cholecystectomy, and, of 25 patients with normal cholecystograms, 4 developed stones and 5 had nonvisualization of the gallbladder 6-12 months postoperatively. Bile saturation ratio and lithogenic index did not change consistently postoperatively. No clear cut increase in lithogenic potential or in bile acid (lithocholic acid) hepatotoxic potential after jejunoileostomy was demonstrable.

6943 MULTIPLE POLYPS OF THE SMALL INTESTINE: AN UNUSUAL FEATURE OF MULTIPLE MYELOMA. (Eng.) Pais, M. J.; Kricun, M. E.; Scotti, D. M. (Hahnemann Medical Coll. and Hosp., 230 N. Broad St., Philadelphia, PA 19102). *Br. J. Radiol.* 50:364-366; 1977.

6944 GASTROINTESTINAL ADAPTATION FOLLOWING SMALL BOWEL BYPASS FOR OBESITY. (Eng.) Dudrick, S. J.; Daly, J. M.; Castro, G.; Akhtar, M. (Univ. Texas Medical Sch. at Houston, Houston, TX). *Ann. Surg.* 185(6):642-648; 1977.

6945 PNEUMATOSIS CYSTOIDES INTESTINALIS IN CHILDHOOD SYSTEMIC LUPUS ERYTHEMATOSUS. (Eng.) Binstadt, D. H.; L'Heureux, P. R. (St. Paul Ramsey Hosp., St. Paul, MN 55101). *Minn. Med.* 60(6): 408-409; 1977.

6946 SEVERE ENAMEL HYPOPLASIA IN A CASE OF INTESTINAL LYMPHANGIECTASIA: A RARE PROTEIN-LOSING ENTEROPATHY. (Eng.) Dummer, P. M. H. (Welsh Natl. Sch. Medicine, Cardiff, CF4 4X4, Wales). *Oral Surg.* 43(5):702-706; 1977.

6947 DISTURBANCES OF BILE ACID METABOLISM IN INTESTINAL DISEASE. (Eng.) Heaton, K. W. (No affiliation given). *Clin. Gastroenterol.* 6(1): 69-89; 1977.

6948 DISORDERS OF FRUCTOSE METABOLISM. (Eng.) Froesch, E. R. (No affiliation given). *Clin. Endocrinol. Metab.* 5(3):599-611; 1976.

6949 IMMUNOGLOBULIN DISORDERS OF THE SMALL BOWEL. (Eng.) Marshak, R. H.; Lindner, A. E.; Maklansky, D. (Mount Sinai Sch. Medicine, New York, NY). *Radiol. Clin. North Am.* 14(3):477-491; 1976.

6950 ABNORMALITIES IN SMALL INTESTINE CONTOUR AND CALIBER: A WORKING CLASSIFICATION.

(Eng.) Goldberg, H. I.; Sheft, D. J. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Radiol. Clin. North Am.* 14(3):461-475; 1976.

6951 SKIN CHANGES IN SHORT-BOWEL SYNDROME: KWASHIORKOR-LIKE SYNDROME. (Eng.) Smith, S. Z. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Arch. Dermatol.* 113(5):657-659; 1977.

6952 GASTROGRAFFIN® AND BOWEL NECROSIS [Letter to Editor]. (Eng.) Hogan, T. F. (Univ. Wisconsin Univ. Hosp., Madison, WI 53706). *Ann. Intern. Med.* 87(3):382-383; 1977.

6953 RECENT ADVANCES IN PEDIATRIC GASTROENTEROLOGY. (Eng.) Auricchio, S. (II Faculty Medicine, Univ. Naples, Naples, Italy). *Pediatr. Res.* 11(9, Part 2):997-1005; 1977.

6954 MILK-CURD BOWEL OBSTRUCTION IN THE NEWBORN INFANT. (Eng.) Graivier, L.; Harper, N. E.; Currarino, G. (Children's Medical Center, Dallas, TX). *JAMA* 238(10):1050-1052; 1977.

6955 MULTIPLE LIPOMAS OF THE ILEUM WITH VOLVULUS. (Eng.) Ueda, K.; Kitagawa, A.; Oka, Y.; Nakao, K. (Osaka Policeman's Hosp., Komiyacho-8, Tennoji-Ku, Osaka, Japan). *Arch. Surg.* 112(9):1144-1145; 1977.

6956 CHRONIC INTESTINAL ISCHEMIA. (Eng.) Hertzer, N. R.; Beven, E. G.; Humphries, A. W. (Cleveland Clinic Foundation, Cleveland, OH). *Surg. Gynecol. Obstet.* 145(3):321-328; 1977.

6957 THE INTERPRETATION AND MANAGEMENT OF DUODENAL LESIONS OTHER THAN BENIGN ULCER. (Eng.) Weinberger, H. A. (Lenox Hill Hosp., New York, NY). *Surg. Gynecol. Obstet.* 145(3):329-337; 1977.

6958 COMPLEMENT STUDIES IN ADIPOSE PATIENTS TREATED WITH INTESTINAL BYPASS. (Eng.) Moller, B. B.; Jensen, J.; Nielsen, I. L. (Hvidovre Hosp., Copenhagen, Denmark). *Acta Med. Scand.* 202(3):149-152; 1977.

6959 SCINTIGRAPHIC DETECTION OF ACUTE GASTROINTESTINAL BLEEDING. (Eng.) Alavi, A.; Dann, R. W.; Baum, S.; Biery, D. N. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Radiology* 124(3):753-756; 1977.

6960 SUPERIOR MESENTERIC ARTERY EMBOLIZATION: AN ANGIOGRAPHIC EMERGENCY. (Eng.) Kaufman, S. L.; Harrington, D. P.; Siegelman, S. S. (Johns Hopkins Medical Inst., Baltimore, MD 21205). *Radiology* 124(3):625-630; 1977.

6961 SUBTOTAL INTESTINAL RESECTION IN THE NEWBORN. (Eng.) Rickham, P. P. (Univ. Children's Surgery Service, Zurich, Switzerland). *Ann. Chir. Infant.* 18(3):173-182; 1977.

6962 SPONTANEOUS NEONATAL AND FETAL INTESTINAL PERFORATION. (Eng.) Wynne, J. M. (Livingstone Hosp., Port Elizabeth, South Africa). *S. Afr. Med. J.* 52(9):351-353; 1977.

6963 MANAGEMENT OF THE MORBIDLY OBESE PATIENT AFTER SMALL BOWEL BYPASS FAILURE. (Eng.) Hitchcock, C. T.; Jewell, W. R.; Hardin, C. A.; Hermreck, A. S. (Univ. Kansas Medical Center, 39th & Rainbow Blvd., Kansas City, KS 66103). *Surgery* 82(3):356-361; 1977.

6964 ENHANCING THE OUTCOME OF JEJUNOILEAL BYPASS IN POOR-RISK PATIENTS THROUGH POSTOPERATIVE GROUP COUNSELING. (Eng.) Lundgren, K. D.; Scott, G.; Grabski, D. A. (Kern County Dept. Mental Health, P.O. Drawer 3517, Bakersfield, CA 93305). *Am. Surg.* 43(8):534-537; 1977.

6965 AN APPRAISAL OF THE STATUS OF SMALL BOWEL BYPASS IN THE TREATMENT OF MORBID OBESITY. (Eng.) O'Leary, J. P. (No affiliation given). *Clin. Endocrinol. Metab.* 5(2):481-502; 1976.

6966 CO-EXISTENT EOSINOPHILIC GASTROENTERITIS AND HYPOTHALAMIC-PITUITARY DYSFUNCTION. (Eng.) Haeney, M. R.; Wilson, R. J. (East Birmingha Hosp., Birmingham B9 5ST, England). *Postgrad. Med. J.* 53(621):411-415; 1977.

6967 AN ISLAMIC TWIST. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8031):232; 1977.

6968 THE CASE OF SPONTANEOUS PNEUMOPERITONEUM WITHOUT PERITONITIS. (Eng.) Seaman, W. B. (Columbia-Presbyterian Medical Center, New York, NY). *Hosp. Pract.* 12(9):105, 108; 1977.

6969 PEUTZ-JEGHERS POLYPOSIS WITH METASTASIZIN DUODENAL CARCINOMA. (Eng.) Lin, J. I.; Caracta, P. F.; Lindner, A.; Guzman, L. G. (U.S. Public Health Service Hosp., Staten Island, NY 10304). *South. Med. J.* 70(7):882-884; 1977.

6970 VAGINAL EVISCERATION. (Eng.) Fox, W. P (West Suburban Hosp., Oak Park, IL). *Obstet. Gynecol.* 50(2):223-224; 1977.

6971 RESULTS OF ENDOSCOPY OF THE DUODENAL BULB AND OF THE DUODENUM. (Ger.) Kratochvil, P.; Brandstatter, G. (Landeskrankenhaus Gra

II. Medizinische Abteilung, Auenbruggerplatz 1,
A-8036 Graz, Austria). *Wien. Med. Wochenschr.* 126(23):
329-331; 1976.

5972 RELATIONS BETWEEN THE INTESTINAL IgA LEVEL
AND THE EVALUATION OF IgA PLASMA CELLS OF
HE JEJUNAL MUCOSA [Abstract]. (Fre.) Sonsino, E.;
lirsch-Marie, H.; Cerf, M.; Marche, C.; Bocquet, L.;
ebray, C. (Hopital Bichat, 75877 Paris Cedex 18,
rance). *Gastroenterol. Clin. Biol.* 1(5):484-485;
977.

973 IS THE PRESENCE OF AIR IN THE SMALL
INTESTINES PATHOLOGICAL? (Fr.) Scherrer,
.; Nahum, P.; Nahum, H. (Hopital Beaujon, F 92110
lichy, France). *J. Radiol. Electrol. Med. Nucl.*
8(3):199-202; 1977.

974 SUCCESSFUL ZINC TREATMENT OF A SEVERE
CASE OF ACRODERMATITIS ENTEROPATHICA.
Ger.) Reich, H.; Opitz, K.; Bertram, H. P.;
egeler, K. (Universitats Hautklinik, v. Esmarch-Str. 56, 4400 Munster, W. Germany). *Dtsch. Med. Wochenschr.* 101(47):1724-1726; 1976.

6975 DIAGNOSIS AND THERAPY OF PRIMARY DUODENAL CARCINOMA [Abstract]. (Dut.) Leguit, P., Jr.; Tytgat, G. N.; Verhoeven, A. G. M. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(33): 1309; 1977.

6976 ENDOSCOPIC DETECTION OF TUMOR CELLS IN THE DUODENUM. (Ger.) Witte, S. (Medizinische Abteilung, Diakonissenkrankenhauses, Diakonissenstrasse 28, D-7500 Karlsruhe 51, W. Germany). *Z. Gastroenterol.* 14(4):508-514; 1976.

See also, 6736, 6783, 6852, 6858, 6859, 6869, 6874, 6893, 6898, 6899, 6900, 6903, 6914, 6921, 6977, 6979, 6986, 7007, 7024, 7042, 7054, 7113, 7228, 7236, 7239, 7242, 7244, 7247, 7255, 7257, 7262, 7265.

SMALL INTESTINE

Malabsorption

977 TWO CASES OF ALPHA CHAIN DISEASE FROM
NIGERIA. (Eng.) Whicher, J. T.;
jdukiewicz, A.; Davies, J. D. (Westminster Hosp.
edical Sch., Kaduna, Nigeria). *J. Clin. Pathol.*
)(7):678-681; 1977.

ne first two cases of alpha chain disease from
ropical Central Africa are reported. Two men,
ged 60 and 14 yr, presented with a small bowel
ymphoma and malabsorption. The first patient
as treated with levamisole for a concomitant
trongyloides stercoralis infection. The bio-
emical and hematological findings were nonspecific
d were compatible with malabsorption. Patient 1
d a raised alkaline phosphatase level. Electro-
oresis did not reveal a paraprotein in either pa-
ent but a diffuse increase in gamma globulin run-
ng forward into the beta and alpha 2 was seen.
munoelectrophoresis was not diagnostic, and con-
rmation was obtained only by immunoselection
thods. Patient 1 showed the characteristic his-
logical features of the disease with a dense plas-
cytic infiltration of the lamina propria associated
th villous atrophy. Both patients were lost to
llow-up and treatment, but they died soon after
agnosis.

78 JEJUNAL MUCOSAL GAMMA GLUTAMYL TRANSFERASE
ACTIVITY IN COELIAC DISEASE. (Eng.)
irman, M. J.; Scott, B. B.; Toothill, C.; Los-
sky, M. S. (St. James' Hosp., Leeds, England).
t 18(6):484-487; 1977

In view of data suggesting that deficiency of gamma glutamyl transferase (GGT) may be the primary abnormality in the small intestinal mucosa of patients with celiac disease, this enzyme was measured in mucosal biopsies from celiac patients at different stages of treatment. The patients included four untreated patients, eight patients on a gluten-free diet but with abnormal jejunal histology, and nine patients on a gluten-free diet with normal mucosa. In 20 control patients, the GGT level was 0.6-2.6 IU/g. The GGT level fell below the control range in only one of the 21 celiac patients and in one of the nine treated patients with normal mucosa, suggesting that deficiency of this enzyme has no primary role in the etiology of celiac disease.

6979 ENTEROCHROMAFFIN CELLS IN THE DUODENAL MUCOSA OF CHILDREN WITH COELIAC DISEASE. (Eng.) Challacombe, D. N.; Robertson, K. (Children's Res. Unit, Taunton, England). *Gut* 18(5):373-376; 1977.

To examine the hypothesis that hyperplasia and/or hyperactivity of the enterochromaffin (EC) cells could explain raised blood 5-hydroxytryptamine (5-HT) and urinary 5-hydroxyindoleacetic acid (5-HIAA) in patients with untreated celiac disease, a cell counting technique was used to count EC cells in the duodenal mucosa of 10 children with celiac disease and in 10 controls. Significantly greater numbers of EC cells were found in children with celiac disease ($p<0.001$). In four children with a clinical history suggestive of celiac disease, but with minor histopathologic changes in the duodenum, gluten challenge resulted in increased numbers of EC cells. Abnormalities of 5-hydroxytryptamine metabolism in celiac disease may result from hyperplasia of EC cells in the small intestine.

6980 RELATIVE LACTOSE INTOLERANCE: A CLINICAL STUDY OF TUBE-FED PATIENTS. (Eng.) Walike, B. C.; Walike, J. W. (Sch. Medicine, Univ. Michigan, Ann Arbor, MI). *JAMA* 238(9):948-951; 1977.

Lactose tolerance was studied in 16 patients receiving nasogastric tube feedings following surgery for head or neck carcinoma. Two liquid diets, differing only in the presence or absence of lactose (75 g/l), were administered for 8-20 days in a double-blind crossover study. Increased stool frequency, decreased stool consistency, and more frequent flatulence, borborygmi, and distention were found with the lactose diet, although classic lactose intolerance (plasma glucose rise <26 mg/dl) occurred in only two patients. Differences between amounts and times of peak rise following the glucose tolerance test and lactose tolerance test for each patient indicated the advisability of locating patients on a continuum of ability to hydrolyze lactose. The results indicate that lactose should be reduced or eliminated from tube-feeding diets to improve patient tolerance and comfort and to reduce diarrhea.

6981 POSSIBLE PATHOGENETIC MECHANISMS PRODUCING BOVINE MILK PROTEIN INDUCIBLE MALABSORPTION: A HYPOTHESIS. (Eng.) Liu, H. Y.; Giday, Z.; Moore, B. F. (2104 Vinewood Blvd., Ann Arbor, MI 48104). *Ann. Allergy* 39(1):1-7; 1977.

In view of the well known smooth muscle-stimulating effect of some of the mediators of anaphylaxis, it was determined whether clinically evident histaminergic signs could be concurrently induced along with those of intestinal malabsorption and hyperperistalsis by challenging atopic patients with bovine milk or milk proteins. The feeding of bovine milk to five highly allergic pediatric patients with bilateral family histories of atopy led to transient malabsorption of glucose and fat as well as systematic autonomic functional changes that may be attributable to pharmacologic actions of histamine and/or acetylcholine. During allergic reactions, endogenously released smooth muscle-stimulating neuromediators could provide rapid propulsion of nutrients through the absorbing portion of the gut, leading to suboptimal absorption; it is also hypothesized that bovine milk-inducible malabsorption in the atopic patients has an immunopharmacologic basis in its pathogenesis.

6982 INTESTINAL PERFUSION STUDIES IN TROPICAL SPRUE. 2. MOVEMENT OF WATER AND ELECTROLYTES. (Eng.) Hellier, M. D.; Bhat, P.; Albert, J.; Baker, S. J. (St. Thomas' Hosp., London S.E. 1, England). *Gut* 18(6):480-483; 1977.

Jejunal sodium and water absorption was investigated in 10 normal Indians and in 11 patients with chronic tropical sprue. Normal saline and solutions containing amino acids and dipeptides were studied. In both groups, little absorption of sodium and water from normal saline was seen. Mean water and sodium absorption from the free amino acid or dipeptide solutions showed no significant difference between the groups and was similar to absorption from normal saline. These results differ from data obtained in normal English subjects in whom significant stimulation of sodium and water absorption was seen at these concentrations. In some subjects in both groups, net secretion was observed. However, no correlation was seen between mucosal histology or luminal bacteriology and sodium or water movement. These findings in patients with chronic tropical sprue are similar to findings in normal Indians and suggest that jejunal handling of sodium and water is abnormal when compared with normal English subjects, but that the mucosa is not in a secretory phase as seen in certain other diarrheal states or in the acute early phase of sprue.

6983 INTESTINAL LACTASE DEFICIENCY IN CEYLON (SRI LANKA). (Eng.) Senewiratne, B.; Thambipillai, S.; Perera, H. (Dept. Medicine, Univ. Ceylon, Peradeniya, Ceylon). *Gastroenterology* 72(6): 1257-1259; 1977.

6984 FOOD HYPERSENSITIVITY ALLERGY OR MALABSORPTION. (Eng.) Waickman, F. J. (1625 W. Portage Trail, Cuyahoga Falls, OH 44223). *Laryngoscope* 87(5, Part 1):661-664; 1977.

6985 SELECTIVE VITAMIN B_{12} MALABSORPTION (IMERSLUND-GRASBECK SYNDROME): STUDIES ON GASTROENTEROLOGICAL AND NEPHROLOGICAL PROBLEMS. (Eng.) Becker, M.; Rotthauwe, H. W.; Weber, H. P.; Fischbach, H. (Universitats-Kinderklinik, Adenauerallee 119, D-5300 Bonn, W. Germany). *Eur. J. Pediat* 124(2):139-153; 1977.

6986 DISORDERS OF CARBOHYDRATE DIGESTION AND ABSORPTION. (Eng.) McMichael, H. B. (No affiliation given). *Clin. Endocrinol. Metab.* 5(3):627-649; 1976.

6987 ABSORPTION AND MALABSORPTION OF FOLATES. (Eng.) Rosenberg, I. H. (No affiliation given). *Clin. Haematol.* 5(3):589-618; 1976.

6988 LACTOSE MALABSORPTION AND BONE MINERAL CONTENT. (Eng.) Alhava, E. M.; Jussila, J.; Karjalainen, P.; Vuojolahti, P. (Univ. Central Hosp., Kuopio, Finland). *Acta Med. Scand.* 201(4): 281-283; 1977.

6989 DETERMINATION OF ^{58}Co-VITAMIN B_{12} ABSORPTION IN PERNICIOUS ANEMIA BY USE OF WHOLE-BODY COUNTING: REPRODUCIBILITY AND CONTROL OF GUT TRANSIT TIME. (Eng.) Hjelt, K.; Rasmussen, P. A.; Munck, O. (Glostrup Hosp., Glostrup, Denmark). *Acta Med. Scand.* 201(4):167-171; 1977.

6990 LACTOSE INTOLERANCE--A REVIEW. (Eng.) Ransome-Kuti, O. (Coll. Medicine, Univ. Lagos, Lagos, Nigeria). *Postgrad. Med. J.* 53(Suppl. 2):73-83; 1977.

6991 MILK INTOLERANCE--MIMIC OF THE IRRITABLE BOWEL SYNDROME. (Eng.) Hines, C., Jr. (Ochsner Medical Inst., New Orleans, LA). *J. La. State Med. Assoc.* 129(5):125-127; 1977.

6992 MALABSORPTION IN CHILDREN. (Eng.) Anderson, C. M. (No affiliation given). *Clin. Gastroenterol.* 6(2):355-375; 1977.

6993 CARBOHYDRATE PROBLEMS IN PAEDIATRIC GASTROENTEROLOGY. (Eng.) Lifshitz, F. (No affiliation given). *Clin. Gastroenterol.* 6(2): 415-429; 1977.

6994 RETICULIN AUTOANTIBODIES IN CHILDHOOD COELIAC DISEASE NOT DIRECTED AGAINST TYPE III COLLAGEN. (Eng.) Timpl, R.; Wick, G.; Granditsch, G. (Max-Planck-Inst. Biochemistry, Martinsried, Munich, W. Germany). *Clin. Exp. Immunol.* 28(3):546-547; 1977.

6995 COELIAC DISEASE. (Eng.) Booth, C. C. (Royal Postgraduate Medical Sch., Ducane Rd., London W12, England). *Nutr. Metab.* 21(1/3): 65-75; 1977.

6996 ENTEROCHROMAFFIN CELLS AND TISSUE CONCENTRATIONS OF 5-HYDROXYTRYPTAMINE IN DUODENAL MUCOSA OF CHILDREN WITH COELIAC DISEASE [Abstract]. (Eng.) Challacombe, D. N.; Dawkins, P. D.; Baker, P.; Robertson, K. (Taunton and Somerset Hosp., Taunton, Somerset, England). *Arch. Dis. Child* 52(5):427-428; 1977.

See also, 6695, 6902, 6940, 6947, 6948, 6949, 6953, 6966, 7050, 7242, 7252, 7258.

LARGE INTESTINE

6997 METASTATIC COLON CARCINOMA SIMULATING PRIMARY BILE DUCT CARCINOMA VIA ENDOSCOPIC CHOLANGIOGRAPHY. (Eng.) Nagler, J.; Rochwarger, A. M. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *Gastrointest. Radiol.* 2(1):75-76; 1977.

The case of a 59-yr-old man with metastatic colon carcinoma simulating primary bile duct carcinoma is presented. The radiographic similarities via endoscopic retrograde cholangiopancreatography included bile duct narrowing and mucosal destruction. A distinguishing feature, however, was the failure of the intrahepatic biliary tree to dilate. When an area of irregular narrowing of a bile duct with mucosal destruction is demonstrated on a cholangiogram, metastatic disease from the colon, gallbladder, pancreas, or lymphoma should be considered in the differential diagnosis along with primary bile duct carcinoma.

6998 ACCUMULATION OF BONE-SEEKING RADIONUCLIDES IN LIVER METASTASIS FROM COLON CARCINOMA. (Eng.) Garcia, A. C.; Yeh, S. D. J.; Benua, R. S. (Cornell Medical Coll., New York, NY). *Clin. Nucl. Med.* 2(8):265-269; 1977.

Liver and bone scans were carried out in 15 colon cancer patients with metastasis to the liver. Seven of these showed accumulation of bone seeking radionuclides in the liver at the site of a defect in the scan. Such accumulation was found in two diphosphonate, in one pyrophosphate, and in six ^{18}F scans. This is apparently the first series to report localization of ^{18}F in intrahepatic metastasis from colon cancer.

6999 PRELIMINARY LONGITUDINAL STUDIES OF SERUM POLYAMINES IN PATIENTS WITH COLORECTAL CARCINOMA. (Eng.) Nishioka, K.; Romsdahl, M. M. (Univ. Texas System Cancer Center, M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Cancer Lett. (Amsterdam)* 3(3/4):197-202; 1977.

Serum polyamine levels in 10 patients with colorectal carcinoma or Gardner's syndrome who were examined >1 yr were found to reflect the disease status. In a patient with multiple adenocarcinoma of the colon (stage B) who underwent a total colectomy, preoperative levels of spermidine and spermine were slightly elevated above the normal values of 0.33 and 0.06 nmol/ml serum, resp., but the preoperative putrescine level (about 1.4 nmol/ml) was greatly elevated above the normal level of 0.33 nmol/ml. An 11-day postoperative sample showed even higher polyamine levels. Over the next 20 months, however, serum polyamine levels decreased to the normal range in this subject, who currently has no clinical evidence of disease.

A patient with adenocarcinoma of the ascending colon, four with stages B and C disease, and one with benign bowel disease (villous adenoma) who underwent successful surgery showed polyamine profiles similar to that of the above patient, except that the villous adenoma patient showed normal serum polyamine levels before surgery. Preoperative serum from a rectal adenocarcinoma patient showed slightly elevated putrescine (0.40 nmol/ml) and spermidine (0.43 nmol/ml) levels. Metastasis to the liver was found at colostomy, and chemotherapy with 5-fluorouracil was instituted. Serum analysis 8 days later showed a high putrescine level (almost 1.0 nmol/ml) that subsequently declined. Despite no clinical evidence of disease 12 months after surgery, a persistent slight elevation of spermidine suggested the presence of a slow-growing tumor; an abnormal liver scan and a slightly elevated alkaline phosphatase level were found 15 months after surgery, and the disease is currently progressive. In a patient with Gardner's syndrome, a preoperative serum sample prior to ileostomy showed a high putrescine level (about 2 nmol/ml) that gradually declined after surgery. However, at 21 months, the patient developed partial bowel obstruction, and the putrescine level was elevated (0.45 nmol/ml). A final serum sample obtained 1 month before death (exploratory laparotomy had indicated desmoid-type fibrosarcoma) showed high polyamine levels (putrescine and spermidine >1.0 nmol/ml and spermine about 0.6 nmol/ml). The results suggest that sequential determination of serum polyamine levels correlates highly with the clinical course in patients with colorectal carcinoma.

7000 CLINDAMYCIN-ASSOCIATED COLITIS IN CHILDREN: A PROSPECTIVE STUDY AND A NEGATIVE REPORT. (Eng.) Randolph, M. F.; Morris, K. E. (70 Deer Hill Ave., Danbury, CT 06810). *Clin. Pediatr.* 16 (8):722-725; 1977.

A prospective study was carried out over a 31-month period in 1,484 children to assess the risk of colitis associated with clindamycin therapy. The patients received clindamycin (8-16 mg/day, p.o.) for 10 days for the treatment of beta hemolytic streptococcal pharyngitis, acute cervical adenitis, impetigo, acne, or cellulitis. Children who were taking another antibiotic; had a known allergy to lincomycin or clindamycin; or had a personal or family history of irritable bowel, colitis, food allergies, milk intolerance, melena, or bloody stools were excluded. Diarrhea (≥5 watery bowel movements/24 hr) occurred in 38 children; this began on the fourth to eighth day of drug use and ended within 8 days (average 5 days) after clindamycin was stopped. In 90 stool samples from these patients, no occult blood was present, mucus was scant to moderate, and fecal films stained with methylene blue were negative for WBC. The results suggest that clindamycin is better tolerated by children than by adults.

7001 PERFORATION OF THE SIGMOID COLON DURING PREGNANCY: A RARE COMPLICATION OF ENDOMETRIOSIS: CASE REPORT. (Eng.) Clement, P. B. (Dept. Pathology, Univ. British Columbia, Vancouver, British Columbia, Canada). *Br. J. Obstet. Gynaecol.* 84(7):548-550; 1977.

The case of a 28-yr-old woman in whom perforation of the sigmoid colon occurred during the 37th week of pregnancy is reported. There was almost complete replacement of the bowel wall by endometriotic tissue showing extensive decidualization of its stroma. This condition appears to be a very rare complication of endometriosis. The effects of pregnancy upon endometriosis are briefly reviewed.

7002 COMPARISON OF BARIUM ENEMA AND COLONOSCOPY IN THE DETECTION OF SMALL COLONIC POLYPS. (Eng.) Thoeni, R. F.; Menuck, L. (Univ. California, Sch. Medicine, San Diego, CA). *Radiology* 124(3): 631-635; 1977.

Two hundred and ten patients were examined by barium enema (both conventional and double-contrast technique) and colonoscopy to determine and compare the accuracy of each method in the detection of small colonic polyps. Two hundred and nineteen polyps were found in 112 patients; of these, 142 were diagnosed by both methods and 50 polyps were identified by colonoscopy and not detected by barium enema. Colonoscopy failed to detect 27 polyps, 21 of these because the area could not be reached by the colonoscope. The usual cause of error in the other cases was that bleeding or a large fold obscured the lesion. Single-contrast barium enema missed 33 and double-contrast barium enema missed 17 polyps. There were five malignant polyps 1 cm or less in diameter, the smallest being 5 mm, among 112 patients studied. All five small carcinomas were detected by direct double contrast examination. Double-contrast barium enema offers a definite advantage in the right colon. In general, the two methods are complementary for evaluating the colon.

7003 IMMUNOLOGICAL ASPECTS OF COLORECTAL CANCER. (Eng.) Sjogren, H. O. (No affiliation given). *Clin. Gastroenterol.* 5(3):563-571; 1976.

7004 PSEUDOMEMBRANOUS ENTEROCOLITIS COMPLICATING AMPICILLIN THERAPY. (Eng.) Read, L.; Cove-Smith, J. R. (City Hosp., Hucknall Rd., Nottingham NG5 1PB, England). *Postgrad. Med. J.* 53(620): 324-326; 1977.

7005 EIGHT YEARS EXPERIENCE WITH CIVILIAN INJURIES OF THE COLON. (Eng.) Yaw, P. B.; Smith, R. N.; Glover, J. L. (Wishard Memorial Hosp., Indianapolis, IN). *Surg. Gynecol. Obstet.* 145(2):203-205; 1977.

7006 SIGNIFICANCE OF THE VERTEBRAL VENOUS (BATSON'S) PLEXUS IN METASTATIC SPREAD IN COLORECTAL CARCINOMA. (Eng.) Vider, M.;

Maruyama, Y.; Narvaez, R. (Temple Univ. Hosp., Philadelphia, PA). *Cancer* 40(1):67-71; 1977.

7007 HIRSCHSPRUNG'S DISEASE. (Eng.) Dinner, M. (Johannesburg Group Teaching Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 52(8):319-321; 1977.

7008 GENESIS OF COLORECTAL CANCER. (Eng.) Morson, B. C. (No affiliation given). *Clin. Gastroenterol.* 5(3):505-525; 1976.

7009 TREATMENT OF CARCINOMA OF THE SIGMOID COLON AND UPPER RECTUM: A COMPARISON OF LOCAL SEGMENTAL RESECTION AND LEFT HEMICOLECTOMY. (Eng.) Busuttil, R. W.; Foglia, R. P.; Longmire, W. P., Jr. (Univ. California at Los Angeles Medical Center, Los Angeles, CA 90024). *Arch. Surg.* 112(8):920-923; 1977.

7010 COMPLICATIONS OF COLONOSCOPY. (Eng.) Graham, J.; Eusebio, E. B. (Southern Illinois Univ. Sch. Medicine, Springfield, IL). *Ill. Med. J.* 152(1):39-42; 1977.

7011 MULTIPLE APOCRINE FIBROADENOMAS OF THE ANAL SKIN. (Eng.) Assor, D.; Davis, J. B. (Consolidated Biomedical Lab., Inc., Dublin, OH). *Am. J. Clin. Pathol.* 68(3):397-399; 1977.

7012 THE DIAGNOSIS AND SURGICAL TREATMENT OF PATIENTS WITH GARDNER'S SYNDROME. (Eng.) Watne, A. L.; Lai, H. Y.; Carrier, J.; Coppula, W. (West Virginia Medical Center, Morgantown, WV 26506). *Surgery* 82(3):327-333; 1977.

7013 GARDNER'S SYNDROME: REPORT OF THREE CASES AND REVIEW OF THE LITERATURE. (Eng.) Axelsson, C. K.; Clausen, B.; Henriksen, F. W. (Rigshospitalet, Copenhagen, Denmark). *Acta Chir. Scand.* 143(2):121-125; 1977.

7014 DUPLICATION CYST OF THE COLON. (Eng.) Azmy, A.; Bedford, A. (Westminster Children's Hosp., London S.W.1, England). *Z. Kinderchir.* 21(3):283-285; 1977.

7015 GASTROSCHISIS COMPLICATED BY INTESTINAL ATRESIA. (Eng.) Amoury, R. A.; Ashcraft, K. W.; Holder, T. M. (Children's Mercy Hosp., 24th and Gillham Rd., Kansas City, MO 64108). *Surgery* 82(3):373-381; 1977.

7016 THE EXTERIORIZED ANASTOMOSIS: ITS ROLE IN SURGERY OF THE COLON. (Eng.) Kirkpatrick, J. R. (Wayne State Univ. Sch. Medicine, Detroit, MI 48201). *Surgery* 82(3):362-365; 1977.

7017 DURATION OF SYSTEMIC PROPHYLACTIC ANTIBIOTIC COVER AGAINST ANAEROBIC SEPSIS IN INTESTINAL SURGERY. (Eng.) Downing, R.; McLeish, A. R.; Burdon, D. W.; Alexander-Williams, J.; Keighley, M. R. B. (General Hosp., Steelhouse Lane, Birmingham B4 6NH, England). *Dis. Colon Rectum* 20(5):401-404; 1977.

7018 SMOOTH-MUSCLE RECTAL TUMORS: A THERAPEUTIC DILEMMA. (Eng.) Nemer, F. D.; Stoeckinger, J. M.; Evans, O. T. (4121 W. 28th St., St. Louis Park, MN 55416). *Dis. Colon Rectum* 20(5):405-413; 1977.

7019 MUCOEPIDERMOID CARCINOMA IN AN "ANAL FISTULA" WITH ASSOCIATED ADENOCARCINOMA IN A VILLOUS ADENOMA OF THE DESCENDING COLON: REPORT OF A CASE. (Eng.) Fogler, R.; Lanter, B.; Stern, G.; Weiner, E. (625 Rockaway Parkway, Brooklyn, NY 11236). *Dis. Colon Rectum* 20(5):428-435; 1977.

7020 EXTRAMAMMARY PERIANAL PAGET'S DISEASE: REPORT OF A CASE. (Eng.) Grow, J. R.; Kshirsagar, V.; Tolentino, M.; Gramling, J.; Schutte, A. G. (St. Joseph's Hosp., Milwaukee, WI). *Dis. Colon Rectum* 20(5):436-442; 1977.

7021 TRANSSACRAL REMOVAL OF RECTAL LEIOMYOMAS FROM THE SAME PATIENT ON TWO OCCASIONS: REPORT OF A CASE. (Eng.) Van Langenberg, A. (Maryknoll Hosp., Kowloon, Hong Kong). *Dis. Colon Rectum* 20(5):443-446; 1977.

7022 PERIAPPENDICITIS: CLINICAL REALITY OR PATHOLOGIC CURIOSITY? (Eng.) O'Neil, M. B.; Moore, D. B. (Kaiser-Permanente Medical Center, 2025 Morse Ave., Sacramento, CA 95825). *Am. J. Surg.* 134(3):356-357; 1977.

7023 A CONTINENT COLOSTOMY: THE MAGNETIC STOMA CAP. (Eng.) Bauer, J. J.; Wertkin, M. G.; Gelernt, I. M.; Kreel, I. (Mount Sinai Sch. Medicine, City Univ. New York, Fifth Ave. and 100th St., New York, NY 10029). *Am. J. Surg.* 134(3):334-337; 1977.

7024 ROENTGENOGRAPHIC FEATURES OF AMERICAN BURKITT'S LYMPHOMA. (Eng.) Alford, B. A.; Coccia, P. F.; L'Heureux, P. R. (Univ. Virginia Hosp., Charlottesville, VA 22901). *Radiology* 124 (3):763-770; 1977.

7025 ULTRASONOGRAPHIC APPEARANCE OF ADULT INTUSSUSCEPTION. (Eng.) Weissberg, D. L.; Scheible, W.; Leopold, G. R. (Dept. Radiology, Univ. California, San Diego, CA). *Radiology* 124(3): 791-792; 1977.

7026 HEMORRHOIDECTOMY: COMPARATIVE APPRAISAL IN THE LIGHT OF THE LONG-TERM RESULTS.

(Eng.) Militarev, Ju. M.; Protasevitsch, N. N. (Res. Proctological Lab. with Clinic, Ministry Health, Moscow, USSR). *Am. J. Proctol.* 28(4):43-47, 49; 1977.

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7028 TREATMENT OF COLON INJURIES. (Eng.) Steele, M.; Blaisdell, F. W. (San Francisco General Hosp., 1001 Potrero, San Francisco, CA 94110). *J. Trauma* 17(7):557-562; 1977.

7029 THE INJURED COLON. (Eng.) Freeark, R. J. (Loyola Univ. Medical Center, 2160 S. First Ave., Maywood, IL 60153). *J. Trauma* 17(7): 563-564; 1977.

7030 A DOUBLE-BLIND COMPARATIVE EVALUATION OF LOPERAMIDE VERSUS DIPHENOXYLATE WITH ATROPINE IN ACUTE DIARRHEA. (Eng.) Cornett, J. W. D.; Aspeling, R. L.; Mallegol, D. (Janssen R & D, Inc., New Brunswick, NJ 08903). *Curr. Ther. Res.* 21(5):629-637; 1977.

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7032 DEFECTIVE ORGANIZATION OF ACTIN IN CULTURED SKIN FIBROBLASTS FROM PATIENTS WITH INHERITED ADENOCARCINOMA. (Eng.) Kopelovich, L.; Conlon, S.; Pollack, R. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Proc. Natl. Acad. Sci. USA* 74(7):3019-3022; 1977.

7033 FUNCTION OF THE ANAL SPHINCTERS FOLLOWING COLO-ANAL ANASTOMOSIS. (Eng.) Lane, R. H. S.; Parks, A. G. (Royal South Hants Hosp., Graham Rd., Southampton, England). *Br. J. Surg.* 64(8):596-599; 1977.

7034 VILLOUS ADENOMA CAUSING ACUTE APPENDICITIS. (Eng.) Munk, J. F. (Queen Elizabeth Hosp., Cosham, Portsmouth, Hants, PO6 3LY, England). *Br. J. Surg.* 64(8):593-595; 1977.

7035 EXTRAMEDULLARY PLASMACYTOMA OF THE COLON: A RARE CAUSE OF INTUSSUSCEPTION. (Eng.) Budd, D. C.; Cochran, R. C.; Metildi, L. A. (Natl. Naval Medical Center, Bethesda, MD 20014). *Am. Surg.* 43(8):528-530; 1977.

7036 GAS-FILLED APPENDIX DIALOG [Letter to Editor]. (Eng.) Joffe, N.; Soter, C. S.; Lim, M. S. (Beth Israel Hosp. and Harvard Medical Sch., Boston, MA 02115). *Am. J. Roentgenol.* 129(1):182-183; 1977.

7037 CONGENITAL ATRESIA OF THE COLON. (Eng.) Fuller, J. W.; Scarano, V. R. (1002 Brookley Ave., Warner Robins, GA 31093). *South. Med. J.* 70(8):987, 990; 1977.

7038 MALIGNANT TERATOMA WITH FISTULOUS COMMUNICATION TO THE RECTOSIGMOID. (Eng.) Jewel, K. L. (Mountainside Hosp., Bay and Highland Ave., Montclair, NJ 07042). *Am. J. Proctol.* 28(4):51-55; 1977.

7039 BARIUM PERITONITIS. (Eng.) Sung, J. P.; O'Hara, V. S.; Lee, C. Y. (Veterans Admin. Hosp., 2615 E. Clinton Ave., Fresno, CA 93703). *West. J. Med.* 127(2):172-176; 1977.

7040 THE VILLOUS TUMOURS OF THE COLON AND RECTUM: ANATOMOPATHOLOGICAL, CLINICAL AND THERAPEUTIC STUDY. (Eng.) Sarles, J. C.; N'Guyen, R.; Anfossi, G.; Castelo, H. B. (Hospital d'Aubagne, Aubagne, France). *Chir. Gastroenterol.* 11(1):95-103; 1977.

7041 THE PROBLEM OF SPHINCTER-SAVING IN MIDDLE-THIRD TUMORS OF THE RECTUM. (Eng.) Bervar, M. (Military Medical Acad., Belgrade, Yugoslavia). *Chir. Gastroenterol.* 11(1):157-161; 1977.

7042 ETIOLOGIC AND THERAPEUTIC ASPECTS OF INTUSSUSCEPTION IN CHILDHOOD. (Eng.) Freund, H.; Hurvitz, H.; Schiller, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Am. J. Surg.* 134(2):272-274; 1977.

7043 NEW ASPECTS OF THE IRRITABLE BOWEL SYNDROME. (Eng.) Fielding, J. F. (Charitable Infirmary, Jervis St., Dublin 1, Ireland). *J. Ir. Med. Assoc.* 70(10):304-306; 1977.

7044 TYPHLITIS COMPLICATING LEUKEMIA IN AN ADULT: BARIUM ENEMA FINDINGS. (Eng.) Del Fava, R. L.; Cronin, T. G., Jr. (St. Francis Hosp., 355 Ridge Ave., Evanston, IL 60202). *Am. J. Roentgenol.* 129(2):347-348; 1977.

7045 HENOCH-SCHONLEIN PURPURA OF THE COLON: AN UNUSUAL GASTROINTESTINAL MANIFESTATION. (Eng.) Novy, S. B.; Weaver, R. M.; Jensen, K. M.; O'Donnell, W. W. (St. Joseph Hosp., 1919 La Branch, Houston, TX 77002). *South Med. J.* 70(7): 884-886; 1977.

7046 POSTOPERATIVE WOUND INFECTION IN COLONIC AND RECTAL SURGERY. (Eng.) Jekic, M.; Berger, O. (Clinical Hosp. Zemun-Beograd, Yugoslavia). *Chir. Gastroenterol.* 10(4):417-419; 1976.

7047 PNEUMATOSIS CYSTOIDES INTESTINALIS: REPORT OF TWO CASES. (Eng.) Hasselgren, P. O.; Engquist, S.; Sundstrom, C. (Sahlgren's Hosp., Goteborg, Sweden). *Ann. Chir. Gynaecol.* 66:98-101; 1977.

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7049 LOCALIZATION OF CARCINOEMBRYOGENIC ANTIGEN (CEA) IN NORMAL, INFLAMMATORY AND NEOPLASTIC COLONIC MUCOSA BY IMMUNOFLUORESCENCE. (Eng.) Gallo, V.; Golferini, A.; Capussoti, R.; Gubetta, L.; Rizzetto, M.; Tassi, G. C. (Ospedale Mauriziano Umberto I, 10100 Torino, Italy). *Boll. Ist. Sieroter. Milan.* 56(2):132-135; 1977.

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7052 BENIGN (NONPOLYPOID) MUCOSAL CHANGES ADJACENT TO CARCINOMAS OF THE COLON: A LIGHT MICROSCOPIC STUDY OF 20 CASES. (Eng.) Saffos, R. O.; Rhatigan, R. M. (Univ. Hosp. Jacksonville, 655 W. Eighth St., Jacksonville, FL 32209). *Hum. Pathol.* 8(4):441-449; 1977.

7053 PENETRANCE AND EXPRESSIVITY OF THE GENE RESPONSIBLE FOR THE GARDNER SYNDROME. (Eng.) Naylor, E. W.; Gardner, E. J. (Dept. Pediatrics, State Univ. New York at Buffalo, Buffalo, NY). *Clin. Genet.* 11(6):381-393; 1977.

7054 PER ORAL PNEUMOCOLON EXAMINATION OF THE ILEOCECAL REGION. (Eng.) Kellett, M. J.; Zboralske, F. F.; Margulis, A. R. (Dept. Radiology, Univ. California, San Francisco, CA 94143). *Gastrointest. Radiol.* 1(4):361-365; 1977.

7055 THE TREATMENT OF PILONIDAL SINUS AT ST MARK'S HOSPITAL. (Eng.) Britton, D. C.; Marks, C. G.; Ritchie, J. K.; Thompson, H. R. (St. Mark's Hosp., City Rd., London EC1V 2PS, England). *Proc. R. Soc. Med.* 70(7):478-480; 1977.

7056 THE USE OF METRONIDAZOLE IN THE PREPARATION OF THE BOWEL FOR SURGERY. (Eng.) Taylor, S. A.; Cawdery, H. M. (King's Coll. Hosp., Denmark Hill, London SE5 9RS, England). *Proc. R. Soc. Med.* 70(7):481-482; 1977.

7057 SHORT COLON MALFORMATION WITH IMPERFORATE ANUS. (Eng.) Singh, A.; Singh, R.; Singh, A. (Government Medical Coll., Patiala, Punjab, India). *Acta Pediatr. Scand.* 66(5):589-594; 1977.

7058 FAMILIAL POLYPOSIS COLI IN BLACK PATIENTS. (Eng.) Leffall, L. D., Jr.; Chung, E. B.; Dewitty, R. L.; Cornwell, E. E.; Blakey, T. M. (Howard Univ. Hosp., 2041 Georgia Ave. N.W., Washington, DC 20060). *Ann. Surg.* 186(3):324-333; 1977.

7059 DIVERTICULITIS OF THE SIGMOID COLON WITH FISTULA TO CERVICAL STUMP AND URINARY BLADDER. (Eng.) Rich, M.; Dembrow, V. D.; Egozi, I. (Cedars of Lebanon Hosp., Miami, FL). *South. Med. J.* 70(8):1021-1022; 1977.

7060 VARIATION IN THE INCIDENCE OF DIVERTICULAR DISEASE WITHIN THE CITY OF EDINBURGH. (Eng.) Eastwood, M. A.; Sanderson, J.; Pocock, S. J.; Mitchell, W. D. (Western General Hosp., Edinburgh, Scotland). *Gut* 18(7):571-574; 1977.

7061 HIRSCHSPRUNG'S DISEASE: A COMMENTARY. (Eng.) Hixon, H. H. (Hospital for Sick Children, Great Ormond St., London, England). *Ann. Chir. Infant.* 18(3):219-229; 1977.

See also, 6681, 6852, 6858, 6947, 6952, 6956, 6967, 6991, 7062, 7118, 7231, 7239, 7247, 7253, 7255, 7257, 7258, 7260, 7265, 7267, 7268, 7271, 7274, 7277, 7278, 7279, 7281, 7285, 7286, 7287.

Ulcerative Colitis

7062 IMMUNOHISTOCHEMICAL IDENTIFICATION OF LYSOZYME IN INTESTINAL LESIONS IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Klockars, M.; Reitamo, S.; Reitamo, J. J.; Moller, C. (Fourth Dept. Medicine, Unioninkatu 38, 00170 Helsinki 17, Finland). *Gut* 18(5):377-381; 1977.

The distribution of lysozyme (LZM)-containing cells was studied immunohistochemically in the intestinal lesions of 15 patients with ulcerative colitis, 7 patients with Crohn's disease, and 24 controls. LZM was identified in ulcerative colitis in granulocytes, monocytes, and macrophages of the intestinal lamina propria. In contrast with findings in normal colon or rectum, in ulcerative colitis LZM was also detected in some mucosal crypt cells and metaplastic Paneth cells. In both ulcerative colitis and Crohn's disease, LZM was present in inflammatory cells of crypt abscesses. In Crohn's disease, intense LZM staining was seen in epitheloid cell granulomas. The present observations permit one explanation for the raised concentration of serum LZM in patients with ulcerative colitis and Crohn's disease. The fate of LZM-containing inflammatory cells and their enzymic content may differ in these two diseases. Fixed mononuclear phagocytes may lose their enzymic content into the circulation, whereas the granulocytes in ulcerative colitis may ultimately reach the colonic lumen by diapedesis.

7063 INTENSIVE TREATMENT IN SEVERE ACUTE ATTACKS OF ULCERATIVE COLITIS. (Eng.) Schjonsby, H.; Heimann, P.; Kremer, D.; Nordgard, K.; Raugstad, T. S.; Ringheim, F.; Stray, O. (Haukeland Sykehus, Univ. Bergen, Bergen, Norway). *Acta Med. Scand.* 603(Suppl.):43-46; 1977.

The results of intensive treatment including steroids and early surgery in severe colitis in the period 1971-1975 were compared with the results from the period 1966-1970, when systematic intensive therapy was not given. The period of preoperative medical treatment was reduced on average from 31 to 17 days. Approximately half the patients went into remission in each period. In the period 1971-1975 (23 patients), there was no mortality during the acute attacks or in the subsequent follow-up period. In the period of 1966-1970, the immediate mortality in 30 patients was 10%. One patient died 6 yr later at the age of 81 during a relapse of the colitis; the overall mortality was 13.3%. The change in overall mortality was mainly due to reduced operative mortality. In the first period, the operative mortality in 15 patients was 20%; whereas, none of 11 patients died after surgery during the second period.

7064 THE EFFECT OF PREDNISOLONE ON LEUCOCYTE FUNCTION IN MAN: A DOUBLE BLIND CONTROLLED STUDY. (Eng.) Clarke, J. R.; Gagnon, R. F.; Gotch, F. M.; Heyworth, M. R.; Maclennan, I. C. M.; Truelove, S. C.; *et al.* (Radcliffe Infirmary, Oxford OX2 6HE, England). *Clin. Exp. Immunol.* 28(2):292-301; 1977.

The effect of prednisolone on WBC numbers and function and on plasma cell population in rectal biopsies was studied in 20 patients with ulcerative colitis in remission. The patients were randomly allocated to two equal groups, one receiving prednisolone (20 mg i.v.; then tablets, 40 mg daily) and the other a dummy preparation (sterile saline i.v.; then lactose tablets). The mean lymphocyte count fell from 1,738 cells/mm to 501 cells/mm 4 hr after prednisolone was given ($p>0.001$) but by 24 hr was significantly elevated to 2,399 cells/mm ($p>0.02$); thereafter it returned to normal levels. Similar fluctuation was observed in lymphocytes forming spontaneous rosettes with sheep cells erythrocytes sensitized with human anti-D antiserum, and erythrocytes incubated with rabbit anti-sheep erythrocyte immunoglobulin, and with an equal volume of fresh AKR male mouse serum. The mitotic response to a submaximal stimulating dose of phytohemagglutinin (PHA) was significantly depressed ($p>0.01$) 4 hr after steroid administration but returned to normal by 24 hr. The spontaneous and PHA-induced lymphocyte-mediated cytotoxic activity was significantly depressed after the injection of 20 mg steroid ($p>0.05$ and $p>0.001$, resp.) and remained depressed at 7 days. K-cell cytotoxicity did not follow the general pattern and was lowest after 24 hr of steroid administration and remained depressed 7 days after cessation of steroid administration. No significant differences in the sigmoidoscopic or histological appearances of the rectal mucosa were observed between the two groups. No significant changes occurred in any of the above assays in the control group. Polymorphonuclear WBC counts were elevated in the patients on steroid therapy and in the control group but the control group returned to normal values by 24 hr. Prednisolone is not likely to lead to bacterial infection or is it likely to be important in the treatment of ulcerative colitis.

7065 X-RAY STUDIES IN COLITIS ULCEROSA. (Ger.) Luber, U.; Fuchs, H. F. (Medizinischen Universitats-Klinik Krankenhausstrasse 12, 8520 Erlangen, W. Germany). *Fortschr. Med.* 94(33):1947-1951; 1976.

7066 ADRENAL RESERVE ASSESSMENT IN PATIENTS WITH ULCERATIVE COLITIS. (Pol.) Nitsche, J.; Zalewski, J.; Mazanek, E.; Machalski, M.; Wojnar, J.; Wojtacha-Wencel, B. (I Klinika Chorob Wewnetrznych, Instytutu Chorob Wewnetrznych AM, ul. Reymonta 8, 40-029 Katowice, Poland). *Pol. Tyg. Lek.* 32(17):635-636; 1977.

7067 ULTRASTRUCTURAL ENZYME HISTOCHEMICAL FINDINGS IN MACROPHAGES IN INFLAMMATORY INFILTRATE IN ULCERATIVE COLITIS [ABSTRACT]. (Ger.) Gebbers, J. O.; Otto, H. F.; Muller-Wieland, K. (No affiliation given). *Zentralbl. Allg. Pathol.* 121(3):306; 1977.

See also, 6953, 7031, 7050, 7258, 7274, 7279.

PANCREAS

7068 RELATIONSHIP BETWEEN THE EXOCRINE FUNCTION OF THE PANCREAS AND THE THROMBOCYTE COUNT IN THE PERIPHERAL BLOOD. (Rus.) Mitropol'skii, A. N.; Porokhnia, N. P. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Ter. Arkh.* 49(2):88-91; 1977.

7069 TRANSDUODENAL PANCREAS BIOPSY. (Dut.) Vos, L. J. M. (Chirurgische Universiteitskliniek, Groningen, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(3):109-111; 1977.

7070 COMPARISON OF THE DIAGNOSTIC PERFORMANCES OF ECHOTOMOGRAPHY, DCWR, ARTERIOGRAPHY AND LAPAROSCOPY IN THE DIAGNOSIS OF PANCREATIC AFFECTIONS. OBSERVATION OF 180 CASES [Abstract]. (Fre.) Gouerou, H.; Gosset, F.; Mury, B.; Debray, D.; Debray, C. (Hopital Bichat, 170, boulevard Ney, 75018 Paris, France). *Gastroenterol. Clin. Biol.* 1(4):405-406; 1977.

7071 ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY. (Rus.) Blagovidov, D. F.; Danilov, M. V.; Sokolov, L. K.; Malkerova, N. N.; Glabai, V. P. (A. V. Vishnevskii Inst. Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (3):86-90; 1977.

7072 GASTRIC LOCALIZATION OF ABERRANT PANCREAS. (Ita.) Beccaria, A.; Beccaria, E.; Oliaro, A.; Formento, E.; Massa, F. (Ospedale Maggiore di San Giovanni Battista e della Citta di Torino, Turin, Italy). *Minerva Med.* 69(21):1441-1446; 1977.

7073 OUTLINES OF THE DIFFERENTIAL DIAGNOSIS OF CARCINOMA OF THE PANCREAS BY ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY. (Ger.) Deyhle, P.; Ammann, R.; Stuby, K. (Departement fur Innere Medizin, Universitat Zurich, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):690-691; 1976.

7074 USE OF "CAMA" MARGARINE IN THE TREATMENT OF ENTERAL AND PANCREATOGENIC STEATORRHEA. (Ger.) Dabels, J.; Hantzschel, U.; Zastrow, R. (Klinik fur Innere Medizin des Bereichs Medizin der Wilhelm-Pieck-Universitat, Ernst-Heydemann-Strasse, DDR-25 Rostock, E. Germany). *Dtsch. Gesundheitswes.* 32(19):880-883; 1977.

See also, 6744, 6853, 6854, 6855, 6856, 6857, 7075, 7078, 7083, 7085, 7195, 7199, 7239, 7242, 7247, 7260, 7266.

PANCREAS

Pancreatitis

7075 PANCREATIC REFLUX INTO WIRSUNG'S DUCT DURING PEROPERATIVE BILIARY RADIOMANOMETRY IN ACUTE AND CHRONIC PANCREATITIS. (Fre.) Lataste, J.; Albou, J. C. (Centre Hospitalier Intercommunal, 94000 Creteil, France). *J. Chir. (Paris)* 113(3):255-262; 1977.

Pancreatic reflux during biliary radiomanometry (RM) occurs frequently in patients with acute and chronic pancreatitis. Of 78 acute pancreatitis patients explored by RM, reflux into Wirsung's duct occurred 22 times. In 7 patients, reflux was due to distal obstruction (3 enclaved calculi, 4 odditis); in 15, it was due to cholelithiasis. In one enclaved calculus patient, Santorini's duct was totally blocked, and the patient died of acute hemorrhagic pancreatitis in 48 hr. The other two enclaved calculus patients were cured after sphincterotomy. Prognosis depends on the completeness of the pancreatic blockage. Of 31 complete blockages of the sphincter of Oddi, 6 cases of acute pancreatitis and 1 of edematous acute pancreatitis resulted, but of 22 incomplete blockages (18 odditic, 4 with a permeable Santorini's duct), only 2 cases of acute pancreatitis were noted. Wirsung's duct was dilated markedly in three cases of acute pancreatitis. Of 138 patients who underwent RM for chronic or subacute recurrences of pancreatitis, radiological reflux in Wirsung's duct occurred in 19 patients. An obstacle in the sphincter of Oddi was noted in nine patients (8 odditis, 1 enclaved calculus), six of whom had a dilated Wirsung's duct. The duct was dilated in only 2/10 patients when no odditic obstacle was present. Sphincterotomy is recommended in cases of chronic pancreatitis associated with gallstones.

7076 HYPERCALCITONEMIA AS A CAUSE OF HYPOCALCEMIA IN ACUTE PANCREATITIS.

(Eng.) Berstad, T.; Onstad, A.; Gautvik, K. M. (Deaconess Hosp., Oslo, Norway). *Chir. Gastroenterol.* 11(1):147-151; 1977.

The cases of two patients (a 27-yr-old woman and a 37-yr-old alcoholic man) with acute pancreatitis and hypocalcemia in whom hypercalcitonemia was present are presented. The diagnosis of acute pancreatitis was made on the basis of clinical examination and verified by changes in the serum amylase, serum electrolytes, blood glucose, and for patient 1, also by peroperative examination of the pancreas. In the acute phase of the disease, both patients showed elevated serum calcitonin concentrations (2.16 ng/ml for patient 1 and 0.60-0.56 for patient 2), and the most marked hormone elevation was associated with the most pronounced hypocalcemia (7.3-4.2 mg% for patient 1 and 8.4 mg% for patient 2). In patient 1, normal serum levels of parathyroid hormone (0.10 ng/ml) were found, while this hormone was increased in the other patient (3.4 ng/ml). The increases in serum concentrations of calcitonin and parathyroid hormone were transient and confined to the acute period of the disease, thereby ruling out the possibility of chronic endocrine diseases underlying these findings. Calcitonin and parathyroid hormone levels returned to normal in parallel with the normalization of the amylase values and in parallel with a general improvement of the condition of the patients. To determine whether glucagon elevates the serum calcitonin level, patient 1 and two healthy subjects received an i.v. infusion of glucagon (3 mg). The serum values of calcitonin did not change significantly in controls or in the patient. The results suggest a causal relationship between increased calcitonin concentrations and hypocalcemia.

7077 SURGICAL TREATMENT OF ACUTE HEMORRHAGIC PANCREATITIS. REPORT OF 75 CASES.

(Fre.) Lataste, J.; Serpault, P. (Hopital intercommunal de Creteil, 40, boulevard de Verdun, 94000 Creteil, France). *J. Chir. (Paris)* 113(5/6):447-456; 1977.

A study of 75 patients with acute hemorrhagic pancreatitis (AHP) showed that in 39, it was associated with a biliary lesion. Etiologically, AHP was due to primary pancreatitis (35), embedded calculus in the ampulla of Vater (11), calculus in the lower bile duct (8), vesicular lithiasis (13), sclerous odditis (2), chronic pancreatitis (1), and postsphincterotomy pancreatitis (5). Mortality was higher in patients with biliary pancreatitis and a blockage of the sphincter of Oddi. Seven of the 11 patients with embedded calculi died, as did 4/5 postsphincterotomy patients. Description of the pancreatic lesions is difficult because of the anatomical location of the pancreas; early surgical excision is not recommended, as it is too dangerous. Overall (in addition to the 4 postsphincterotomy patients), 30 patients died postoperatively, 19 during the first week. Forty-one patients were cured; 11 required secondary sequestrectomy after the 20th day, but 30 did not, despite voluminous hematomas. Immediate surgery is recommended to uncover a suspected biliary lesion. This includes cholecystectomy (which can disclose certain nonpalpable calculi), radiomanometry of the common bile duct, and, if necessary, sphincterotomy.

7078 RELATIONSHIP BETWEEN THE MORPHOLOGIC APPEARANCE OF PANCREATIC CALCULI AND PANCREATIC FUNCTION IN CHRONIC CALCIFYING PANCREATITIS.

(Eng.) Wakabayashi, A.; Hashihira, S. (Osaka Medical Coll., Takatsuki, Osaka 569, Japan). *Am. J. Gastroenterol.* 67(1):47-53; 1977.

The relationship between the morphologic appearance of pancreatic calculi and pancreatic function in chronic calcifying pancreatitis was studied in 12 patients with large calculi (LC) and 7 patients with diffuse minute calculi (DMC). The cause of the calculi could not be determined in 66.7% of the LC cases, whereas in all of the DMC cases, the daily ingestion of >540 ml of sake for >10 yr was shown to be the cause. The LC were located mainly in the head and body of the pancreas, but the DMC were distributed in the head, body, and tail. Disturbances in pancreatic exocrine and endocrine functions, as measured by the pancreozymin-secretin test and the 50-g p.o. glucose-tolerance test, were less severe in cases of LC than they were in cases of DMC. All of the DMC patients were diabetic, but only five of the LC patients were diabetic, with another five being borderline for p.o. glucose loading and the remaining two patients being normal. In the pancreozymin-secretin test, the range of values for volume output for 60 min after secretin (ml), maximum bicarbonate concentration (mEq/l), bicarbonate output for 60 min after secretin (mEq), and amylase output for 100 min after pancreozymin (log U) were 23-133, 19.4-92.4, 0.58-8.88, and 4.6284-5.2210, resp., for the LC patients and 47-93, 18.0-60.2, 0.39-4.12, and 4.3820-5.1987, resp., for the DMC patients. Normal ranges were 50-204, 72.1-144.5, 1.59-21.03, and 5.0219-5.7595, resp. The two types of pancreatic calculi were clearly distinguishable, indicating marked differences in the pathophysiological process. Thus, they cannot be regarded as a single disease entity.

7079 ARTERIAL HEMORRHAGE DURING THE EVOLUTION OF CHRONIC PANCREATITIS. (Fre.) Guntz, M.; Albaret, P.; Ben Bouali, A.; Baudet, P.; Cherruaud, D. (Clinique Medicale A, C.H.U., 49000 Angers, France). *Ann. Chir.* 30(10):836-838; 1976.

Problems in identifying the source of the arterial hemorrhage due to portal hypertension that occurs during the evolution of chronic pancreatitis are exemplified by the case histories of two patients. A 63-yr-old patient with a 10-yr history of calcifying chronic pancreatitis had subacute attacks of pancreatitis with hyperamylasemia. Paraclinical examinations revealed calcifications typical of lithiasis of Wirsung's duct, distinct pneumatization of the common bile duct, enlargement of the duodenum, and total absence of selenomethionine fixation by the pancreas. Extensive hematemesis requiring blood transfusions occurred. Surgery revealed a pseudocyst of the hemorrhagic pancreatic head. Sclerosis ductal and parenchymatous calcifications, and erosion of the large intrapancreatic branch of the gastroduodenal artery and bile duct were noted. The patient was cured following a cephalic duodenopancreatectomy. The other patient, a 42-yr-old alcoholic with calcifying chronic pancreatitis, presented with digestive hemorrhaging. Arteriography of the celiac trunk disclosed an aneurysm of the juxtahiliary splenic artery. The patient was cured following a caudal splenopancreatectomy. A review of 84 literature cases revealed that digestive hemorrhaging was mainly due to ulceration in the walls of the pancreatic artery, pseudocyst, or calcification and rarely to a ruptured aneurysm of an intra- or juxtapancreatic arterial branch that opened into the pancreatic duct.

7080 THE ROLE OF DIETARY FAT AS AN ETIOLOGICAL FACTOR OF ACUTE PANCREATITIS. (Jpn.) Takenaka, M. (Sch. Medicine, Kyoto Univ., Sakyo-ku, Kyoto, Japan). *Arch. Jpn. Chir.* 46(2):141-153; 1977.

7081 ASSOCIATION OF HEMORRHAGIC ACUTE PANCREATITIS WITH STRANGULATED INTERNAL HERNIA. (Ita.) Tritto, V. A.; Di Mambro, M.; De Majo, A. (Ospedaliero Specializzato Regionale Ospedali dei Pellegrini di Napoli 8ª Divisione di Chirurgia, Naples, Italy). *Rass. Int. Clin. Ter.* 57(5):317-324; 1977.

7082 INVESTIGATIVE METHODS IN CHRONIC PANCREATITIS OF THE ADULT. (Fre.) de Montalier, H.; Cassan, Ph.; Deroide, J. P.; Luccioni, P. (Hopital Bichat, 75018 Paris, France). *Rev. Med. (Paris)* 17(31):1627-1634; 1976.

7083 CONTRIBUTION OF THE CLASSICAL AND ANGIOGRAPHIC X-RAY EXAMINATION TO THE DIAGNOSIS OF CHRONIC PANCREATITIS. (Fre.) Pringot, J.; Ponette, E.; Goncette, L.; Baert, A.; Dautrebande, J. (Cliniques Universitaires UCL, Louvain en Woluwe, B-1200 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):426-457; 1976.

See also, 6854, 7071.

LIVER AND BILIARY TRACT

7084 ANTIPYRINE, PARACETAMOL, AND LIGNOCAINE ELIMINATION IN CHRONIC LIVER DISEASE. (Eng.) Forrest, J. A. H.; Finlayson, N. D. C.; Adjepon-Yamoah, K. K.; Prescott, L. F. (Royal Infirmary, Edinburgh EH3 9YW, England). *Br. Med. J.* 1(6073):1384-1387; 1977.

The plasma half-lives of p.o. administered antipyrine, paracetamol, and lignocaine were measured in 23 patients with stable chronic liver diseases of varying severity. Fifteen patients received all three drugs, and 19 received at least two. The test drugs were administered consecutively 2-3 days apart over 7-10 days and usually in the sequence lignocaine (400 mg), antipyrine (18 mg/kg), and paracetamol (1.5 g). The half-life of paracetamol was abnormally prolonged in 9 out of 17 patients (mean 2.9 hr, normal 2.0 hr), of antipyrine in 10 of 19 patients (mean 30.4 hr, normal 12.0 hr), and of lignocaine in 19 of 21 patients (mean 6.6 hr, normal 1.4 hr). Prolongation of the half-lives of all three drugs was significantly correlated with an increase of the vitamin-K_1-corrected prothrombin time ratio and a reduction in serum albumin concentration. There was no correlation with serum bilirubin concentration or serum alanine aminotransferase activity. This finding suggests that impaired drug elimination was related to depressed hepatic protein synthesis. Considerable prolongation of the half-life of one drug was invariably associated with delayed elimination of the others. The half-life of lignocaine, however, was always the most prolonged and was a highly sensitive indicator of hepatic dysfunction. The pharmacokinetic characteristics of a drug as well as the severity of liver disease should be taken into account when considering drug dosage in patients with chronic liver disease.

7085 PRACTICAL ENZYMATIC DIAGNOSIS IN GASTROENTEROLOGY. (Ger.) Camenisch, R.; Filippini, L. (Gastroenterologische Abteilung, Kantonsspital, 6004 Lucerne, Switzerland). *Praxis* 66(7):200-205; 1977.

Possibilities of the enzymatic differential diagnosis of gastrointestinal diseases are reviewed. Increased transaminase activity is a feature of the hepatitis syndrome, and a persistent, considerable rise in alkaline phosphatase (AP) activity is characteristic of the cholestatic syndrome. However, the severity of disease can be determined only from the prothrombin time, which is reduced by vitamin K in hepatitis and normalized by this vitamin in cholestasis. Severe chronic liver diseases are characterized by an increased γ-globulin level. γ-Glutamyl transpeptidase is highly specific for anicteric liver damage, and, therefore, it should replace the BSP test, which is not without risks. The urine amylase test is of diagnostic value in acute pancreatitis, even though an increase of amylase activity is not specific for primary pancreatic diseases. The fecal chymotrypsin test is suitable for screening chronic pancreatic diseases. Idiopathic and symptomatic pernicious anemia (in the malassimilation syndrome or in postgastrectomy patients) usually is characterized by significantly increased lactate dehydrogenase activity.

7086 ANGIOGRAPHY IN THE DIAGNOSIS OF LIVER DISEASE IN CHILDREN. (Eng.) Rosch, J.; Mayer, B. S.; Campbell, J. R.; Neerhout, R. C. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *Radiol. Clin. (Basel)* 46(5):321-339; 1977.

A total of 75 hepatic angiograms were taken in 64 children with normal (23 cases) or diseased (41 cases) livers. The latter comprised diffuse inflammatory or degenerative disease (hepatitis or cirrhosis, 10 cases), primary malignant tumor (7), diffuse infiltrative neoplasm (2), metastatic tumor (7), benign tumor (4), abscess (4), and extrahepatic portal occlusion (7). The angiographic diagnosis was accurate in 42/44 patients in whom the diagnosis was proved by surgery, autopsy, and/or biopsy. A hypervascular, solitary, inflamed, necrotic liver cyst was misdiagnosed as a tumor with internal bleeding or necrosis, and a false-negative diagnosis was made in a 2-yr-old boy with a Wilms' tumor. Primary malignant tumors had characteristic angiographic patterns, whereas diffuse neoplasms were relatively avascular and caused stretching, displacement, and luminal irregularities of intrahepatic arteries and, occasionally, their occlusions. Non-neoplastic masses such as benign cysts or liver abscesses were manifested by avascular defects with displaced surrounding branches and, in liver abscesses, by regional inflammatory hypervascularity. In chronic hepatitis with predominant fibrosis and hepatomegaly, elongation, stretching, and thinning of major and medium-sized arteries appeared along with poor peripheral branch filling, particularly in the late stages of disease. Cirrhosis, often showed increased arterial flow to the liver with enlarged and characteristically tortuous corkscrew arteries. In patients with extrahepatic portal obstruction, typical findings were seen during the venous phase of tolazoline-augmented superior mesenteric angiography. Portal veins and the upper part of the mesenteric veins in two patients were replaced by varying numbers of hepatopetal collaterals that entered middle-sized intrahepatic portal branches. Hepatofugal collateral vessels shunting portal blood to both vena cava systems were also present in varying degrees.

7087 DIAGNOSIS OF IMMUNOPATHOLOGICAL REACTIONS IN LIVER DISEASES. (Ger.) Meyer zum Buschenfelde, K. H. (II. Medizinische Klinik und Poliklinik, Johannes-Gutenberg-Universitat Mainz, Postfach 3960, 6500 Mainz, W. Germany). *Med. Klin.* 71(36):1401-1412; 1976.

Studies and observations of the diagnostic relevance of immunopathological reactions in liver diseases are reviewed. Study of the humoral immune reactions is necessary for the diagnosis and differential diagnosis of primary biliary cirrhosis, chronic active hepatitis, and cryptogenic cirrhosis. The detection of hepatitis B surface antigen (HBsAg) and HBs antibody has improved the differentiation between virus-induced and autoimmune hepatitis. Along with these diagnostic markers, functional study of the thymus-dependent immune system, detection of cellular immune reactions to liver antigens and HBAg components, and localization of IgG on the hepatocyte membrane have been of great value in studies of the pathogenesis of chronic hepatitis. The presence of antibodies to the internal mitochondrial membranes of various tissues is one of the major characteristics of primary biliary cirrhosis; these antibodies are found in >90% of the patients. Consequently, they help differentiate between the intrahepatic and extrahepatic obstruction syndromes and among the various intrahepatic cholestases.

7088 ALPHA$_1$-FETOPROTEIN IN NEONATAL HEPATOBILIARY DISEASE. (Eng.) Andres, J. M.; Lilly, J. R.; Altman, R. P.; Walker, W. A.; Alpert, E. (Massachusetts General Hosp., Boston, MA 02114). *J. Pediatr.* 91(2):217-221; 1977.

The value of quantitating serum alpha$_1$-fetoprotein (AFP) in distinguishing the neonatal hepatitis syndrome from biliary atresia was investigated in 52 neonates and infants with various hepatobiliary disorders, including neonatal hepatitis syndrome (group I), biliary atresia (group II), and other hepatopathies such as choledochal cyst (group III). The mean serum AFP concentration in patients with neonatal hepatitis (51.1 ± 25.8 μg/ml) was significantly greater than the mean concentrations in the other two groups (9.8 ± 1.8 and 3.8 ± 2.3 μg/ml in groups II and III, resp.). There was no significant difference between the mean serum AFP concentrations in patients with biliary atresia and in group III patients. Patient age was noted to be an important factor; serum AFP levels greater than 35 μg/ml in infants 1-4 months of age suggested the diagnosis of neonatal hepatitis syndrome. Serum AFP levels below 10 μg/ml in infants less than 4 months of age suggested the diagnosis of biliary atresia or hepatopathies other than neonatal hepatitis. However, the variable and significant overlapping of serum AFP values between 10 and 35 μg/ml limit the diagnostic value of this test.

7089 RADIOIMMUNOLOGICAL DETERMINATION OF α-FETOPROTEIN IN HEPATOBILIARY DISEASES.

(Fre.) Joubaud, F.; Cheguillaume, J.; Baudet, P.; Ben Bouali, A.; Boyer, J.; Dao, M. (Clinique Medicale A, C.H.U. Angers, Angers, France). *Rev. Fr. Gastroenterol.* 126(2):13-21; 1977.

Radioimmunoassay was used to measure serum levels of α-fetoprotein (AFP) in 364 patients with various hepatobiliary diseases. Control levels in 126 normal subjects averaged 3.4 ng/ml. In 51 patients with a primary hepatocarcinoma, AFP levels averaged 1,654.4 ng/ml, but in 31 patients with a secondary liver tumor, they averaged only 15.8 ng/ml. Some gastric or prostatic cancers caused moderate elevations in AFP. Levels were normal or slightly elevated in 201 patients with cirrhosis and moderately elevated (>100 ng/ml) in 17/23 patients with viral hepatitis. The latter values were transitory, and they reflected hepatic recovery and regeneration. Diseases such as biliary tumor, alcoholic hepatitis, or lithic cholangitis did not affect AFP levels.

7090 SIGNIFICANCE OF ANTIALBUMIN ANTIBODIES, A NEW SYSTEM OF ANTIBODIES IN CHRONIC LIVER DISEASES.

(Fre.) Buligesco, L.; Lenkei, R.; Ciontea, M.; Dan, E. M. (Medical Clinic, Fundeni Hosp., Bucharest, Rumania). *Gastroenterol. Clin. Biol.* 1(5):487; 1977.

The presence of antialbumin antibodies (AAA) in 69 patients with liver diseases (persistent chronic hepatitis, 12; types A and B aggressive chronic hepatitis, 33; compensated hepatic cirrhosis, 17) was determined by immunodiffusion or passive hemagglutination. There was a correlation between the presence of AAA, and the etiology, degree of evolution, change in hepatic function, and intensity of the immunological process. AAA was found in the serum of 16.6% of the persistent hepatitis patients, 75.75% of the aggressive hepatitis patients, and 85% of the hepatic cirrhosis patients. The overall incidence was 68.11%. The presence of AAA correlated with a decrease in serum albumin, BSP clearance, and an increase in γ-globulins, immunoglobulins, AAN and AMI.

7091 ELIMINATION OF CANRENONE IN CONGESTIVE HEART FAILURE AND CHRONIC LIVER DISEASE.

(Eng.) Jackson, L.; Branch, R.; Levine, E.; Ramsay, L. (Bristol Royal Infirmary, Bristol, England). *Eur. J. Clin. Pharmacol.* 11(3):177-179; 1977.

Because spironolactone is frequently prescribed in chronic liver disease and in congestive heart failure, the elimination half-life ($T_{1/2}$) of canrenone (the principal unconjugated metabolite of spironolactone) was determined in seven patients with congestive heart failure and five patients with chronic liver disease. The $T_{1/2}$ of canrenone was 59 hr (range 32-105 hr) in the patients with chronic liver disease and 37 hr (range 19-48 hr) in the patients with congestive heart failure. In comparison, the $T_{1/2}$ in normal subjects was 13.5-24 hr in previous reports and 20.5 hr in normal subjects in the present study. However, there was no evidence of greater cumulation of canrenone in the plasma of those patients with a prolonged $T_{1/2}$.

7092 PLASMA DISAPPEARANCE OF INTRAVENOUSLY INJECTED RADIOLABELLED GLYCOCHOLIC ACID IN PATIENTS WITH LIVER DISEASE.

(Eng.) Sewell, R. B.; Hoffman, N. E.; Ireton, H. J. C.; Smallwood, R. A. (Austin Hosp., Heidelberg, Victoria 3084, Australia). *Aust. N.Z. J. Med.* 7(2):148-150; 1977.

The diagnostic value of determining the plasma disappearance of i.v. injected radiolabeled glycocholic acid (5 μCi) in liver disease was studied in 10 patients with liver cell necrosis (chronic active hepatitis, alcoholic hepatitis, liver cirrhosis, cholestasis, and liver carcinoma), 10 patients with diffuse hepatocellular disease without liver cell necrosis (alcoholic liver disease), and 3 patients without diffuse hepatocellular disease. The retention of radiolabel in the plasma was similar in the patients with hepatocellular disease and in those without it. The label retention in the patients with liver cell necrosis (8.90 ± 2.46, 7.20 ± 2.98, 4.91 ± 3.10, 3.92 ± 2.92, and 3.44 ± 2.69% at 4, 6, 10, 15, and 20 min, resp.) was significantly higher than that in those with liver disease but without necrosis (6.18 ± 1.68, 4.21 ± 1.45, 2.34 ± 0.97, 1.46 ± 0.90, and 0.99 ± 0.69%, resp.; $p<0.01$, $p<0.01$, $p<0.025$, $p<0.025$, and $p<0.025$, resp.). Comparison of the retention in the patients with liver disease but without necrosis with previous data from normal subjects showed that the two groups are indistinguishable. This test is not a sensitive index of the presence of significant liver disease.

7093 SERUM LIPOPEROXIDE LEVEL IN PATIENTS SUFFERING FROM LIVER DISEASES.

(Eng.) Suematsu, T.; Kamada, T.; Abe, H.; Kikuchi, S.; Yagi, K. (Osaka Univ. Medical Sch., Osaka 553, Japan). *Clin. Chim. Acta* 79(1):267-270; 1977.

A micro-method was used to determine the serum lipoperoxide levels in 14 patients with acute hepatitis, 8 patients with fulminant hepatitis, 16 patients with chronic active hepatitis, 39 patients with compensated liver cirrhosis, 4 patients with decompensated liver cirrhosis, 11 patients with fatty liver, and 121 healthy subjects. The mean serum lipoperoxide level in the healthy subjects was 1.77 ± 0.36 nmol/0.5 ml serum, and the level seldom exceeded 2.0 nmol/0.5 ml serum. The mean levels were significantly elevated in all patients with liver disease. The levels were 3.20 ± 0.88, 6.55 ± 0.88, 3.73 ±

1.83, 1.96 ± 0.65, 4.11 ± 0.53, and 3.80 ± 0.79 nmol/0.5 ml serum in acute hepatitis ($p<0.001$), fulminant hepatitis ($p<0.001$), chronic active hepatitis ($p<0.001$), compensated liver cirrhosis ($p<0.025$), decompensated liver cirrhosis ($p<0.001$), and fatty liver ($p<0.001$), resp. Because other studies have indicated that increased serum lipoperoxide levels may cause degeneration of the endothelial walls of vessels in some organs, the large increases in lipoperoxide levels seen in these diseases may be responsible for secondary disorders in organs other than the liver.

7094 HEPATIC SCINTIGRAPHY IN MANAGEMENT OF INFANTS AND CHILDREN WITH LIVER DISEASE.

(Eng.) Smith, A. L.; Mowat, A. P.; Williams, R. (King's Coll. Hosp. Medical Sch., Denmark Hill, London SE5 8RX, England). *Arch. Dis. Child.* 52(8): 633-637; 1977.

Scintiscans of the liver and spleen using ^{99m}Tc sulfur colloid in 15 infants with extrahepatic biliary atresia and 11 infants with severe obstructive jaundice (7 with genetic deficiency of α_1-antitrypsin) showed similar liver size, pattern of isotope uptake, and splenic abnormality, with no distinguishing features. In 37 older children with various liver disorders (8 chronic active hepatitis, 8 cirrhosis, 3 cystic fibrosis with hepatosplenomegaly and abnormal liver function tests, 2 congenital hepatic fibrosis, 2 glycogen storage disease, 9 extrahepatic portal hypertension, and 5 space-occupying defects in the liver), there was a tendency for patients in each pathological group to show a particular pattern of uptake by the liver and spleen, such as reduced liver size, peak count rate, and enlarged spleen in cirrhosis. However, there was considerable overlap among these groups. The main value of the scan in older children was in excluding or showing space-occupying lesions of >2 cm in diameter in those presenting with hepatomegaly of uncertain cause. In all five children with space-occupying lesions, the scan showed an area of defective uptake. On selenomethionine scanning, the isotope was taken up by the filling defect in each of two patients with hepatoblastoma and in an infant with hemangioendothelioma. However, selenomethionine was not taken up by a patient with rhabdomyosarcoma and one with a hydatid cyst. An important new observation concerning the hepatic tumor patients was that the cold area on the ^{99m}Tc scan that takes up selenomethionine (^{75}Se) cannot necessarily be interpreted as primary liver cell cancer, since the hemangioendothelioma behaved similarly. In children with chronic liver disease, the main value of the scan is in confirming the presence of liver disease when the biochemical and clinical findings are equivocal. Liver scanning is concluded to have no place at present in the management of infants with obstructive jaundice.

7095 CLINICAL ASPECTS AND DIAGNOSIS OF BUDD-CHIARI SYNDROME.

(Ger.) Zimmerman, H. B.; Schimmelpfennig, W.; Wack, R. (II. Medizinische Klinik des Bereichs Medizin, Humboldt-Universitat, Schumannstrasse 20/21, DDR-104 Berlin, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36 (3/4):159-161; 1976.

General etiological, diagnostic, and therapeutic aspects of Budd-Chiari syndrome are reviewed, and six new cases (5 women, 1 man, aged 19-41 yr) are reported. Two of the women had been using oral contraceptives. The length of the prodromal symptoms was 1-12 months. The symptoms included epigastric pain (3 patients), ascites (6), edema (5), hepatomegaly (6), splenomegaly (3), and polycythemia (1). The bilirubin level was 0.9-4.1 mg/100 ml, the alkaline phosphatase level was 29-330 U/l, and the glutamic-pyruvic transaminase level was 12-100 U/l. Liver cirrhosis was found in two patients and portal hypertension in five. Thrombosis of the hepatic vein or pelvic veins was found in all six. Exploratory laparotomy was performed in two patients, reconstruction of the hepatic vein in one, and cervical lymphovenous anastomosis in one. Two patients did not undergo surgery. Surgery was successful only in the 41-yr-old man who underwent cervical lymphovenous anastomosis; he was cured in 8 months, but the three other patients died within 2-17 months.

7096 SIGNIFICANCE OF α-FETOPROTEIN (AFP) IN LIVER TUMORS (HEPATOBLASTOMA AND HEPATOMA) IN CHILDREN.

(Fre.) Hata, Y.; Uchino, J.; Kasai, Y.; Nishi, S. (First Dept. Surgery, Hokkaido Univ., Sapporo, Japan). *Ann. Chir. Infant.* 18(1):73-77; 1977.

A simple radial immunodiffusion method can be used to measure α-fetoprotein (AFP) levels in children with hepatoblastomas and hepatomas. In one patient, a 13-yr-old boy, preoperative AFP levels were 52 mg/dl (normal, <10 mg/dl). By 4 weeks postsurgery (PS), AFP was 0-1 mg/dl; however, the child became AFP positive again 2 months PS. The tumor recurrence was not detected by hepatic scintigraphy until 4 months PS and by liver function tests until 6 months PS. AFP levels were temporarily depressed during chemotherapy, but they rose again when tumor growth resumed. These results indicate that measurements of AFP levels may be valuable in the early and accurate detection of liver tumors or recurrences in children.

7097 DIAGNOSTIC EVALUATION OF SERUM LIPIDS IN PATIENTS WITH HEPATOCELLULAR CARCINOMA.

(Eng.) Yoshida, T.; Okazaki, N.; Yoshino, M; Araki, E. (Natl. Cancer Center Hosp., 1-1, Tsukiji 5-chome, Chuo-ku, Tokyo 104, Japan). *Jpn. J. Clin. Oncol.* 7(1):15-20; 1977.

Serum lipid levels were determined in 24 patients with hepatocellular carcinoma (18 of whom also had liver cirrhosis), 13 patients with liver cirrhosis only, and 18 healthy subjects after an overnight fast. There was no significant difference among the three groups in terms of the average level of serum total lipids. However, patients with hepatocellular carcinoma showed levels of serum total cholesterol (221.3 ± 81.2 mg/100 ml, $p<0.005$), esterified cholesterol (133.3 ± 55.3 mg/100 ml, $p<$

0.05), and phospholipid (239.9 ± 90.9 mg/100 ml, $p<0.025$) that were significantly elevated compared with those of patients with cirrhosis only (145.9 ± 52.5, 92.5 ± 32.8, and 160.8 ± 69.4 mg/100 ml, resp.). Patients with hepatocellular carcinoma plus liver cirrhosis showed significant elevations in levels of total cholesterol (212.3 ± 73.5 mg/100 ml, $p<0.01$) and phospholipid (233 ± 90.6 mg/100 ml, $p<0.05$) compared with those in patients with cirrhosis only. Patients with hepatocellular carcinoma without liver cirrhosis showed significant elevations in total cholesterol (244.3 ± 100.9 mg/100 ml, $p<0.01$), esterified cholesterol (170.0 ± 70.0 mg/100 ml, $p<0.01$), and phospholipid (255.0 ± 98.4 mg/100 ml, $p<0.05$) compared with levels in patients with cirrhosis only. Determination of serum lipids is concluded to be useful in differentiating hepatocellular carcinoma from liver cirrhosis. It may also be useful in diagnosing the development of hepatocellular carcinoma during the course of liver cirrhosis.

7098 SURGICAL TREATMENT OF PRIMARY LIVER CARCINOMA. (Eng.) Flatmark, A.; Fretheim, B.; Knutrud, O. (Rikshospitalet, Oslo, Norway). *Chir. Gastroenterol.* 11(1):129-131; 1977.

Experience with 44 patients (including 13 children) surgically treated for liver carcinoma was reviewed. Liver cirrhosis was diagnosed in three adult patients. General weakness and epigastic pain were the most common presenting symptoms. Only two patients were icteric, and a 17-yr-old girl presented with acute intraperitoneal bleeding due to rupture of the tumor. Selective angiography and liver venography were performed preoperatively in all patients. Twenty-one patients were screened for alpha-fetoprotein, with a positive result in only one child. Laparotomy was performed in all patients, and resectability was 36%. Extended right lobectomy was carried out in five patients, and the right or left hepatic lobe was removed in three and eight patients. There was one postoperative death, and this was caused by bleeding from a hepatic vein. Nine patients are alive 1-8.5 yr after liver resection. The longest survivor has recurrence of the liver tumor with metastasis. Two patients died of myocardial infarction 7.5 and 4 yr, resp., after surgery. Four patients died of matastasis, three within 1 yr and one within 2 yr after surgery; the 1-yr survival rate was 75%. The results favor radical surgery in primary liver carcinoma when the tumor is operable.

7099 QUADRUPLE CHEMOTHERAPY VERSUS RADIOTHERAPY IN TREATMENT OF PRIMARY HEPATOCELLULAR CARCINOMA. (Eng.) Cochrane, A. M. G.; Murray-Lyon, I. M.; Brinkley, D. M.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5, England). *Cancer* 40(2):609-614; 1977.

A controlled trial of chemotherapy alone versus radiotherapy followed by chemotherapy for the treatment of 18 patients with primary hepatoma is reported. All patients received chemotherapy, which consisted of 500 mg 5-fluorouracil, 500 mg cyclophosphamide, 50 mg methotrexate, and 2 mg vincristine given systematically once every 3 weeks as single bolus injections. In eight patients, a course of radiotherapy was completed 2 months before the start of chemotherapy, with a total dose of 3,000 rads being delivered in 15 fractions over 21 days. Patients receiving chemotherapy alone survived considerably longer (median, 21.0 weeks; range, 4-72 weeks) than did those receiving radiotherapy/chemotherapy (median, 12 weeks; range, 2-28 weeks). Length of survival in both treatment groups was related to age, length of history, levels of serum bilirubin and aspartate transaminase, and the presence of cirrhosis or ascites. When patients were subdivided according to these criteria into those with less severe disease (grade A) and those with severe disease (grade B), grade A patients had a median survival of 54 weeks after treatment with chemotherapy alone compared with 24 weeks after treatment with radiotherapy/chemotherapy. This difference in survival just failed to reach statistical significance ($p<0.07$). However, survival of patients with grade B disease was equally poor in both treatment groups, being 5 weeks for the chemotherapy group and 7.5 weeks for the chemotherapy/radiotherapy group. Quadruple chemotherapy alone is concluded to be a valuable form of therapy for grade A patients, whereas neither form of therapy appears to be of any benefit to grade B patients.

7100 THE INDUCTION OF LIVER CELL CANCER BY CHEMICALS. (Eng.) Wogan, G. N. *In: Liver Cell Cancer*. Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Co.): pp. 121-152; 1976.

Chemicals that induce liver cancer in experimental animals and are encountered by humans as components of the general environment are reviewed. Of the chemicals known to be hepatocarcinogenic to experimental animals, the strongest evidence of involvement in human liver cancer exists for the aflatoxins. Studies of various human populations have shown a positive association between aflatoxin ingestion and liver cancer incidence. Other experimental hepatocarcinogens that may be involved in human liver cancer include: sterigmatocystin and, possibly, other mycotoxins; certain pyrrolizidine alkaloids; cycasin and related glycosides; and carcinogenic nitrosamines or nitrosamides formed through the interaction of nitrite and nitrosatable substances in the environment. It is impossible to assess the importance of other known synthetic carcinogens, such as chlorinated hydrocarbons, even though some of them are widely distributed in the environment. Although humans are exposed to trace amounts of chlorinated hydrocarbons such as carbon tetrachloride and chloroform in municipal drinking water, there is no epidemiologic evidence that they cause human liver cancer.

7101 PRIMARY CARCINOMA OF THE LIVER: A HISTOLOGICAL STUDY OF 27 CASES OF PRIMARY CAR-

CINOMA OF THE LIVER FROM MALAWI. (Eng.) Norredam, K. (Esperance Alle 9, 2920 Charlottenlund, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*]. 85(4):461-469; 1977.

Liver biopsies from 27 Bantu patients from Malawi with primary carcinoma of the liver were examined histologically. All of the biopsies showed hepatocellular carcinoma. Structurally, the tumors consisted of trabeculae, singly or in groups, separated by a variable amount of connective tissue that in three cases was so pronounced the tumor had a scirrhous appearance. A characteristic feature of the tumor tissue was the scarcity of reticulin inside the trabeculae, in contrast to the elaborate reticulin network of benign liver tissue. Using a reticulin staining technique, the cytoplasm and, especially, the nuclei of the malignant cells were markedly stained, but the benign liver cells were left unstained. In the 26 cases in which the grade of tumor differentiation could be evaluated, there were 3 grade I tumors, 10 grade II, 5 grade III, and 8 grade IV. Reticulin staining was not useful in evaluating the degree of tumor differentiation. Among 15 evaluable patients, 12 had postnecrotic-type cirrhosis.

7102 CARCINOID TUMORS WITH HEPATIC METASTASES. ANATOMOCLINICAL AND THERAPEUTIC ASPECTS. (Fre.) Saubier, E. C.; Gerdil, F.; Partensky, C.; Barbe, C.; Mallet-Guy, Y. (Hopital Ed.-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(2): 132-140; 1977.

The treatment of seven patients with hepatic metastases from carcinoid tumors is reported. Hepatomegaly was present in four. The carcinoid syndrome was primary in two patients with obvious flushing, secondary in two others, and doubtful in one. The tumor was situated in the ileum in three patients, on the right lower lobar branch in one, and in the sigmoid in one; it could not be located in two patients, even at autopsy. Multiple small tumors occurred in two patients with ileal tumors, which made radiological diagnosis difficult. Of the three ileal tumor patients, small intestinal transit was positive in one, negative in another, and normal in the third. The results were confirmed by mesenteric arteriography. Diffuse mesenteric scleroses affecting the peritoneal serosa, arteries, veins, and lymphatics were found in these three patients. Hepatic metastases in all seven patients were detected by palpation, laparoscopy, hepatic scintigraphy, and celiac arteriography. A high level of 5-hydroxyindoleacetic acid (5-HIA) was found in the two patients with primary carcinoid syndrome and in one with secondary syndrome; 5-HIA was normal in two patients. Hepatic metastases were removed by repeat operations in four patients, one of whom required three interventions. All surgical procedures were enucleoresections; in one patient, the procedure was associated with a planned left lobectomy. One 72-yr-old woman died postoperatively of profuse hemorrhaging. Autopsy showed a blood-filled small intestine. The other three patients who underwent surgery survived 7 yr and 20 and 37 months, resp. Of the three nonoperated patients, one died of respiratory and renal insufficiency 25 months after the beginning of symptoms and one died of carcinoid tumor after 10 months. One is alive with metastases and a high 5-HIA level (27 mg/24 hr), but this patient did not have a carcinoid syndrome at the time.

7103 HEPATIC NEUROBLASTOMA. (Fre.) Uchino, J.; Hata, Y.; Kasai, Y.; Kikuchi, K. (First Dept. Surgery, Hokkaido Univ., Sapporo, Japan). *Ann. Chir. Infant.* 18(1):65-73; 1977.

Neuroblastomas were diagnosed in 3/13 children with malignant liver tumors. Laparotomies revealed greatly enlarged livers with diffuse tumors that had few necrotic or hemorrhagic areas on their surfaces. The catecholamine granules found by electron microscopy and the high serum levels of catecholamine metabolic products were characteristic of neuroblastomas. However, the α-fetoprotein levels were normal for children in this age range (12 days-3 months). The tumors were treated with radio- and/or chemotherapy, and the patients were well 2, 7, and 12 yr later, indicating a more optimistic prognosis for these tumors than for hepatoblastomas.

7104 TRUE HEPATIC TERATOMA WITH HIGH ALPHA FETOPROTEIN IN SERUM. (Eng.) Todani, T.; Tabuchi, K.; Watanabe, Y.; Tsutsumi, A. (Okayama Univ. Medical Sch., 2-5 Shikatzcho, Okayama City, Japan). *J. Pediatr. Surg.* 12(4):591-592; 1977.

The case of a 4-month-old girl with a true hepatic teratoma, producing a high level of alpha fetoprotein, is presented. Preoperatively, the serum alpha fetoprotein level was 2.5 mg/dl. The well-encapsulated tumor, measuring 12 x 12 x 10 cm, was located at the parietal surface of the quadrate lobe. After its removal, repeated alpha fetoprotein tests were negative. Histologically, the tumor had the features of a true malignant teratoma, with three germinal layers. The patient is asymptomatic at 2 yr of age. This case suggests that a hepatic teratoma, regardless of malignancy, is also a tumor that produces alpha fetoprotein.

7105 BILE ACIDS IN SERUM AND BILE OF INFANTS WITH CHOLESTATIC SYNDROMES. (Eng.) Deleze, G.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Murtenstrasse 35, CH-3010 Berne, Switzerland). *Helv. Paediatr. Acta* 32(1):29-38; 1977.

Serum bile acids were measured in 18 neonates and infants with various cholestatic conditions. The concentration of total bile acids was markedly elevated (32-336 μM) in all patients studied. The cholate (C)/chenodeoxycholate (CDC) ratio in serum was <1 in each of eight patients with neonatal hepatitis syndrome (range, 0.31-0.80) and in each of two patients with extrahepatic biliary atresia (0.46 and 0.58). The C/CDC ratio was >1 in each of two patients with chronic intrahepatic cholestasis (1.60 and 1.94). Among six patients with posthemolytic cholestasis, the C/CDC ratio was >1 in two cases (1.99 and 2.23) and <1 in four cases (range, 0.28-0.82). The administration of cholestyramine (4 g/day) to an infant with neonatal hepatitis of unknown etiology decreased the total bile acid concentration markedly (from almost 300 to <75 µM) and increased the C/CDC ratio (from 0.4 to 1.6). A similar effect was observed in three other patients with patent extrahepatic bile ducts. Thus, cholestyramine administration may be of diagnostic value for the evaluation of bile duct patency in infant cholestasis. A comparison of the bile acid pattern in the serum and bile of three patients with cholestatic syndromes revealed that the C/CDC ratio was always higher in bile than in serum (0.71 versus 0.59 and 1.35 versus 0.31 for two cases of neonatal hepatitis syndrome of unknown etiology, and 1.24 versus 0.51 for a case of posthemolytic cholestasis). 3β-Hydroxy-5-cholenoic acid was found in serum, but not in bile. This finding suggests that impairment of biliary excretion rather than increased hepatic synthesis is responsible for the elevation of this monohydroxy bile acid in serum.

7106 POSTOPERATIVE INTRAHEPATIC CHOLESTASIS.

(Eng.) Hampel, N.; Lichtig, C.; Gersh, I.; Gellei, B. (Rambam Univ. Hosp., Technion Sch. Medicine, Haifa, Israel). *Int. Surg.* 62(1):51-54; 1977.

The diagnostic problems, pathophysiology, and treatment of postoperative intrahepatic cholestasis are illustrated by four cases. The patients included a 70-yr-old man, a 65-yr-old man, a 58-yr-old man, and a 57-yr-old woman who underwent surgery for pharyngolaryngoesophagectomy with colon replacement of the esophagus, for prostatectomy, gastric malignancy, and for the creation of an aortobifemoral bypass graft, resp. Hypotension occurred during surgery in cases 1, 3, and 4. The remaining patient was admitted in shock (related to hematemesis and melena) 24 days after the operation. In the four cases, the maximum bilirubin levels were 11.5-32.0 mg/100 ml, and more than half of it was conjugated. In case 1, the SGOT rose to 300 U, and histological examination revealed prominent centrilobular necrosis without any signs of hepatitis. SGOT levels in the other three patients were moderately increased, and two of these showed centrilobular necrosis. Sepsis, leading to a proposed disruption of the secretory mechanism of conjugated bilirubin, may have been a factor in the development of jaundice in cases 1 and 2. Three patients died, but death was not due to postoperative jaundice. The second patient died 2 days after an exploratory operation for obstructive jaundice. This case emphasizes the importance of recognizing the syndrome as a functional disorder that must not be treated by surgery.

7107 EEG FINDINGS IN HEPATIC ENCEPHALOPATHY DURING MODERN CONSERVATIVE TREATMENT.

(Ger.) Gemende, G.; Gemende, I. (Chirurgische Klinik, Ernst-Moritz-Arndt-Universitat, Friedrich-Loeffler-Strasse 23b, DDR-22 Greifswald, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):183-185; 1976.

Regular EEG examinations are recommended for patients with hepatoportal encephalopathy, both for the progressive forms (hepatic coma) and during the initial stages of long-standing obstructive jaundice or compensated liver cirrhosis. During the acute phase, certain bioelectric phenomena are indicative of the degree of brain stem dysfunction. Changes in the intensity and frequency of the biorhythms parallel cerebral decompensation and recompensation and are indirect criteria of the metabolic disorders. Without being a diagnostic tool, the EEG characterizes the current functional status of the brain during therapy.

7108 BLOOD CELL GLYCOGEN SYNTHETASE ACTIVITIES IN HEPATIC GLYCOGEN SYNTHETASE DEFICIENCY.

(Eng.) Gitzelmann, R.; Aynsley-Green, A.; Williamson, D. H. (Univ. Zurich, Kinderspital, 8032 Zurich, Switzerland). *Clin. Chim. Acta* 79(1):219-221; 1977.

The use of RBC and WBC in the diagnosis of hepatic glycogen synthetase deficieny was studied in a patient with glycogen synthetase deficiency, three members of her family, and in healthy adults. The mean glycogen synthetase activities in the RBC and WBC of healthy controls were 53.4 ± 13.0 mU/g hemoglobin and 2.3 ± 0.6 U/g protein, resp. The levels were normal in the RBC and WBC of both the patient and the family members; they ranged between 2.4 and 4.1 U/g protein in the WBC, and the levels in the RBC of the patient and her brother were 68.2 and 82.5 mU/g hemoglobin, resp. The brother was found to have glycogen synthetase deficiency, although to a lesser degree than that of his sister. The presence of active enzyme in RBC as well as WBC in both children is strong evidence for the existence of genetically different forms of glycogen synthetase. Since this study shows that glycogen synthetase of the blood cells is not representative for the liver enzyme, hepatic glycogen synthetase deficiency cannot be diagnosed by enzyme assay performed on blood cells.

7109 CONTROL OF HEPATIC BLEEDING WITH MICROFIBRILLAR COLLAGEN.

(Eng.) Morgenstern, L.; Michel, S. L.; Austin, E. (Cedars-Sinai Medical Center, P. O. Box 48750, Los Angeles, CA 90048). *Arch. Surg.* 112(8):941-943; 1977.

Thirty-six cases in which intractable bleeding from the liver surface was treated with microfibrillar collagen are reported. Microfibrillar collagen was effective in all of 13 patients with bleeding from the gallbladder bed, in 6 of 7 patients with parenchymal lacerations, in all 5 patients with bleeding at a liver biopsy site, in both patients with capsular denudation, in both patients with hemangiomas, and in all 3 patients with bleeding after hepatic resection. Microfibrillar collagen, alone or in combination with other hemostatic measures, was also successful in the treatment of spontaneous rupture of a hepatoma in a cirrhotic liver; removal of a large solitary, metastatic, myxoid liposarcomatous mass from the dome of the right lobe; bleeding from the wall of a liver abscess after evacuation of the purulent material within it; and evacuation and biopsy of a cyst high on the dome of the right lobe. The use of microfibrillar collagen was considered to be lifesaving in at least six cases. The patient in which this treatment failed bled from a deep wound presumably caused by a retractor during a Whipple procedure. In this case, bleeding continued into the hepatic parenchyma. This case demonstrated that microfibrillar collagen should not be applied to deep hepatic lacerations where only a portion of the laceration can be effectively packed. The authors believe that microfibrillar collagen is superior to topical hemostatic agents such as oxidized cellulose or gelatin foam, inasmuch as it has a more physiologic basis for action (activation of platelet clotting factors), it adheres well to moist surfaces, and it is well tolerated even in the presence of severe infection.

7110 THERAPY OF HEMOSTATIC DISTURBANCES IN LIVER DISEASES: PROTHROMBIN COMPLEX CONCENTRATES.

(Ger.) Fischer, M. (Krankenhaus der Stadt Wien-Lainz, Wolkersbergenstrasse 1, A-1130 Vienna XIII, Austria). *Z. Gastroenterol.* 14(6):650-653; 1976.

The indications, dosage, effect, and possible risks of prothrombin complex concentrate therapy for patients with hemostatic disorders due to liver diseases are reviewed. Administration of prothrombin complex or partial prothrombin complex concentrates is indicated in liver diseases such as hepatitis, liver cirrhosis, liver necrosis, and esophageal varices associated with at least 20% factor II, VII, IX, and X deficiency. The dosage is basically determined by clotting test results. The initial dose should be 15-20 U/kg, then 5-15 U/kg at 6- to 12-hr intervals. Low-dose heparinization (30-40 IU/kg s.c. at 6- to 12-hr intervals) is recommended to prevent disseminated intravascular coagulopathy. Transmission of hepatitis B and the induction of intravascular coagulation are the major hazards involved in prothrombin complex therapy.

7111 APLASTIC ANEMIA ASSOCIATED WITH SUBMASSIVE HEPATIC NECROSIS: REPORT OF FOUR CASES.

(Eng.) Watananukul, P.; Israsena, S.; Dechakaisaya, S. (Chulalongkorn Hosp. and Medical Sch., Rama 4th Rd., Saladang, Bangkok, Thailand). *Arch. Intern. Med.* 137(7):898-901; 1977.

The cases of four patients (men, aged 20-33 yr) with fatal aplastic anemia associated with submassive hepatic necrosis are presented. The first patient presented with fever, jaundice, and hepatomegaly after having taken phenacetin and phenylbutazone. Pancytopenia developed 8 weeks after the onset of hepatitis. The liver disease was still progressive when the patient died with respiratory tract infection. Submassive hepatic necrosis and aplastic bone marrow were seen at necropsy. The bone marrow depression from phenacetin and phenylbutazone cannot be excluded. The second patient had recurrent episodes of hepatitis. Pancytopenia developed, and the liver biopsy specimen was consistent with relapsing hepatitis. Both hepatitis and aplastic anemia showed little improvement after blood transfusion, prednisone, and antibiotic therapy. The patient died of lobar pneumonia. Aplastic anemia was diagnosed in the third patient during the course of acute hepatitis. The patient died of septicemia, and at autopsy the liver showed submassive hepatic necrosis. In the fourth patient, three relapses of hepatitis occurred shortly after his recovery from an attack of acute viral hepatitis. Pancytopenia developed during the last relapse. No adequate explanation for the association between hepatic necrosis and aplastic anemia is available, but infectious hepatitis should be accepted as a potential cause of aplastic anemia. Phagocytic cells were observed in the bone marrow during the time of relapse in patient 4 and gradually decreased after he became asymptomatic. The nuclei of these cells were pushed against the cell membrane, while the cytoplasm was filled with one or more platelets, WBC, and RBC precursors. The phagocytosis of platelets and myeloid and erythroid cells may be one of the immunological mechanisms against the patient's own blood cells, and may have been an essential mechanism leading to aplastic anemia.

7112 NODULAR TRANSFORMATION OF THE LIVER: REPORT OF A CASE.

(Eng.) Connolly, C. E.; O'Brien, M. J. (Galway Medical Sch., Galway, Ireland). *Hum. Pathol.* 8(3):350-352; 1977.

The rare case of a patient with portal hypertension due to nodular transformation of the liver is presented. The patient presented with abdominal distention, dysphagia, ascites, and splenomegaly. Esophagoscopy revealed a tight postcricoid stricture, and a barium swallow demonstrated gross esophageal varices. A liver scan showed diffuse irregular uptake suggestive of cirrhosis. Liver biopsies on two occasions were reported as normal. The patient died after massive hematemesis due to bleeding esophageal varices. At autopsy, the liver weighed 1,265 g and was smaller than normal, but the external surface was smooth and showed no evidence of cirrhosis. Portal vein thrombosis was present. Serial sectioning of the liver revealed multiple 1- to 2-cm tan or pale nodules situated both in the hilum and in the periphery of both lobes. The liver in this case differed from the cirrhotic liver in one essential respect; although nodules that were probably regenerative in nature were present, as in cirrhosis, there were no delimiting scars or fibrous bands. Because of the apparently normal liver architecture in a small biopsy specimen, the diagnosis of this condition by needle biopsy is extremely difficult; nodular transformation of the liver should be suspected in patients with evidence of portal hypertension and normal liver biopsies.

7113 PYLORODUODENAL DEFORMITY DUE TO LIVER MALFORMATION ASSOCIATED WITH OMPHALOCELE.

(Eng.) Oh, K. S.; Strife, J. L.; Fischer, K. C.; Teele, R. (Children's Hosp. Pittsburgh, 125 De Soto St., Pittsburgh, PA 15213). *Am. J. Roentgenol.* 128(6):957-960; 1977.

The cases of three infants in whom a malpositioned, malformed liver caused pyloroduodenal deformity and apparent pyloric obstruction are reported. In all cases, vomiting occurred after surgical repair of an omphalocele; in one case, the vomiting did not occur until the patient was 1 yr old. The radiographic characteristics in the three patients included a soft tissue mass in the middle and anterior portion of the abdomen, external compression of the pylorus, and malrotation of the midgut. The compression was distinguished from hypertrophic pyloric stenosis by the lack of a symmetric pyloric narrowing, lack of significant elongation of the pyloric channel, and absence of a "shoulder sign." In the patient in whom the onset of vomiting was delayed, liver-spleen isotope scans and ultrasonographic scans demonstrated the malformed and malpositioned liver when the patient was 10 yr old. The cause of recurrent vomiting and abdominal pain in this patient was uncertain, but there was evidence of external compression of the pylorus by the pedicle of the accessory lobe of the malformed liver. In another patient, the relief of vomiting by a gastrojejunostomy suggested that the accessory lobe of the malformed liver might have been the cause. In the remaining patient, adhesion may have contributed to the symptoms, in addition to pyloric compression by the malformed and malpositioned liver. In infants with omphaloceles, the surgeon should evaluate the size, shape, position, and relationship of the liver to the stomach at the time of initial surgery. A bypass operation such as gastrojejunostomy may be considered if pyloric compression by the malformed liver is found.

7114 THE NEUROLOGICAL MANIFESTATIONS OF PORPHYRIA: A REVIEW.

(Eng.) Becker, D. M.; Kramer, S. (Sch. Pathology, Univ. Witwatersrand, Johannesburg, South Africa). *Medicine (Baltimore)* 56(5):411-423; 1977.

Three hereditary hepatic porphyrias, acute intermittent porphyria, porphyria variegata, and hereditary coproporphyria, are reviewed in terms of their biochemical and clinical manifestations, pathogenesis, and treatment. They are characterized biochemically by increased excretion of porphyrins and the porphyrin precursors δ-aminolevulinic acid (ALA) and porphobilinogen (PBG) and clinically by episodes of acute neurological involvement. The symptoms and signs of acute attacks from all three porphyrias are, in decreasing frequency: abdominal pain, constipation, vomiting, vesical symptoms, tachycardia, hypertension, paresthesias, and weakness with ascending paralysis, which may progress to quadriplegia and respiratory failure. The increased production of porphyrins and porphyrin precursors in these porphyrias has been shown to be due to partial enzyme blocks along the heme biosynthetic pathway that result in secondary depression of the key enzyme ALA synthetase. Therefore, the neurological manifestations could be related to a decrease in essential heme-proteins or other heme-containing compounds within the nervous system or to a toxic effect of the overproduction of ALA and PBG. Porphyrin precursors have been shown to have potent pharmacological effects on the nervous system, and these are possibly related to the γ-aminobutyric acid receptor and binding site-porphyrin precursor interactions. Current studies on therapy for acute attacks of porphyria are concentrating on the suppression of ALA synthetase activity and, consequently, on reduced ALA and PBG production. Several of these therapeutic methods have met with remarkable success.

7115 HEPATOCYTE GIANT MITOCHONDRIA: AN ALMOST CONSTANT LESION IN SYSTEMIC SCLERODERMA.

(Eng.) Feldmann, G.; Maurice, M.; Husson, J. M.; Fiessinger, J. N.; Camilleri, J. P.; Benhamou, J. P.; Housset, E. (Hopital Beaujon, F-92118 Clichy, France). *Virchows Arch.* [*Pathol. Anat.*] 374(3):215-227; 1977.

Electron microscopic studies of the liver were performed in 14 women with systemic scleroderma but with no clinical manifestation of liver disorder. Histologically, the liver was normal in 10 patients. Steatosis was present in 1 patient, portal sclerosis in 2, and cloudy swelling of some hepatocytes in 2. In 13 patients, giant mitochondria with a diameter ≥5 μm were observed in the hepatocytes. In 11 of these patients, giant mitochondria were present in about 20% of the hepatocytes; they were less frequent in the 2 remaining patients. The structure of the giant mitochondria was markedly abnormal, especially the arrangement of the cristae. Instead of being perpendicular to the inner mitochondrial membrane, as they are in normal hepatocyte mitochondria, the cristae were either parallel to the inner membrane or randomly distributed throughout the matrix. The matrix of some mitochondria contained paracrystalline inclusions (in the neighborhood of the cristae) or tubular linear structures with a diameter of 40 nm. In general, the paracrystalline inclusions were absent when the tubular structures were present. The other organelles of the hepatocytes were normal. No mitochondrial abnormalities were observed in the biliary cells, endothelial cells, Kupffer cells, lipocytes, or fibroblasts. The mechanism of formation of giant mitochondria in systemic scleroderma is unknown.

7116 PROGRESS IN LIVER TRANSPLANTATION.

(Eng.) Putnam, C. W.; Halgrimson, C. G.; Koep, L.; Starzl, T. E. (Univ. Colorado Medical Center, 4200 E. Ninth Ave., Denver, CO 80262). *World J. Surg.* 1(2):165-175; 1977.

Experience with 114 patients who underwent liver transplantation is reported. The overall 1-yr survival rate was 29%, with the longest survivor living 6 yr, 8 months post-transplantation. Most of the early deaths were caused by technical complications, frequently related to difficulties in establishing and maintaining adequate biliary drainage. More recent deaths are attributed to a variety of reasons, including recurrent tumor, hepatitis, bile duct obstruction, and chronic rejection. Favorable indications for liver transplantation include biliary atresia, chronic aggressive hepatitis, inborn errors of metabolism, and certain other benign hepatic diseases such as primary biliary cirrhosis and the Budd-Chiari syndrome. Alcoholic cirrhosis is a less favorable indication, and primary hepatic malignancy is a relative contraindication. The immunologic criteria for donor-recipient selection are much less rigid than those for renal transplantation. Biliary reconstruction is the principal technical problem encountered with orthotopic liver transplantation. Although no one technique of biliary reconstruction is satisfactory for all patients, the following principles have emerged: use of the cystic duct, with its inherently high risk of obstruction should be avoided; the liver should be protected from the bacterially contaminated gastrointestinal contents by a defunctionalized Roux-en-Y limb of jejunum or by the sphincter of Oddi; radiographic visualization of the biliary tree, either by tube cholangiography or by the transhepatic approach, must be performed whenever jaundice reappears after transplantation; and if obstruction is detected, prompt reoperation is vital.

7117 CURRENT STATUS OF LIVER TRANSPLANTATION. EXPERIENCE WITH 50 PERSONAL CASES OF LIVER TRANSPLANTATION. IMPROVEMENT OF EARLY POSTOPERATIVE SURVIVAL BY A NEW BILE DUCT DRAINAGE TECHNIQUE. (Ger.) Calne, R. Y.; Williams, R. (Addenbrooke's Hosp., Hills Rd., Cambridge CB2 200, England). *Internist (Berlin)* 17(12):597-603; 1976.

Experience with 50 liver transplantations performed since May 1968 is presented. Liver transplantation is indicated for patients with liver cirrhosis, bile duct atresia, primary liver cancer, portacaval anastomosis, and poorly controllable portacaval encephalopathy who would not benefit from any other therapy. Heterotopic auxiliary liver transplantation was performed four times, but orthotopic transplantation is more efficient because of the better vascularization it provides. The last 10 transplant patients were supplied with improved biliary drainage by use of the donor's gallbladder as a pedicle graft conduit between the donor's and recipient's bile ducts. As a result, the sphincter of Oddi is preserved and reflux cholangitis is prevented. Although the liver is rejected much less frequently than the kidney, immunosuppressive treatment with azathioprine or cyclophosphamide and steroids is necessary, even though two patients fared rather well without steroids. Nineteen patients died within 1 month of transplantation, 15 within 1-6 months, 4 within 6-12 months, and 2 died at 25 and 63 months post-transplantation, resp. Ten patients operated since February 1974 are alive.

7118 HEPATOMA PRESENTING AS LOWER GASTROINTESTINAL BLEEDING. (Eng.) Kalra, T. M. S.; Mangla, J. C.; Schwartz, S.; Lee, J. C. K. (Monroe Community Hosp., Univ. Rochester, Rochester, NY). *Am. J. Gastroenterol.* 67(5):485-488; 1977.

7119 DISEASE OF THE LIVER ASSOCIATED WITH α_1-ANTITRYPSIN DEFICIENCY. (Eng.) Cuthbert, D.; Chaun, H.; Frolich, J.; Chung, W. B. (Vancouver General Hosp., Vancouver, British Columbia, Canada). *Can. Med. Assoc. J.* 117(3):264-265; 1977.

7120 ANGIOGRAPHIC CONTROL OF TRAUMATIC HAEMOBILIA BY SELECTIVE ARTERIAL EMBOLIZATION. (Eng.) Eggink, W. F.; Perlberger, R. R.; Van Urk, H. (Univ. Hosp. Dijkzigt, Rotterdam, Netherlands). *Br. J. Surg.* 64(9):635-637; 1977.

7121 FATTY LIVER AND PLEURAL EFFUSION WITH IBUPROFEN THERAPY. (Eng.) Bravo, J. F.; Jacobson, M. P.; Mertens, B. F. (Univ. Colorado Medical Center, Denver, CO 80218). *Ann. Intern. Med.* 87(2):200-201; 1977.

7122 DRUG-INDUCED EXTRAPYRAMIDAL SIGNS IN CHRONIC LIVER DISEASE--A CASE REPORT. (Eng.) Park, J.; Logan, R.; Pottage, A. (Royal Infirmary, Edinburgh, Scotland). *Clin. Toxicol.* 11(1):117-120; 1977.

7123 SONOGRAPHIC EVALUATION OF NON-PARASITIC LIVER CYSTS. (Eng.) Sakuda, D. H. (Kuakini Medical Center, Honolulu, HI 96817). *Hawaii Med. J.* 36(7):212-215; 1977.

7124 THE SEA BLUE HISTIOCYTE SYNDROME. (Eng.) Licastro, R.; Dibar, E.; Ciocca, M. (Policlino Prof. Alejandro Posadas, Martinez de hoz y Marconi, Haedo, Buenos Aires, Argentina). *Arq. Gastroenterol. S. Paulo* 14(2):109-112; 1977.

7125 GRAVITY DEPENDENT LAYERING IN NECROTIC METASTATIC CARCINOMA TO THE LIVER. (Eng.) Baker, D. A.; Morin, M. E. (Veterans Admin. Lakeside Hosp., 333 E. Huron St., Chicago, IL 60611). *J. Clin. Ultrasound.* 5(4):282-283; 1977.

7126 HEPATOCELLULAR CARCINOMA IN A WOMAN ON LONG-TERM ORAL CONTRACEPTIVES. (Eng.) Pryor, A. C.; Cohen, R. J.; Goldman, R. L. (Mount Zion Hosp. and Medical Center, P.O. Box 7921, San Francisco, CA 94120). *Cancer* 40(2):884-888; 1977.

7127 FALSE NEGATIVE MECONIUM TEST RESULTS IN SCREENING FOR CYSTIC FIBROSIS. (Eng.) Desai, N.; Nousia-Arvanitakis, S. (Univ. Kansas Medical Center, 39th St. at Rainbow Blvd., Kansas City, KS 66103). *J. Pediatr.* 91(3):447-448; 1977.

7128 HEPATORENAL SYNDROME: RECOVERY AFTER PERITONEOVENOUS SHUNT. (Eng.) Pladson,

T. R.; Parrish, R. M. (Veterans Admin. Hosp., E. 54th St. and 48th Ave. S, Minneapolis, MN 55417). *Arch. Intern. Med.* 137(9):1248-1249; 1977.

7129 HEMOBILIA: CALCIFIED HEPATIC ARTERY ANEURYSM PRESENTING WITH MASSIVE GASTROINTESTINAL BLEEDING. (Eng.) Balthazar, E. J. (New York Medical Coll., 5th Ave. and 106th St., New York, NY 10029). *Gastrointest. Radiol.* 2(1): 71-74; 1977.

7130 FOCAL PORTA-HEPATIS DEFECT ON NUCLIDE IMAGING [Letter to Editor]. (Eng.) Myerson, P. J. (Griffin Hosp., Derby, CT). *J. Nucl. Med.* 18(9):944-945; 1977.

7131 SERUM ALPHAFETOPROTEIN IN BLADDER CARCINOMA. (Eng.) Alsabti, E. A. K. (Albaath Protein Reference Unit Karadt Marium 500C2/1, Baghdad, Iraq). *Oncology* 34(2):78-79; 1977.

7132 TRAUMATIC HAEMOBILIA: CASE REPORTS. (Eng.) Bryer, J. V.; Nirmul, D.; Hadley, G. P.; Angorn, I. B. (Dept. Surgery, Univ. Natal, Durban, South Africa). *S. Afr. Med. J.* 52(11): 451-453; 1977.

See also, 6721, 6759, 6831, 6836, 6850, 6853, 6854, 6900, 6998, 7133, 7139, 7142, 7165, 7173, 7181, 7182, 7190, 7194, 7207, 7212, 7214, 7215, 7219, 7236, 7239, 7247, 7252, 7257, 7260, 7270, 7274, 7280.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

7133 BENIGN COURSE OF EXTREME HYPERBILIRUBINEMIA IN SICKLE CELL ANEMIA: ANALYSIS OF SIX CASES. (Eng.) Buchanan, G. R.; Glader, B. E. (Univ. Texas Health Science Center at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235). *J. Pediatr.* 91(1):21-24; 1977.

The approach to the management and outcome of extreme hyperbilirubinemia in patients with sickle cell anemia was defined by reviewing experience with marked hyperbilirubinemia in six children with sickle cell disease. Sickle hepatopathy, rather than hepatitis or biliary stones appeared to be primarily responsible for the extreme jaundice in at least four children and possibly in all six. Signs and symptoms were few, and laboratory abnormalities were not striking, other than marked hyperbilirubinemia (total serum bilirubin concentrations of 20.4-57.6 mg/dl with approximately one-half conjugated). The bilirubin level returned to normal in all patients in 4 days to 18 months, and all patients are currently well, without recurrence of hyperbilirubinemia or evidence of chronic liver disease. The cases described suggest that sickling within the liver, previously reported to be a serious and even fatal syndrome, usually is a benign and self-limited process.

7134 CHOLESTYRAMINE AND PHOTOTHERAPY COMBINED TREATMENT OF NEONATAL JAUNDICE [Abstract]. (Eng.) Nicolopoulos, D.; Hadjigeorgiou, E.; Kalpoyiannis, N.; Bazigou, H. (Alexandra Maternity Hosp., Athens, Greece). *Pediatr. Res.* 11(9):1023; 1977.

7135 CHARACTERIZATION OF THE BILIRUBIN PIGMENTS IN BILE OF NEONATES AND OF CHILDREN WITH CRIGLER-NAJJAR DISEASE [Abstract]. (Eng.) Blanckaert, N.; Fevery, J.; Heirwegh, K. P. M.; Compernolle, F.; Dodion, J. (Lab. Liver Physiopathology, Univ. Leuven, Leuven, Belgium). *Digestion* 14(5/6): 468-469; 1976.

See also, 7094.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

7136 THE ROLE OF METABOLIC ACTIVATION FOR DRUG-INDUCED LIVER INJURIES. (Eng.) Dybing, E.; Mitchell, J. R. (Natl. Inst. Public Health, Oslo, Norway). *Acta Pharmacol. Toxicol. (Kbh.)* 41(Suppl. 2): 263-272; 1977.

The role of metabolic activation in drug-induced liver injury is discussed. Toxic reactive metabolites produced by microsomal cytochrome P-450 oxidation reactions have recently been implicated in the production of acute liver injury by paracetamol (a minor analgesic), furosemide (a diuretic), isoniazid (a tuberculostatic agent), and methyldopa (an antihypertensive agent. The identity of an arylating metabolite of paracetamol is uncertain, although an *N*-hydroxy derivative seems the most likely candidate. Presumably, the *N*-hydroxylated metabolite subsequently undergoes dehydration to a chemically reactive imidoquinone before arylating tissue macromolecules. Hepatic injury produced by furosemide apparently results from metabolic activation of the furan ring, possibly by an epoxidation similar to that proposed for the hepatocarcinogenic dihydrofuran aflatoxins. Increased risk of isoniazid-induced liver injury has been correlated with the rapid metabolism of this compound. In one study, 86% of 21 patients who recovered from isoniazid hepatitis displayed a rapid acetylator phenotype for isoniazid metabolism, whereas the expected distribution on a genetic basis was only 45%. In fast metabolizers, about 94% of the isoniazid is converted to acetylisoniazid, and it is hypothesized that acetylisoniazid is converted in the body to a chemically reactive form via activation of acetylhydrazine. Recently, liver microsomes from humans and laboratory animals have been shown to activate methyldopa to a potent arylating agent by a cytochrome P-450-generated superoxide anion.

7137 ACUTE STRUCTURAL HEPATIC ALTERATION DUE TO POISONS.

(Eng.) Thaler, H. (Wilhelminenspital, Vienna, Austria). *Acta Pharmacol. Toxicol. (Kbh.)* 41(Suppl. 2):253-261; 1977.

Hepatotoxins that cause acute hepatic alterations are reviewed. Five hours after carbon tetrachloride injury, liver cells show hydropic degeneration accompanied by a clear cytoplasm and pyknotic nuclei. The damage may progress to frank necrosis, with fatty change occurring in some surviving hepatocytes. Jaundice has been observed after the accidental ingestion of 4,4'-diaminodiphenylmethane, a hardener for epoxy resin. The overall appearance of liver biopsies was that of an inflammatory process, particularly in the portal areas, sometimes with cholangitis. After the ingestion of *Amanita* mushrooms, the liver shows centrilobular necrosis surrounded by nests of ceroid-containing phagocytes. In severe cases, the surviving liver cells show fatty change. The antibiotic tetracycline inhibits the synthesis of low-density lipoprotein-apoprotein, which removes triglycerides from the liver cell. After 2 weeks of treatment with tetracycline (275 mg 2 times/day, i.v.), hepatic triglycerides increased from 6.4 ± 1.8% to 11.2 ± 7.5%. Large tetracycline doses (3.5-6 g/day, i.v.) produce acute fatty liver and hepatorenal failure, resulting in death. Acetaminophen, the main constituent of many analgesic preparations, can cause fatal hepatic necrosis, but doses of at least 15 g are required. However, jaundice and hepatic necrosis have been observed after therapeutic doses (21 weeks of treatment, or 426.6 g). Halothane (an anesthetic agent), α-methyldopa (an antihypertensive agent), and oxyphenisatin (a constituent of many laxatives) cause liver changes that resemble viral hepatitis.

7138 NECROTIZING ANGIITIS AND HEPATITIS IN AN AMPHETAMINE ABUSER.

(Eng.) Richlin, D. M.; Saltzman, D. B.; Wills, J. (Presbyterian Hosp., New York, NY). *Delaware Med. J.* 49(8):469-477; 1977.

The case of a 23-yr-old amphetamine abuser with necrotizing angiitis and hepatitis is presented. The patient presented with recurrent abdominal pain, fever, and weight loss. He reported that he regularly used i.v. amphetamines. A liver-spleen scan revealed hepatomegaly, and selective celiac and right renal arteriograms revealed extensive, multiple aneurysms of the small and medium arteries. A hepatitis B antigen test was positive, but the serum complement levels were not depressed. The patient's serum alkaline phosphatase level was normal, and his bilirubin and SGOT levels were only marginally elevated. The patient recovered after antihypertensive therapy with methyldopa and furosemide. Although it has been previously suggested that those cases of necrotizing angiitis attributed to amphetamine abuse were really caused by hepatitis B virus, the hepatitis B virus infection in this patient is thought to be merely a coincidental finding; his extensive necrotizing angiitis is thought to have been amphetamine-induced.

7139 LIVER BIOPSIES FROM PSORIATICS RELATED TO METHOTREXATE THERAPY: 3. FINDINGS IN POST-METHOTREXATE LIVER BIOPSIES FROM 160 PSORIATICS.

(Eng.) Nyfors, A. (Dept. Dermatology, Finsen Inst., DK-2100, Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(4):511-518; 1977.

Liver biopsy findings for 160 psoriatics who had been treated with methotrexate (MTX) in single weekly p.o. doses of 25 mg maximum are reported. Among 92 patients who underwent a single biopsy and who had received a mean cumulative MTX dose of 2,287 mg (range, 50-5,075 mg), there were 6 cases of fibrosis and 1 case of cirrhosis. A comparison of these 7 patients with 13 patients with a normal liver histology revealed no statistically significant difference in cumulative MTX dose. However, the former were significantly older ($p<0.002$) and had a significantly higher admitted alcohol intake during MTX therapy ($p<0.016$). Among 68 patients who underwent serial biopsies and who had received a mean cumulative MTX dose of 3,940 mg (range, 325-8,355 mg) at the time of the latest liver biopsy, there were 14 cases of cirrhosis and 16 cases of fibrosis. When the 14 cirrhotics were compared with 9 patients with a normal liver histology, there was no statistically significant difference in the total MTX dose taken at the latest biopsy. However, the cirrhotics tended to be older ($p<0.058$), and they had consumed a significantly higher amount of alcohol during MTX therapy ($p<0.041$). Comparison of the single and serial-biopsy patients indicated that the prevalence of cirrhosis and fibrosis among MTX-treated psoriatics increases rapidly beyond a cumulative MTX dose of 2-4 g.

7140 HEPATIC DAMAGE ASSOCIATED WITH MINERAL OIL DEPOSITS. (Eng.) Blewitt, R. W.; Bradbury, K.; Greenall, M. J.; Burrow, H. (Dept. Pathology, Univ. Leeds, Leeds, England). *Gut* 18(6):476-479; 1977.

The case of a 33-yr-old man with hepatic inflammation and scarring associated with deposits of mineral oil in the portal triads is reported. During the course of an operation for a chronic duodenal ulcer, the liver was noted to be somewhat enlarged and irregular, and biopsies were taken from the porta hepatis and from an enlarged lymph node. The portal triads contained cystic spaces, some with a histiocytic lining, and vacuolated histiocytes; they were infiltrated by chronic inflammatory cells. The portal triads also showed increased fibrous tissue and some bile ductule proliferation. In the dilated medullary sinuses of the lymph node, plentiful histiocytes and scattered hemosiderin deposits were seen. Groups of cystic spaces, associated with many coarsely vacuolated histiocytes, were present in the cortex. Lipid analysis by thin layer chromatography showed spots with similar retardation factors to those of liquid paraffin, motor oil, and engineering oil. Cholesterol, tripalmitan, lecithin, palmitic acid, castor oil, and almond oil failed to migrate from the origin in several tests. The patient's only other recorded medical problem had been hemorrhoids, treated by sclerosant injections consisting of phenol in almond oil. He had taken 1 tablespoon of liquid paraffin as a laxative daily for about 2 months before his gastric operation. A further source of oil in this patient could have been respired oily aerosols.

7141 THERAPEUTIC ASPECTS OF PARACETAMOL OVERDOSE INCLUDING MANAGEMENT OF ACUTE LIVER FAILURE. (Eng.) Williams, R.; Davis, M. (King's Coll. Hosp. Medical Sch., London, England). *Acta Pharmacol. Toxicol. (Kbh.)* 41(Suppl. 2):300-310; 1977.

Methods for reducing the degree of liver damage after paracetamol overdose and for managing acute liver failure are reviewed. Patients should be hospitalized and observed for 48 hr, and serum aspartate aminotransferase, bilirubin, and prothrombin time should be estimated serially. All patients should be given i.v. infusions of 10% dextrose to avoid dehydration and calorie deprivation. The simplest ways of reducing the quantity of drug absorbed from the gastrointestinal tract and, thus, diminishing the degree of liver damage are by gastric lavage or by induced vomiting. Liver damage is preceded by depletion of hepatocellular reduced glutathione, allowing a hepatotoxic metabolite of paracetamol to bind to the cellular protein. Current treatment of patients after a paracetamol overdose is centered around the administration of compounds such as cysteamine or dimercaperol, which will substitute for the reduced glutathione. If hepatic failure intervenes, the patient should be treated by protein restriction, bowel sterilization, and replacement of clotting factors by infusions of fresh frozen plasma. Methods of temporary liver support are being developed based on charcoal hemoperfusion or hemodialysis.

7142 GRANULOMAS AND CHOLESTATIC-HEPATOCELLULAR INJURY ASSOCIATED WITH PHENYLBUTAZONE: REPORT OF TWO CASES. (Eng.) Ishak, K. G.; Kirchner, J. P.; Dhar, J. K. (Armed Forces Inst. Pathology, Washington, DC 20306). *Am. J. Dig. Dis.* 22(7):611-617; 1977.

The cases of two patients who developed combined cholestatic hepatocellular injury and noncaseating granulomas during phenylbutazone therapy are presented. The patients were men, aged 56 and 72 yr, who had received total doses of 3 and 14 g of phenylbutazone, resp. Both patients were also receiving tranquilizers (diazepam and chlordiazepoxide hydrochloride in each case, resp.). The drugs were discontinued when the patients developed nausea, pruritus, anorexia, and icterus. One patient had a macular rash, and both had peripheral blood eosinophilia. Liver biopsy specimens from both patients showed a combined hepatocellular and cholestatic injury, in addition to granulomas. Symptoms and signs subsided, and abnormal liver function tests returned to normal within 3 weeks after phenylbutazone was discontinued in both patients. Liver biopsy specimens 6 months later showed no granulomas or other pathologic changes. Cases of granulomatous hepatic reactions complicating phenylbutazone or oxyphenbutazone therapy are reviewed. Complete blood count and tests of hepatic function should be carried out before a patient is given either drug and at periodic intervals thereafter.

7143 HEPATITIS DUE TO MUSHROOM POISONING [Abstract]. (Eng.) Benhamou, J. P.; Ellinger, S. (Hopital Beaujon, Clichy, France). *Acta Pharmacol. Toxicol.* 41(Suppl. 2):299; 1977.

7144 QUANTITATIVE ASSESSMENT OF LIVER FUNCTION IMPAIRMENT IN HEPATOCELLULAR INJURY [Abstract]. (Eng.) Buch Andreasen, P. (Rigshospitalet, Copenhagen, Denmark). *Acta Pharmacol. Toxicol.* 41 (Suppl. 2):262; 1977.

See also, 7086, 7106.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

7145 FULMINANT HEPATITIS: A PRESENTATION OF WILSON'S DISEASE. (Eng.) Adler, R.; Mahnovski, V.; Heuser, E. T.; Presser, D. H.; Robinson, R. G. (Childrens Hosp. Los Angeles, 4650 Sunset Blvd., Los Angeles, CA 90027). *Am. J. Dis. Child.* 131(8):870-872; 1977.

The case of a 10-yr-old boy with fatal hepatic failure in whom Wilson's disease was confirmed at autopsy is presented. The patient presented with scleral icterus, right upper quadrant pain, recurrent epistaxis, and hepatosplenomegaly. His history included extensive exposure to animals and exposure to malathion 53 weeks prior to admission. Serum ceruloplasmin drawn on the second hospital day was reported at 11 mg/100 ml. The patient's condition was diagnosed as acute hepatic failure, and he was treated with ice-saline lavage, neomycin enemas, protein restriction, and i.v. fluids. On the third hospital day, ascites were detected, neurological deterioration progressed, and Babinski signs were present. The patient died in cardiopulmonary arrest within 3 weeks after the initial symptoms had developed. At autopsy, the pathological findings were typical of the intermediate or acute stage of the evolution of Wilson's disease; these included variably sized nodular liver, with collapse of the hepatocytes, fibrosis, inflammation, and bile duct proliferation. The liver copper level of 18.9 mg/100 g tissue wet weight, together with the ceruloplasmin level of 11 mg, were decisive in establishing the diagnosis of Wilson's disease. Wilson's disease must be included in the differential diagnosis of fulminating hepatic failure.

7146 PROTECTIVE EFFECT OF IMMUNE SERUM GLOBULIN (ISG) AGAINST HEPATITIS A INFECTION IN A NATURAL EPIDEMIC. (Eng.) Hall, W. T.; Madden, D. L.; Mundon, F. K.; Brandt, D. E. L.; Clarke, N. A. (Electro-Nucleonics Lab., Inc., Bethesda, MD 20014). *Am. J. Epidemiol.* 106(1):72-75; 1977.

In two wards of young patients housed at a hospital for the mentally retarded, 44 of 60 patients had no detectable antibody to hepatitis A prior to an epidemic that took place in 1970; 12 of 19 nonimmunized susceptible patients contracted the disease, while only 4 of 25 patients receiving human immune serum globulin (ISG) developed hepatitis. These four were probably infected with the virus prior to ISG administration. Of the 16 patients with pre-existing antibody, none showed any signs or symptoms of hepatitis.

7147 THE USE OF HEPATITIS B IMMUNE GLOBULIN (HBIG) IN THE PREVENTION OF HEPATITIS. (Eng.) Holland, P. V. (Blood Bank Dept., Clinical Center, NIH, Bethesda, MD 20014). *Acta Haematol. Pol.* 8(2):97-102; 1977.

Recommendations for the use of hepatitis B immune globulin (HBIG) in the prevention of hepatitis B are presented based on a literature review of clinical experiments with HBIG. HBIG should be given to the individual who had a small-dose, single-point exposure to the disease or intimate contact with an acutely ill hepatitis B surface antigen (HBsAg)-positive hepatitis patient. However, individuals who had anti-HBsAg at the time of exposure are immune to hepatitis B and need no immunoprophylaxis. HBIG also does not seem to be indicated for transfusion-associated hepatitis; this is largely a non-B problem, now that there is widespread HBsAg screening of blood donors. Since HBIG may suppress active immunity to hepatitis B, individuals who are going to be exposed to HBsAg-positive material on more than one occasion or who are in a chronically contaminated environment, such as a renal dialysis unit, may be better off receiving immune serum globulin (ISG) than HBIG. The significantly increased chance of obtaining residual immunity would counterbalance the slightly increased risk of overt hepatitis associated with ISG. The best and ultimate answer to the problem of hepatitis B prophylaxis is a safe and effective vaccine.

7148 CONTROLLED STUDIES WITH ACTH AND CORTICOSTEROIDS IN PATIENTS WITH CHOLESTATIC VIRAL HEPATITIS. (Ita.) Di Nola, F.; Bosio, G.; Marietti, G.; Veglio, V.; Baroni, L. (Ospedale per Infettivi Amedeo di Savoia, Torino, Italy). Italy). *Minerva Med.* 67(59):3903-3912; 1976.

Twenty-seven patients with cholestatic viral hepatitis were treated with ACTH, β-methasone, or a conventional dietary regimen supplemented with glucose, detoxifying agents, and vitamins. Treatment was continued for 21 days. Clinical and biochemical evaluations were made at the beginning and end of treatment, and they included parameters such as anorexia, icterus, nausea and vomiting, uremia, glycemia, total bilirubinemia, and levels of alkaline phosphatase, SGOT, and SGPT. Based on a statistical evaluation of the results by covariance and multivariance analyses, there was no advantage of hormone therapy over conventional dietary treatment of the disease.

7149 VERTICAL TRANSMISSION OF THE VIRUS OF HEPATITIS B AND NEONATAL HEPATIC CIRRHOSIS IN AN ARGENTINE FAMILY. (Eng.) Jorge, A.; Diaz, M.; Sanchez, D.; Filice, H.; Flores, A.; Perez-Elizalde, R. (Catedra de Clinica Medica III, Universidad Nacional de Cuye, Mendoza, Argentina). *Acta Hepatogastroenterol.* 24(3):162-166; 1977.

Vertical transmission of hepatitis B virus was observed in a family of six members. The mother was a healthy hepatitis B surface antigen (HBsAg) carrier, who also carried antibody to hepatitis B core antigen (anti-HBc). The father had chronic persistent hepatitis, was anti-HBc-positive, and carried antibody to hepatitis B surface antigen (anti-HBs). Two of the children developed neonatal cirrhosis. One child with cirrhosis was an anti-HBs carrier (anti-HBc was not determined), and the other was positive for anti-HBs and anti-HBc. Both died, and the diagnosis of cirrhosis was confirmed. The two other children were healthy anti-HBc carriers.

7150 HEPATITIS B: IMMUNOPATHOLOGY IN DIFFERENT CLINICAL COURSES OF THE DISEASE. (Ger.)

Bianchi, L.; Gudat, F. (Institut fur Pathologie, Schonbeinstrasse 40, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(27):929-935; 1977.

The presence of nuclear hepatitis B core antigen (HBcAg) and cytoplasmic hepatitis B surface antigen (HBsAg) in the liver tissue and of Dane particles and anti-HBc titers in the blood of 62 patients with acute and chronic HB was determined. Four reaction patterns of diagnostic and prognostic significance were found. (1) The elimination-type pattern is found in acute, self-limiting viral hepatitis. There are no viral components in the liver tissue at the height of the disease, despite seropositivity. (2) The HBc-predominance type, as seen in immunosuppressed kidney transplant patients and silent chronic, nonaggressive hepatitis (unspecific reactive or chronic persisting hepatitis patients), is associated with marked expression of HBcAg (60-100% of hepatocyte nuclei) and cytoplasmic HBsAg in 0-20% of cells. This type may also occur without exogenous immunosuppression or without a detectable endogenous immune defect. (3) The HBs-predominance type, with HBsAg occurring in up to 80% of the hepatocytes, is associated with a second type of silent chronic nonaggressive hepatitis. (4) The HBc+s type is found in aggressive types of hepatitis, and up to 70% HBcAg and 30% cytoplasmic HBsAg can be expressed. Nonaggressive chronic hepatitis can be linked to types 2, 3, and 4. Anti-HBc titers were elevated in both aggressive and nonaggressive hepatitis, but they were usually negative in immunosuppressed patients and highest in those with chronic aggressive hepatitis. HBcAg in liver tissue was constantly associated with Dane particles in the blood. In view of this association, two forms of chronic HB virus infection can be distinguished: (1) chronic infective forms, including HBc+s-type aggressive hepatitis, and HBc-predominance-type nonaggressive hepatitis and (2) variants with no or low infectivity (HBs-predominance-type chronic nonaggressive hepatitis). The reaction pattern is probably determined by the immune response, the key mechanism being the elimination of affected cells. Between efficient elimination (elimination type) and effective immunosuppression (HBc-predominance type), a graded elimination is found in chronic forms (HBs-predominance and HBc+s types), which explains the persistence and, possibly, aggressiveness of HB virus infection.

7151 LEUKOCYTE MIGRATION INHIBITION TEST IN HBs-POSITIVE AND HBs-NEGATIVE CHRONIC LIVER DISEASE USING AN HBsAg PREPARATION. (Ita.)

Craxi, A.; Genova, G.; Spano, C.; Chiarini, A.; Pagliaro, L. (Ospedale V. Cervello, Palermo, Italy). *Minerva Gastroenterol.* 22(3):253-256; 1976.

The leukocyte migration inhibition (LMI) test in agarose was applied to 81 patients with chronic liver disease. Four patients had cholestasis, and all were sero negative for hepatitis B surface antigen (HBsAg); 7 had chronic persisting hepatitis, 5 were HBsAg-negative and 2 HBsAg-positive; 44 had active or inactive cirrhosis, 33 HBsAg-negative and 11 HBsAg-positive; 16 had chronic active hepatitis (CAH), 10 HBsAg-negative and 6 HBsAg-positive; and 16 had hepatoma, 9 HBsAg-negative and 1 HBsAg-positive. Fifty percent of the HBsAg-positive CAH patients and 63% of the HBsAg-positive cirrhosis patients had positive LMI test results. In these patients, therefore, it is not possible to demonstrate a depression of cellular immunity as a hypothetical basis for the persistence of infection. Fifty percent of the HBsAg-negative CAH patients and 18% of the HBsAg-negative cirrhosis patients also had positive LMI test results. These patients, although antigenically negative, may have been infected with hepatitis B virus. There was an inverse relationship between a positive LMI test result and anti-hepatitis B core antigen (HBcAg) levels in all HBsAg-positive patients. This relationship could not be verified in HBsAg-negative patients because only a small number had anti-HBcAg in their serum.

7152 HEPATITIS-B ANTIGEN IN THE LIVER: IMMUNOFLUORESCENCE STUDIES. (Ger.)

Storch, W. (Neurologische Klinik, Karl-Marx-Universitat, Karl-Marx-Stadter-Strasse 50, A 2, DDR-7039 Leipzig, E. Germany). *Dtsch. Gesundheitsw.* 32(28):1304-1310; 1977.

Liver biopsy specimens from 71 patients with and without liver diseases were investigated for hepatitis B antigen (HBAg) by an immunofluorescence method. Fifteen patients had acute viral hepatitis (AVH), 2 chronic persisting hepatitis (CPH), 10 chronic aggressive hepatitis (CAH), 9 liver cirrhosis (LC), 8 unspecific reactive hepatitis (URH), 20 other or no liver diseases, and 7 were clinically healthy HBAg carriers. Twenty-one patients were positive for liver HBAg, 33 for serum HBAg. There was no marked correlation between serum and liver HBAg; both tests were positive in 15 patients and negative in 32; 6 serum-negative patients had HBAg in their livers, and 18 serum-positive patients had none. HBAg was found in the hepatocyte nuclei in one patient (in <20% of the hepatocytes), in the cytoplasm in 13 (in <20% of the hepatocytes in 2, >20% in 11), in the nucleus and cytoplasm in three, in the hepatocyte membrane and/or sinusoids in two, and simultaneously in the cytoplasm of hepatocytes, sinusoids, and necroses in two. Differences in localization may be due primarily to the specificity of the anti-HBAg sera used (human and rabbit anti-HBAg of different origin). There was no clearcut correlation between clinical and histological diagnosis and the number of positive cells, even though the latter was substantially higher in "healthy" carriers than in patients with liver diseases. Core antigen (HBcAg) was found mainly in AVH and CAH. HBcAg correlated with nude intranuclear bodies measuring 20-25 nm, but surface HBAg correlated with amorphous and filamentous material in the increased smooth endoplasmic reticulum of "ground glass" hepatocytes. The presence of HBAg in the hepatocytes of serum-positive patients may indicate a persisting HB virus infection and/or a disturbance of the immunological elimination of infected cells.

7153 HEPATITIS Bs ANTIGEN (HBsAg) DURING PREGNANCY.

(Eng.) Hill, L. M.; Marcus, W. M.; Kempers, R. D.; Taswell, H. F. (Mayo Clinic, 200 First St. S.W., Rochester, MN 55901). *Obstet. Gynecol.* 50(1):78-81; 1977.

Three patients with serum hepatitis during pregnancy are described. The first patient first became pregnant 1 yr after an episode of anicteric viral hepatitis; this pregnancy ended in a spontaneous abortion. The patient's serial transaminase values remained stable during her second pregnancy, although she was hepatitis B surface antigen (HBsAg)-positive. She was clinically well, and her liver disease was classified as consistent with chronic persistent hepatitis. Her child was found to have HBsAG at the age of 3 months. He is developing normally at age 4 yr. The patient's third child was HBsAg-negative at birth and was treated with hepatitis B immune globulin; he remains HBsAg-negative at age 14 months. The second patient had acute hepatitis during the eighth month of pregnancy, and was HBsAg-positive at delivery. Her child became HBsAG-positive at 6 weeks of age. He has been clinically well, although mild liver function abnormalities persist at 3 yr of age. The third patient was HBsAg-positive during her pregnancy, but antigen-negative at delivery. The amniotic fluid 3 weeks before delivery was HBsAg-positive, but the child was HBsAg-negative at birth. She received hepatitis B immune globulin at 1 day of age. All patients had a normal spontaneous vaginal delivery. None of the infants was breast fed. Abortion is not indicated for either the patient with acute hepatitis B or the chronic HBsAg carrier. Cesarean section should not be performed in the hope of preventing the fetal infection that frequently occurs, but should be performed only for standard fetal and maternal indications. Routine precautions for hepatitis should be rigidly enforced during the labor, delivery, and postpartum care of the HBsAg-positive patient. Treatment with hepatitis B immune globulin may be effective in preventing neonatal hepatitis type B.

7154 METHODS FOR DETECTION OF HEPATITIS B SURFACE ANTIGEN IN PARAFFIN SECTIONS OF LIVER: A GUIDELINE FOR THEIR USE.

(Eng.) Sumithran, E. (Dept. Pathology, Univ. Malaya, Kuala Lumpur, Malaysia). *J. Clin. Pathol.* 30(5):460-463; 1977.

Methods for the localization of hepatitis B surface antigen (HBsAg) in paraffin sections of the liver were compared, and suggestions for their use are outlined. The methods include the detection of ground glass-positive hepatocytes, the use of Shikata orcein stain, and immunoperoxidase and immunofluorescent techniques. A comparative study of the different methods on 20 livers showed the orcein stain to be the method of choice for routine use. The Shikata stain is not only specific but is relatively inexpensive, easily performed, and stains out distinct cytoplasmic inclusions even in stored formalin-fixed livers, old paraffin blocks, and autolysed livers. Since HBsAg is irregularly distributed in the liver, adequate sampling is necessary to prevent false negatives; when sufficient tissue is available at least five blocks should be examined before a case is labeled as HBsAg-negative.

7155 INCIDENCE OF HBsAG, ANTI-HBs AND SUBTYPES ad AND ay IN A GENERAL HOSPITAL: CORRELATION WITH CLINICAL DATA AND ITS SIGNIFICANCE AS A PUBLIC HEALTH PROBLEM.

(Eng.) Telischi, M.; Steigmann, F.; Canlas, N.; Foemmel, R.; Decker, R.; Ling, C. (Cook County Hosp., 1825 W. Harrison St., Chicago, IL 60612). *Am. J. Gastroenterol.* 67(5):449-455; 1977.

The incidence of hepatitis B surface antigen (HBsAg) and anti-HBsAg among 9,418 individuals comprising new hospital admissions, new employees, and blood donors in a general hospital was investigated. The incidence of HBsAg among 101 patients with acute hepatitis, 363 patients with liver disease (other than hepatitis) and gastrointestinal problems, 6,731 newly admitted patients with all types of medical and surgical entities, 1,824 volunteer blood donors, and 399 newly employed persons were 69.3%, 5.2%, 2.2%, 1%, and 4.0%, resp. The incidence of anti-HBsAg in the acute hepatitis patients was 17.8% compared with 12.7% for the liver-gastrointestinal patients and 30.3% for the newly admitted patients. No anti-HBsAg tests were done on employees or donors. Subtyping was performed on acutely ill patients and carriers. Of 46 patients with HBsAg-positive acute hepatitis, 31 had subtype *ay*, 15 subtype *ad*. Of 30 nonhepatitis patients positive for HBsAg, 5 had subtype *ay*, 25 subtype *ad*. Of 17 acute hepatitis patients with anti-HBsAg, 5 had *ay*, 12 *ad*, and among 92 nonhepatitis patients with anti-HBsAg, 18 had *ay*, 74 *ad*. Subtype *ay* predominated in the acute hepatitis cases, but subtype *ad*, was found in approximately 70% of the other cases. No significant correlation was noted between subtypes and duration of symptoms, duration of HBsAg antigenemia, length of hospital stay, or severity of clinical disease. The incidence of

HBsAg-positive persons detected at this hospital is concluded to be high. Despite this, no significant epidemics of hepatitis have occurred. This appears to be partly due to the fact that a comparatively high number of individuals coming to this hospital have an immunity to this infection and partly due to the institution of preventive measures.

7156 HBsAg AND HBcAg IN VIRUS-LIKE PARTICLES DISCOVERED BY IMMUNOFLUORESCENCE IN LIVER BIOPSY SPECIMENS FROM ACUTE AND CHRONIC HEPATITIS PATIENTS. (Ita.) Rizzetto, M.; Bonino, F.; Toselli, M.; Verme, G. (Ospedale Mauriziano, Turin, Italy). *Minerva Gastroenterol.* 22(3):241-244; 1976.

Liver biopsy specimens from patients with acute and chronic hepatitis were examined by immunofluorescence to determine the presence of surface and core antigen to hepatitis B virus (HBsAg or HBcAg). Of the 109 specimens, 74 were from patients seronegative for HBAg and 35 were from patients seropositive for the antigen. None of the 74 negative patients were positive for HBsAg or HBcAg by immunofluorescence. Biopsy specimens from 14/35 positive patients were also negative for HBsAg and HBcAg. In one group of positive patients, HBsAg was diffused throughout the cytoplasm, but it was not present in the border cells. In six patients, HBsAg was in discrete locations in the cytoplasm, in small groups or in single cells, and in the border cells. These patients were HBcAg-negative. In another group of 10 positive patients, HBcAg was found in the nucleus. Seven of these patients were also capable of fixing complement *in vitro*. The localization of HBsAg exclusively in the cytoplasm indicates an undamaged or mildly inflamed liver. The presence of HBsAg in the cytoplasm and the border cells is associated with chronic hepatitis, either active or persisting. The presence of HBcAg in the nucleus is associated with active hepatitis, with or without cirrhosis, and it is correlated with degree of aggressiveness of the disease. The significance of the ability of HBcAg-positive cells to fix complement *in vitro* has not been determined.

7157 DIFFERENCE IN THE DISTRIBUTION OF e ANTIGEN AMONG DIFFERENT ETHNIC GROUPS IN A POPULATION OF BLOOD DONORS. (Eng.) Richer, G.; Phaneuf, D.; Boisvert, F.; Guevin, R.; Viallet, A. (Hopital Saint-Luc, 1058 St. Denis St., Montreal, Quebec H2X 3J4, Canada). *Can. Med. Assoc. J.* 116(7): 757-759; 1977.

The sera of 368 blood donors positive for hepatitis B surface antigen in the Montreal area and 310 people living in close contact with them were screened for the presence of e antigen and antibody (anti-e), using Ouchterlony wells and counterimmunoelectrophoresis. Neither e nor anti-e was found in the absence of markers of hepatitis B virus (HBV). The e antigen was detected in 23 blood donors and anti-e in 313; 32 were negative for both markers. Of the 368 blood donors, 330 were of French origin and 38 from other ethnic groups. The 23 e-positive subjects were unequally distributed among the ethnic groups; only 4.2% were recruited among the French group, while 23.7% were recruited among other ethnic groups ($p < 0.001$). This difference among ethnic groups might be related to the vertical or horizontal mode of dissemination of HBV infection.

7158 PERIPHERAL T AND B LYMPHOCYTE ROSETTING IN ACUTE INFECTIVE HEPATITIS AND EVALUATION OF A PLASMA INHIBITORY FACTOR. (Eng.) Mahalanabis, D.; Jalan, K. N.; Maitra, T. K.; Agarwal, S. K.; Bhattacharyya, S. (Calcutta Medical Res. Inst., Diamond Harbour Rd., Calcutta, India). *Indian J. Med. Res.* 64(12):1723-1727; 1976.

7159 PATTERNS OF SEXUALLY TRANSMITTED ENTERIC DISEASES IN A CITY. (Eng.) Dritz, S. K.; Ainsworth, T. E.; Back, A.; Boucher, L. A.; Garrard, W. F.; Palmer, R. D.; River, E. (Dept. Public Health, 101 Grove St., San Francisco, CA 94102). *Lancet* 2(8027):3-4; 1977.

7160 VIRAL HEPATITIS. (Eng.) Melnick, J. L.; Dreesman, G. R.; Hollinger, F. B. (No affiliation given). *Sci. Am.* 237(1):44-52; 1977.

7161 CLINICAL AND EDIDEMIOLOGICAL [sic] STUDIES ON HEPATITIS B IN CHILDREN. (Eng.) Fujiwara, T.; Chiba, S.; Nakao, T.; Ito, H. (Sapporo Medical Coll., Sapporo, Japan). *Tohoku J. Exp. Med.* 121(3):281-287; 1977.

7162 TYPE-B HEPATITIS IN LAGOS. (Eng.) Majekodunmi, A. E.; Olu Mabayoje, J. (Coll. Medicine, Univ. Lagos, Lagos, Nigeria). *Trop. Geogr. Med.* 29(1):74-76; 1977.

7163 INTENSIVE HEPATITIS SURVEILLANCE IN MINNESOTA: METHODS AND RESULTS. (Eng.) Levy, B. S.; Mature, J.; Washburn, J. W. (Minnesota Dept. Health, 717 Delaware St. S.E., Minneapolis, MN 55440). *Am. J. Epidemiol.* 105(2):127-134; 1977.

7164 ACUTE VIRAL HEPATITIS: MODERN KNOWLEDGE. (Eng.) Silverberg, M. (North Shore Univ. Hosp., Manhasset, NY). *Pediatr. Ann.* 6(5):30-47; 1977.

See also, 7087, 7088, 7090, 7094, 7165, 7173, 7263.

Chronic Hepatitis

7165 AUTOANTIBODIES IN THE DIAGNOSIS OF LIVER DISEASES. (Ger.) Lehmann, H. U.; Renger, F.; Morenz, J.; Zugehor, M. (Medizinische Klinik, Medizinische Akademie "Carl Gustav Carus," Fetscherstrasse 74, DDR-8019 Dresden, E. Germany). *Dtsch. Gesundheitsw.* 32(30):1415-1419; 1977.

Sera from 397 patients with liver diseases and 303 patients with other, nonspecified diseases (control group) were investigated for autoantibodies to smooth muscle (SM-AAB), mitochondria (M-AAB), and cell nuclei (N-AAB) and for hepatitis B antigen (HBAg). The positive test rates were 57/97 for M-AAB, 8/97 for SM-AAB, 2/97 for N-AAB, and 38/97 for HBAg in patients with infectious hepatitis. The corresponding rates were 16/30, 3/30, 0/30, and 15/30 among patients with chronic persisting hepatitis; 48/63, 19/63, 8/63, and 22/63 in chronic active hepatitis; 71/112, 15/112, 3/112, and 12/112 in liver cirrhosis; 19/19, 4/19, 3/19, and 0/19 in primary biliary cirrhosis; 11/21, 1/21, 0/21, and 0/21 in secondary biliary cirrhosis; and 25/44, 5/44, 1/44, and 0/44 in fatty degeneration of the liver. All tests were negative in the 11 patients with alcoholic liver cirrhosis. The incidences of positive tests were 119/303 for M-AAB, 11/303 for SM-AAB, 6/303 for N-AAB, and 0/303 for HBAg in the control group. Autoantibody titers were low in all HBAg-positive cases. The total serum titer (TST) of the autoantibodies (sum of the ranges for each individual titer) was found to be of diagnostic value. Primary biliary cirrhosis and autoimmune chronic active hepatitis can be ruled out if the TST=0. In patients suspected of having either chronic persisting or chronic active hepatitis, a TST$\geq$640 probably indicates chronic active hepatitis.

7166 SIGNIFICANCE OF "GROUND GLASS" HEPATOCYTES IN LIVER BIOPSY SPECIMENS FROM CHILDREN WITH CHRONIC HEPATITIS. (Ger.) Hinkel, G. K.; Probsthain, A. R.; Roschlau, G.; Stotzner, H.; Kemmer, Chr. (Medizinische Akademie "Carl Gustav Carus," Fetscherstrasse 74, DDR-8019 Dresden, E. Germany). *Dtsch. Gesundheitsw.* 32 (29):1365-1370; 1977.

One hundred fifty-eight liver biopsy specimens from 34 children with chronic persisting hepatitis (CPH) and 11 children with chronic aggressive hepatitis (CAH) were investigated for "ground glass" hepatocytes (GGH). The sections were stained with hematoxylin-eosin. Nine patients with CPH and eight with CAH were positive for hepatitis B surface antigen (HBsAg), and of these patients, four with CPH and three with CAH had GGH. Although all seven patients with GGH were HBsAg-positive, none had anti-HBs antibodies. When the GGH were detected, most of the seven patients had GOT and GPT levels of <50 IU and 50-150 IU, resp.; only two had GOT levels and one a GPT level of >150 IU. No definite correlation was found between the occurrence of GGH and the age of the patients, therapy, γ-globulin levels, and humoral immunological parameters. In all patients with GGH, IgG levels were around 2S and IgM and IgA levels were above 3S. Typical GGH with a diffuse distribution pattern were found mainly in CPH of 1-2 yr duration. Electron microscopy of biopsy specimens from four children with GGH revealed proliferation of the smooth endoplasmic reticulum, and an accumulation of perigranular, filamentous and partially ring-shaped material and individual, dense, intracisternal particles. Investigations of GGH in larger series of patients will be necessary to determine its significance.

7167 CHRONIC HEPATITIS IN HEMOPHILIA. (Eng.) Seeff, L. B.; Hoofnagle, J. (Veterans Admin. Hosp., Washington, DC). *Ann. Intern. Med.* 86(6):818-819; 1977.

The occurrence of chronic hepatitis in patients with hemophilia is discussed and reviewed. The first report to suggest that chronic hepatitis might be common in patients with hemophilia showed that 45% of 91 hemophiliacs had moderate elevations of serum transaminases, 41% had abnormal BSP retention, 8% were hepatitis B surface antigen (HBsAg)-positive, and 66% were anti-HBs-positive. None had symptoms of liver disease. The existence of chronic liver disease was not confirmed by liver biopsy. In a recent study, however, liver biopsies in three of six hemophiliacs with prolonged abnormal liver function tests showed the features of chronic active hepatitis; in the remaining three, the liver biopsy showed features of chronic persistent hepatitis. Chronic infection with hepatitis B virus is clearly one cause for the disease in these patients, but appears to account for less than one-fourth of the cases. Many of the remaining cases may result from chronic infection with the virus(es) of type non-A, non-B hepatitis. In addition, the stabilizing chemicals (phthalates, polyethylene glycol), used in the various stages of clotting factor concentrate preparation, deserve investigation.

7168 CHRONIC ACTIVE LIVER DISEASE: DEFINITION, DIAGNOSIS, AND MANAGEMENT. (Eng.) Whitcomb, F. F. (Lahey Clinic Foundation, Boston, MA). *Lahey Clin. Found. Bull.* 26(2):69-77; 1977.

7169 A STUDY OF CHRONIC HEPATITIS IN NORTHERN INDIA. (Eng.) Singh, D. S.; Sama, S. K.;

Singh, G. (Jawaharlal Inst. Postgraduate Medical Education and Res., Pondicherry, India). *Indian J. Med. Res.* 64(12):1728-1734; 1976.

7170 DIAGNOSIS AND TREATMENT OF CHRONIC ACTIVE HEPATITIS. (Eng.) Sherlock, S. (Royal Free Hosp., Univ. London, London, England). *Resident Staff Physician* 23(7):42-51; 1977.

See also, 7084, 7085, 7087, 7090, 7093, 7116, 7150, 7152, 7156, 7177, 7263.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

7171 RATIO OF PLASMA ALPHA AMINO-n-BUTYRIC ACID TO LEUCINE AS AN EMPIRICAL MARKER OF ALCOHOLISM: DIAGNOSTIC VALUE. (Eng.) Morgan, M. Y.; Milsom, J. P.; Sherlock, S. (Royal Free Hosp. Sch. Medicine, Univ. London, Hampstead, London NW3 2QG, England). *Science* 197(4309):1183-1185; 1977.

The value of determining the ratio of plasma alpha amino-*n*-butyric acid to leucine (A/L ratio) in the diagnosis of alcoholism was studied in 50 controls, 43 alcoholics with various degrees of liver damage, and 77 patients with nonalcoholic liver and biliary tract disease. The relation between the A/L ratio and several parameters of liver cell damage were also studied, and the changes that occur in the ratio postprandially and diurnally were observed. The A/L ratio in the alcoholic patients (0.225 ± 0.110) was significantly increased in comparison with that of the controls (0.181 ± 0.058, $p<0.025$). The A/L ratio was raised in the alcoholic patients, regardless of whether or not they had been recently drinking. In the 22 alcoholics with fatty change only, the A/L ratio was not significantly different from that of controls, regardless of recent alcohol abuse. In the alcoholics with more advanced liver damage, the ratio was raised both in patients who had been drinking recently and in those who had not. Among the 77 patients with nonalcoholic liver and biliary tract disease, the mean A/L ratio was raised in those with active chronic hepatitis, primary biliary cirrhosis, cryptogenic cirrhosis, and acute type A hepatitis, but not in the group with primarily biliary tract disease. In the alcoholic patients there was no significant correlation between the plasma A/L ratio and the standard liver function tests or the degree of histological hepatocellular damage. Thus, the A/L ratio is not a sensitive index of hepatocellular dysfunction. The results indicate that the A/L ratio cannot be used as an index of alcoholism.

7172 ENZYME TESTS FOR ALCOHOLISM. (Eng.) Rosalki, S. B. (St. Mary's Hosp., London W2, England). *Rev. Epidemiol. Sante Publique* 25(2):147-158; 1977.

Enzyme tests for detecting alcoholism are reviewed. Elevated serum γ-glutamyltransferase (GGTP) levels can be used to detect early alcoholism, before the onset of abnormal liver function. With continued drinking, hepatocellular injury and biliary stasis contribute to serum GGTP elevation, which may then be accompanied by increased levels of serum aspartate and alanine transaminase from hepatocellular injury and of alkaline phosphatase from biliary stasis. Serum GGTP levels were analyzed in four patient groups with increasing levels of alcohol consumption and clinical severity: outpatient heavy drinkers, outpatient alcoholics, alcoholics admitted for drying-out, and alcoholics admitted for complications, including cirrhosis. The results showed elevated serum GGTP levels in 85%, 89%, 85%, and 81% of the respective groups for an overall incidence of 85%. The fact that the incidence of increased GGTP levels remains nearly constant in each patient group underlines the fact that GGTP is a test for excess alcohol consumption, independent of the liver damage or behavioral changes that separate the alcoholic from the heavy drinker. The sensitivity of elevated GGTP is evidenced by the fact that consumption of 1 g of alcohol/kg body weight over an evening by normal subjects is sufficient to produce a transient elevation in GGTP (not >3 U/l at 37 C) that reverts to normal within 19 hr after the cessation of drinking. About 3 weeks of daily alcohol consumption at this dose is required before pathological levels are seen. When an alcoholic stops drinking, the GGTP level generally shows a 50% reduction within 2 weeks and is near normal within 5 weeks. However, a more persistent elevation is observed in the presence of underlying cirrhosis. Enzymes useful for detecting vitamin B deficiency in alcoholics are transketolase, glutathione reductase, and aspartate transaminase.

7173 HEPATIC TRIGLYCERIDE LIPASE DEFICIENCY IN LIVER DISEASE. (Eng.) Freeman, M.; Kuiken, L.; Ragland, J. B.; Sabesin, S. M. (Univ. Tennessee Center for the Health Sciences, Memphis, TN 38163). *Lipids* 12(5):443-445; 1977.

The activity of postheparin lipases was evaluated in 10 patients with alcoholic hepatitis or viral hepatitis and in 9 controls. Lipoprotein lipase and hepatic triglyceride lipase were differentiated by assay under high and low salt conditions and also by separation on heparin-agarose affinity chromatography columns. The mean activity of hepatic triglyceride lipase in the sera of liver disease patients was only 21-24% of the mean of controls, but lipoprotein lipase in the patients' sera was similar to that in controls. Hepatic triglyceride lipase deficiency may partially account for the accumulation of a triglyceride-rich low-density lipoprotein in liver disease.

7174 EFFECTS OF ACUTE ETHANOL INTAKE ON LIVER MORPHOLOGY AND METABOLISM. (Eng.) Morland, J. (Inst. Medical Biology, Univ. Tromso, Tromso, Norway). *Acta Pharmacol. Toxicol. (Kbh.)* 41(Suppl. 2):273-281; 1977.

The effects of acute ethanol intake on liver morphology and metabolism are discussed. The metabolism of ethanol, which occurs mainly in the liver, occurs via alcohol dehydrogenase and acetaldehyde dehydrogenase, leading to the production of acetaldehyde, acetate, and acetyl-coenzyme A. An important reaction accompanying ethanol oxidation is the reduction of NAD to NADH, which increases the ratio of reduced:oxidized coenzyme ratio. A single dose of ethanol can produce changes in triglyceride metabolism, the citric acid cycle, glucose production, amino acid transport, urea synthesis, protein synthesis, enzyme leakage, and drug metabolism. Morphologically, these biochemical changes may be accompanied by fatty liver and mitochondrial and lysosomal alterations. The effect of ethanol on blood glucose depends on the nutritional status of the individual, producing hypoglycemia in fasting subjects but not in well-nourished subjects. In chronic drinkers, acute ethanol intake can lead to an increased enzyme leakage, an increased net production of acetaldehyde, and acute massive liver necrosis.

7175 PLATYPNEA AND HYPOXEMIA IN LAENNEC'S CIRRHOSIS OF THE LIVER. (Eng.) Santiago, S. M., Jr.; Dlaton, J. W., Jr. (Wadsworth Veterans Admin. Hosp., Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *South Med. J.* 70(4):510-512; 1977.

7176 ALCOHOLIC HEPATITIS. (Eng.) Smith, J. N. (Univ. Missouri Sch. Medicine, Columbia, MO 65201). *Mo. Med.* 74(4):174-176; 1977.

See also, 7116, 7122.

LIVER AND BILIARY TRACT

Cirrhosis

7177 DETECTION OF MICROSOMAL ANTIBODIES IN CHRONIC LIVER DISEASES BY OPTICAL IMMUNOFLUORESCENCE. (Ger.) Storch, W.; Petzold, H. (Neurologische Klinik, Karl-Marx-Universitat, Emilienstrasse 30, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):137-139; 1976.

Over 1,000 serum samples from patients with chronic liver diseases were tested for autoantibodies by optical immunofluorescence. Composite blocks of rat kidneys, liver, and stomach and mouse kidneys were used as the antigenic substrate, and labeled anti-human IgG from rabbits was used as the conjugate. Reproducible, simultaneous, specific diffuse cytoplasmic fluorescence of the proximal renal tubule cells (mainly of the P_3 segment) and hepatocytes was found in 18 patients (10 with liver cirrhosis, 7 with chronic acitve hepatitis, 1 with chronic persisting hepatitis). Microsomal antibodies do not appear to form a homogeneous group.

7178 CHRONOBIOLOGICAL STUDY ON SERUM IMMUNOREACTIVE GASTRIN RIA LEVELS IN PATIENTS WITH LIVER CIRRHOSIS. (Eng.) Tarquini, B.; Anichini, P.; Brocchi, A.; Falchi, S.; Tommasi, S. (Istituto di Semeiotica Medica, Villa Monna Tessa, Viale Pieraccini, 18, I-50139 Firenze, Italy). *Digestion* 15(5):447-451; 1977.

To study possible circadian rhythms in gastrin release, serum gastrin levels were measured in six patients with liver cirrhosis on 3 consecutive days and in 14 normal controls on 1 day. The study was carried out after the subjects had been kept on a standardized diet for at least 7 days. Blood samples were drawn every 4 hr. In patients as well as in controls, a significant serum gastrin circadian rhythm was noted. The daily mean serum gastrin levels of patients were not significantly different from those of controls. These results suggest a secondary role of the liver in gastrin metabolism.

7179 REINFUSION OF ASCITIC FLUID IN THE TREATMENT OF CIRRHOTIC ASCITES. (Ger.) Standaert, L. O. (Abteilung fur Interne Krankheiten, St. Elisabeth-Hospitals, Lange Lozanastraat 222, B-2000 Antwerp 1, Belgium). *Dtsch. Z. Verdau Stoffwechselkr.* 36(3/4):153-155; 1976.

Eleven patients with ascites caused by liver cirrhosis were treated by a reinfusion of concentrated cirrhotic liquid. The ascitic liquid was aspirated by a peritoneal catheter at a rate of 20 ml/min, and water and electrolytes were separated in a closed-cycle multimembrane ultrafilter. The resulting liquid, concentrated by a factor of 2.15, was reinfused into the subclavian artery at a rate of 250-300 ml/min. The reinfusion lasted an average of 8 hr, and during this time the patients also received furosemide (40 mg) and cardiac stimulants. The treatment was well-tolerated, even though nearly all the patients developed slight hypertension. A small drop in hemoglobin concentration and hematocrit was seen in all patients immediately after reinfusion and five developed thrombocytopenia. Liver function showed no change. Hepatitis B antigen was found in the ascitic fluid, but not in the ultrafiltrate of three patients. Some patients responded to conventional treatment (drainage of ascitic liquid) or remained "dry" after reinfusion, but others required repeated reinfusions of longer durations. The results with a larger series indicate increased 1- and 2-yr survival rates after reinfusion. This new therapeutic method is indicated for patients with decompensated cirrhosis, hypovolemia, hypoproteinemia, hyponatremia, and functional renal insufficiency. Severe oliguria, uremia, hyperammonemia, and jaundice are not counterindications, but severe cardiac insufficiency, peritoneal infection, and sepsis are.

7180 PERITONEOVENOUS SHUNTING FOR ASCITES. (Eng.) Reinhardt, G. F.; Stanley, M. M. (Veterans Admin. Hosp., Hines, IL). *Surg. Gynecol. Obstet.* 145(3):419-424; 1977.

The use of a peritoneovenous shunt for relieving dietary, diuretic-resistant ascites in 25 adult men with alcoholic cirrhosis is reported. A pressure-sensitive valve, which is incorporated in the shunt, permits flow in one direction only, and its characteristics are such that an i.p. pressure that exceeds central venous pressure by 3-5 cm of water will allow flow of ascitic fluid into the central venous system. The shunt can be performed safely under local anesthesia. All of the patients tolerated the procedure well. Three patients in hepatic coma survived the procedure, although all eventually died of progressive hepatic failure during the same hospitalization period. Since the course of patients with such severe hepatic failure does not appear to be favorably influenced by the shunt, its use in patients with severe encephalopathy is not recommended. A good response to the shunt procedure was observed in 19/22 patients discharged with shunts in place. These 19 patients showed a sustained normal pattern of diuresis and relief of disabling ascites. Two patients had a fair but incomplete response to the shunt procedure. One additional patient with a fair response returned to alcoholism and died 4 months after the surgical procedure. The average length of follow-up time in the 18 surviving outpatients was 10 months (range 3-21 months).

7181 ULTRASTRUCTURE OF HEPATOCELLULAR CARCINOMA IN A CIRRHOTIC LIVER. (Eng.) Livni, N.; Behar, A.; Brautbar, N. (Hebrew Univ.-Hadassah Medical Sch., Jerusalem, Israel). *Isr. J. Med. Sci.* 13(6):590-599; 1977.

Light and electron microscopic observations of biopsy material from a 23-yr-old woman with hepatocellular carcinoma in a cirrhotic liver are reported. Although the hepatoma cells shared many similarities with nonneoplastic hepatocytes, they showed conspicuous alterations, such as intranuclear pseudoinclusions and lipoid material, abundant small fat droplets and glycogen in the cytoplasm, high mitotic activity, and an increased nuclear/cytoplasmic ratio. The rough endoplasmic reticulum and Golgi apparatus were prominent in the hepatoma cells, and the sinusoids showed capillarization. The latter was observed in cirrhotic as well as in neoplastic areas; however, in neoplastic liver tissue, this transformation consisted not only of the deposition of basement membrane-like material, but also of the appearance of junctions between endothelial cells. Annulate lamellae were occasionally seen in the hepatoma cells. Microtubules, which were present in small amounts in normal hepatocytes, were abundant in the hepatoma cells, and they appeared as long filamentous structures of 15-20 nm diameter with a center of low electron density.

7182 HEPATIC ENCEPHALOPATHY: HEMODYNAMIC AND METABOLIC STUDY OF THE INFLUENCES OF AMMONIA AND L-DOPA. (Fre.) Baldy-Moulinier, M.; Bories, Ph.; Michel, H.; Passouant, P. (Institut de biologie, boulevard Henri IV, F 34000 Montpellier, France). *Rev. Neurol. (Paris)* 133(3):175-189; 1977.

Cerebral blood flow (CBF) and cerebral energy metabolism (CEM) were studied in 15 patients with cirrhosis (12 of whom had hepatic encephalopathy), 3 chronic alcoholism patients without cirrhosis, and 1 normal subject. Measurements were made before and after i.v. administration of ammonium chloride and/or L-dopa. Although all subjects had a normal or near normal CBF, cerebral O_2 consumption was significantly decreased in the cirrhotic patients, even after correcting for their lower hemoglobin values. These lower O_2 values were not directly related to the hypocapnia, hyperlactacidemia, and elevation of phenylalanine and tyrosine levels also found in cirrhotic patients. Ammonium chloride reduced the CBF in all patients, but its effect on CEM was slight. L-dopa had no effect, but it was able to correct the effects of ammonium chloride on CBF and CEM. These results indicate that symptoms of hepatic encephalopathy are not directly related to a reduced CEM and they are not dependent on a blockage of dopaminergic synapses, but that the formation of cerebral arteriovenous shunts may be implicated.

7183 STUDY OF PULMONARY ANOMALIES DURING LIVER CIRRHOSIS.

(Fre.) Seigneuric, Ch. (Faculte de medecine de Dijon, Dijon, France). *Rev. Fr. Gastroenterol.* 126(2):53-54; 1977.

Pulmonary function was studied in 71 patients with liver cirrhosis. Clinical abnormalities were rare (cyanosis in 4, digital hippocratism in 6), but respiratory function was impaired in 65 of the patients. Circulatory abnormalities consisted of arteriovenous, bronchopulmonary, and portopulmonary shunts; alveolar and pleural vasodilation; and pleural angiomas. Restrictive and/or obstructive ventilatory syndromes, diffusion problems, and ventilation-perfusion disequilibria were frequent. Gaseous alkalosis was found in 55 patients. These pulmonary abnormalities may lead to potassium depletion, hemodynamic perturbations, cardiac failure, and digestive hemorrhages, and they must be carefully monitored in cirrhotic patients.

7184 A STUDY OF THE INTRAHEPATIC VASCULATURE IN THE HUMAN FETUS, IN THE NORMAL ADULT AND IN ADULTS WITH PORTAL CIRRHOSIS.

(Eng.) Hidayet, M. A.; Wahid, H. A.; Hidayet, A. M.; Hidayet, N. M. (Faculties Medicine, Univ. Western Ontario, London, Ontario, Canada). *Surg. Gynecol. Obstet.* 145(3): 378-388; 1977.

Anatomic, histologic, roentgenologic, and fluoroscopic examinations of 10 fetal, 10 normal adult, and 6 cirrhotic adult human livers and their vasculature confirm that the human liver consists of nine units and that the prevailing pattern of the intrahepatic vasculature of the fetal liver is a simpler form of the adult pattern. This supports the surgical technique of controlled partial hepatectomy based on preliminary ligation of the blood vessels and bile ducts connected to the segments or lobes to be resected. In portal cirrhosis, repeated destruction and regeneration of the liver parenchyma and the pressure of regenerating nodules and fibrosis result in narrowing, compression, distortion, and obliteration of the hepatic veins and, to a lesser extent, the portal veins (and hepatic arteries in the late stages). These changes also result in portal hypertension. Compensatory dilatation of the hepatic arteries in the earlier stages of portal cirrhosis maintains an adequate arterial supply to the liver parenchyma, which is separated from its portal blood supply. Increased anastomoses between hepatic arteries and portal veins allow hepatic arterial pressure to be transmitted to the venous network and contribute to the rise of portal pressure. Porta hepatic and portasystemic venous collaterals develop at several anastomotic sites, especially as esophageal varices, but they fail to relieve portal hypertension, are prone to rupture, and cause alarming hemorrhage that may be controlled by medical treatment, transesophageal ligation of varices, porta-azygos disconnection, or a selective distal splenorenal shunt. Portacaval shunts are the most effective measures against hemorrhage from portal hypertension, but they are not free from danger and, thus, should be reserved for patients with recurrent hemorrhage and weak or reversed portal flow.

7185 TRANSABDOMINAL SUTURE OF BLEEDING GASTRO-OESOPHAGEAL VARICES IN CRYPTOGENIC CIRRHOSIS OF THE LIVER.

(Eng.) Lam, S. K.; Lam, W. K. Cheng, F. C. Y.; Ong, G. B. (Univ. Hong Kong, Queen Mary Hosp., Hong Kong). *Br. J. Surg.* 64(6):428-432; 1977.

Emergency transabdominal suture of gastroesophageal varices was performed when conventional conservative measures, including esophageal tamponade, failed to control bleeding in 60/167 patients with cryptogenic cirrhosis and bleeding varices. The immediate mortality figure for the entire series was 50 patients; 26/107 who did not have surgery and 24/60 who did. Progressive liver failure accounted for 13 deaths among conservatively treated patients and 14 deaths among surgically treated patients. The transabdominal approach detected and successfully treated 19 patients who had concomitant bleeding from extraesophageal sources. Mortality in both treatment groups was directly related to the degree of liver function impairment, and it reached 100% for patients with severe (grade C) liver dysfunction, irrespective of treatment. Female patients had a significantly ($p<0.05$) lower mortality (13.3%) than males (33.6%). Increasing age was also generally correlated with mortality. Bleeding was arrested successfully in 96.7% of the surgically treated patients, and recurrence of bleeding was acceptably low (10-15%) during the first 6 months after surgery but not thereafter (about 80% recurrence of bleeding at 36 months postsurgery).

7186 BENEFITS OF VASOPRESSIN IN GASTROINTESTINAL HEMORRHAGE--FACT, FICTION, OR FANCY?

(Eng.) Wexler, M. J. (Royal Victoria Hosp., Montreal, Quebec, Canada). *Can. J. Surg.* 20(4):310-313; 1977.

Literature concerning the use of vasopressin in the control of gastrointestinal hemorrhage is reviewed. In one uncontrolled, nonrandomized, retrospective study carried out in 24 cirrhotic patients, vasopressin failed to control bleeding recurrences in many cases. The poor results in this study, however, may have been due to three factors: (a) 15 patients were bleeding only from gastric erosions, rather than esophageal varices, suggesting that some unstated preselection process led to the choice of this form of therapy; (b) vasopressin was infused into the superior mesenteric artery, rather than into the bleeding artery or the vessel more directly feeding the area of bleeding; and (c) the dosage and technique used for control and eventual cessation of therapy may not have been optimal (only 0.2 pressor U/min were used, monitored only by clinical arrest of bleeding). The effectiveness of the administered dose during infusion must be carefully and repeatedly monitored by angiography, and rates of up to 0.4 U/min may be required to achieve satisfactory and safe vasoconstriction. In the first prospective, randomized, controlled trial of vasopressin in upper gastrointestinal hemorrhage, vasopressin was significantly more effective in controlling hemorrhage than conventional therapy. In this study, 34 of the 53 patients had cirrhosis, and the results were similar for both cirrhotic and noncirrhotic patients with both variceal and nonvariceal hemorrhage. Rebleeding within 5 days of initial control occurred in 33-45% of the patients. Studies concerning the possible deleterious effects of parenteral vasopressin upon hepatic blood flow, and on the use of i.v.-administered vasopressin are discussed. The therapeutic value of vasopressin is uncertain in cirrhotic patients. It is clearly more valuable for the initial arrest of bleeding, but rebleeding is frequent. An easily applied i.v. infusion could be the primary method for vasoconstrictive therapy of massive variceal bleeding; at other sites, selective infusion into the artery more directly feeding the bleeding site is necessary.

7187 ARTERIAL HEMODYNAMICS OF THE LIVER AND SPLEEN IN PATIENTS WITH LIVER CIRRHOSIS. (Ger.) Lindenbraten, L. D.; Filimonow, G. P.; Savtschenko, A. P. (I. Moscow Medical Inst., Pirogowski St. 2/6, Moscow, USSR). *Fortschr. Roentgenstr.* 127(1):19-25; 1977.

The results of detailed angiographic studies of 111 patients with liver cirrhosis, 12 patients with thrombosis of the portal system, and 105 control subjects were compared. In the controls, the blood flow (ml/kg body weight) was 15-18 in the celiac trunk (CT), 8-10 in the splenic artery (SA), and 7-9 in the hepatic artery (HA). Values for the patient groups were: 15-20 CT, 8-11 SA, and 7-10 HA in patients with liver cirrhosis without portal hypertension (PH); 18-24 CT, 12-19 SA, and 3-5 HA in patients with cirrhosis, intrahepatic blockage, and small-caliber artery; 19-24 CT, 11-20 SA, and 8-12 HA in patients with intrahepatic blockage and normal or dilated HA; and 22-31 CT, 12-21 SA, and 10-13 HA in patients with thrombosis of the portal system (mixed blockage). Compared with controls, the diameter of the CT and SA was increased in all forms of PH, that of the common and proper HA was reduced in intrahepatic PH and increased in mixed and extrahepatic PH, and the diameter of the left gastric artery was increased in intrahepatic and mixed PH. All forms of PH were characterized by increased blood flow in the splenic and left gastric arteries. The angiographic findings confirm the existence of a close interdependence between the arterial and portal systems, systems that can be regarded as separate limbs of a common vascular chain.

7188 SPLENECTOMY AND SUBSEQUENT MORTALITY IN VETERANS OF THE 1939-45 WAR. (Eng.) Robinette, C. D.; Fraumeni, J. F., Jr. (Natl. Acad. Sciences, 2101 Constitution Ave., N.W., Washington, DC 20418). *Lancet* 2(8029):127-129; 1977.

The risk of cancer, cardiovascular disease, and other possible long-term consequences of splenectomy was assessed in 740 American servicemen splenectomized because of trauma during the 1939-45 war. There was a significant excess mortality from pneumonia and ischemic heart disease in comparison with 740 controls ($p<0.05$). Mortality from cirrhosis was also increased, but not significantly. The findings confirm that the risk of fatal infections is increased by asplenia; however, the risk of cancer was not increased, as it is in some other immunodeficiency states. Postsplenectomy thrombocytosis and hypercoagulability may account for the increased risk of fatal myocardial ischemia in this group.

7189 MITOCHONDRIAL FUNCTIONS AND CONTENT OF MICROSOMAL AND MITOCHONDRIAL CYTOCHROMES IN HUMAN CIRRHOSIS. (Eng.) Gil, J. D.; Rossi, I.; Escartin, P.; Segovia, J. M.; Gosalvez, M. (Facultad de Medicina, Universidad Autonoma, Madrid, Spain). *Clin. Sci. Mol. Med.* 52(6):599-606; 1977.

Mitochondria and microsomal fractions were isolated from the liver biopsies of eight patients with alcoholic cirrhosis, two with cryptogenic cirrhosis, two with chronic aggressive hepatitis, and six with normal livers. Normal livers yielded an average of 40 ± 4 mg of mitochondrial protein/g of tissue, cirrhotic livers 18-22 ± 1.5 mg/g. Compared with control livers, all the pathological livers showed a substantial and significant decrease ($\geq 50\%$, $p<0.005$) in the mitochondrial respiratory control ratio with glutamate + malate or succinate as substrate. The number of ADP molecules phosphorylated to ATP by the mitochondria per atom of oxygen consumed, with both substrates was slightly decreased from the control value in all but three liver disease patients. Microsomal fractions from all types of diseased liver showed a mean decrease of about 50% in cytochrome b_5 and cytochrome P-450 content compared with control livers. Apparently, cirrhotic livers yield less mitochondria than normal livers, and these mitochondria are functionally different. The fact that microsomal cytochromes were also markedly decreased, in cases of chronic aggressive hepatitis implies that this phenomenon is readily detected even in precirrhotic states.

7190 RED BLOOD CELL TRANSKETOLASE ACTIVITY IN CIRRHOSIS AND IN FULMINANT HEPATIC FAILURE. [Abstract]. (Eng.) Labadarios, D.; Roussouw, J. E.; Davis, M.; Williams, R. (Dept. Medicine, Univ. Stellenbosch, P.O. Box 63, Tygerberg 7505, South Africa). *S. Afr. J. Sci.* 73:187; 1977.

7191 CIRRHOSIS OF THE LIVER IN RHODESIAN BLACKS. (Eng.) Wicks, A. C. B.; Thomas, G. E.; Clain, D. J.; Loon, N.; Seggie, J.; Bramston, B. (Dept. Medicine, Univ. Rhodesia, Salisbury, Rhodesia). *S. Afr. Med. J.* 51(25):911-914; 1977.

7192 INFARCTION OF THE GALLBLADDER: A COMPLICATION OF HYPERTENSION: CASE REPORT. (Eng.) Rosen, Y.; Chen, C. (Kings County Hosp. Center, 451 Clarkson Ave., Brooklyn, NY 11203). *Am. J. Gastroenterol.* 67(3):249-252; 1977.

7193 PRIMARY BILIARY CIRRHOSIS. (Eng.) Levine, J. B. (Univ. Connecticut Sch. Medicine, Storrs, CN 06268). *Conn. Med.* 41(5):293-297; 1977.

7194 CHRONIC INTRAHEPATIC CHOLESTASIS WITH GRANULOMAS AND BILIARY CIRRHOSIS: ENIGMATIC DISEASE AND THERAPEUTIC DILEMMA. (Eng.) Thomas, E.; Micci, D. (Metropolitan Hosp. Center, 1901 First Ave., New York, NY 10029). *JAMA* 238(4): 337-338; 1977.

See also, 7084, 7086, 7087, 7090, 7093, 7094, 7098, 7139, 7149, 7152, 7168.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

7195 TECHNIQUE, DIFFICULTIES, AND RESULTS OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP). (Ger.) Soehendra, N. (Chirurgische Universitatsklinik, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Chirurg* 48(2):98-104; 1977.

Experience with endoscopic retrograde cholangiopancreatography (ERCP) is presented on the basis of 604 cases. ERCP is a valuable tool in the diagnosis of bile duct obstruction. Premedication consists of diazepam (10 mg i.v.), atropine sulfate (0.5 mg), and hyoscine *N*-butylbromide (100 mg). The pharyngeal mucosa is anesthetized with Xylocaine spray. Liquid dimethylpolysiloxane preparations are used to prevent excessive foaming of the duodenal juice. The contrast agent used is combined with gentamycin. Lack of contrast due to air bubbles in the catheter or syringe can mimic concretions, and extreme filling may render small concretions invisible and thus lead to a false-negative. Insufficient filling may mimic pathological defects, e.g., carcinoma, especially in the area of the bifurcation or cystic duct. Of the 604 cases, the complication rate was 2%, the mortality rate 0%.

7196 TRANSHEPATIC PERCUTANEOUS CHOLANGIOGRAPHY WITH THE FINE CHIBA NEEDLE. (Fre.) Mousseau, R.; Bourgie, J. (Hopital Maisonneuve-Rosemont, 5415, boul. de l'Assomption, Montreal, Quebec H1T 2M4, Canada). *Can. Med. Assoc. J.* 117 (3):252-254; 1977.

Use of the fine Chiba needle for visualizing intrahepatic bile ducts radiographically was successful in 32/40 patients. Indications for its use were abdominal pain and/or icterus; contraindications were temperature >38 C, altered blood coagulation, or allergy to iodine. Patients were premedicated with meperidine (50 mg i.m.) and promethazine (25 mg i.m.), and placed in the dorsal decubitus position. The radiopaque substance Renographin-60 was slowly introduced into the liver by the needle under fluoroscopic control. In 18 patients the biliary ducts were dilated (diameter >6 mm) and in 14, the ducts were of normal caliber. Hepatic biopsies were performed on seven of eight patients whose ducts were not visualized, and in no case were the ducts dilated. Complications of the procedure were of brief duration or readily reversible (abdominal pain, 18; nausea and vomiting, 5; fall in blood pressure with bradycardia, 1). It is concluded that nonvisualization of the intrahepatic ducts by this method indicates the presence of nondilated ducts.

7197 CLINICAL EXPERIENCE WITH INFUSION CHOLEGRAPHY USING IOTROXAMIDE (BILISCOPIN®). (Ger.) Stillger, E.; Persigehl, M.; Frik, W. (Medizinische Fakultat an der Rheinisch-Westfalischen Technischen Hochschule, Goethestrasse 27/29, 5100 Aachen, W. Germany). *Roentgenblaetter* 30(8):414-420; 1977.

I.v. infusion cholangiocholecystography with iotroxamide (Biliscopin; 100 mg, iodine content 50 mg/ml, total iodine dose 5 mg, infusion rate 66 drops/min, infusion time 30 min) was performed in 43 patients. The indications for cholangiocholecystography were obscure upper abdominal complaints in 22 patients, cholecystitis in 7, cholelithiasis in 21, jaundice in 1, suspected tumor in 3, high ESR or fever in 2, and diagnosis before gastric surgery in 6. Adequate diagnostic evaluation of radiograms was possible in 37/43 cases, usually within 60 min. Minor subjective side-effects (pain at the infusion site, burning sensation) were seen in four patients only. Except for two patients with bile flow obstruction, serum parameters (bilirubin, alkaline phosphatase, SGOT, and SGPT) showed no significant alterations after the contrast medium was administered.

7198 PEROPERATIVE MANOMETRY OF THE BILIARY DUCTS. I. CLINICAL DATA.

(Fre.) Tsuda, Y.; Kinoshita, H.; Shiraha, Y. (Sch. Medicine, Univ. Osaka, Japan). *Lyon Chir.* 73(4):255-259; 1977.

Manometry using a modified Mallet-Guy method (intraductal pressure measured independently of cholangiography) was performed in 122 patients during surgery for gallbladder calculi (76), gallbladder polyps (2), common bile duct calculi with intrahepatic lithiasis (43), and choledochal cyst (1). A normal manometric curve was established for patients undergoing surgery for gallbladder disease who had normal hepatic tests and no evidence of hepatic, pancreatic, or biliary duct disease on exploration. Abnormal curves (ascending phase 30 sec with or without a prolonged descending phase) were obtained in 22/78 patients with calculi or polyps of the gallbladder and in 43/43 with calculi of the common duct. Prolongation of the descending and ascending portions of the curve was more likely to occur with the latter patients (34/43). Diagnostic accuracy was raised to 92.4% after peroperative manometry and to 99% when cholangiography was also performed.

7199 REFLUX INTO THE PANCREATIC DUCT DURING PEROPERATIVE BILIARY RADIOMANOMETRY. REPORT OF 200 CASES.

(Fre.) Lataste, J.; Albou, J. C. (Centre Hospitalier Intercommunal, 40, avenue de Verdun, 94000 Creteil, France). *J. Chir. (Paris)* 113(1):3-14; 1977.

Two types of reflux into the pancreatic duct were detected by radiomanometry during biliary operations in 200/2,500 patients. Functional reflux (I), which occurred in 109 patients, was due to a common duct with or without an ampulla of Vater or to an isolated duodenal obstruction. Secondary reflux (II), which occurred in 38 patients, was due to a pathological obstruction (impacted gallstones, odditis) below the choledocho-Wirsung crossway. No anatomical, organic, or physiological cause for reflux was found in 53 patients. Overall, 28/109 patients with reflux I had odditis, but it disappeared after sphincterotomy. There was no correlation between degree of reflux and choledochal perfusion pressure. The chronological order of reflux partly depended on its nature. Early reflux was found mainly in reflux II, but reflux secondary to passage into the duodenum was found in reflux I. Wirsung's duct was dilated five times more frequently in reflux II patients than in reflux I patients. Santorini's duct was opacified in 26 patients: 10 with reflux I and 10 with reflux II; in 6 the cause was not known. In 17 patients, the reflux flowed into the duodenum. Thus, reflux into Santorini's duct was three times more common in cases of papillary obstruction. No specific surgery is needed in most cases of reflux into Wirsung's duct when it is purely functional or due to an unknown cause. However, in pathological cases accompanied by dilatation of the duct, sphincterotomy should be performed.

7200 EARLY OR INTERVAL CHOLECYSTECTOMY: MORPHOLOGIC AND BACTERIOLOGIC FINDINGS.

(Ger.) Meier zu Eissen, P.; Fuchs, C. G.; Hirsch, H. C. (Kreiskrankenhaus Herford, Auf dem Dudel, 4900 Herford, W. Germany). *Aktuel. Chir.* 12(4):255-262; 1977.

The bacteriological and morphological characteristics of 32 patients who underwent early cholecystectomy (1-4 days after the onset of acute cholecystitis) and 111 patients who underwent interval cholecystectomy (6-9 weeks after onset) were studied. Fifty-eight patients in the interval cholecystectomy group received antibiotic therapy (tetracycline) for 5-6 weeks before surgery. Postoperative mortality was 1/32 and 2/111 patients, resp. Bacteriological tests of the bile were positive in 11/32 and 32/111 cases; i.e., there was no significant difference between the two groups in spite of the fact that many interval cholecystectomy patients received antibiotic treatment. Liver biopsy specimens showed pathological changes in 27/32 and 83/111 cases. These findings show that the reservations against early cholecystectomy for acute cholecystitis are not justified and that early cholecystectomy should be performed whenever possible.

7201 ENDOSCOPIC PAPILLOTOMY.

(Eng.) Seifert, E.; May, B. (Medical Sch. Hannover, Hannover, W. Germany). *Acta Gastroenterol. Belg.* 40(1/2):31-40; 1977.

Endoscopic papillotomy was used to treat 10 patients for the following reasons: remaining stones in the common bile duct after cholecystectomy (3 cases); stenosis of the papilla of Vater or of the choledochian sphincter (4); and choledochus stump syndrome in which there is encrusted material in the bile duct near the papilla, resulting in recurrent cholangitis (3). A specifically designed duodenoscope, which is easy to insert through the pyloric ring and can be placed near the papilla of Vater, was used. After cannulation of the papilla and injection of dye into the common bile duct, the cannulation tube was removed, and a specially designed papillotoma was inserted through the papilla into the common bile duct. A 1-cm incision was made in the upper part of the papilla after the open stoma was visualized and the cannula was reinserted to record the function and outflow of the stoma. Stools of the patients with remaining stones in the common bile duct were examined for 3 days for spontaneous delivery of the calculi. If all of the stones were not passed, duodenoscopy was performed again, and the common bile duct was cannulated and filled once more with dye to visualize the remaining gallstones. These were then extracted with a Dormia basket. The same procedure was performed in the choledochus stump syndrome, if encrusted material remained in the bile duct system after choledochoduodenostomy. Either spontaneous delivery or stone removal with a Dormia basket was successful in the three cases of remaining stones after cholecystectomy. Open papillotomy was successful in the four cases of papillary stenosis and in the three cases of choledochus stump syndrome. The procedure should be limited to older patients who are poor surgical risks.

7202 MICRO-ORGANISMS IN THE BILE: A PREVENTABLE CAUSE OF SEPSIS AFTER BILIARY SURGERY.

(Eng.) Keighley, M. R. B. (Univ. Birmingham, Birmingham, England). *Ann. R. Coll. Surg. Engl.* 59(4): 328-334; 1977.

The use of preoperative antibiotic treatment to reduce morbidity after biliary surgery in patients with infected bile is reported. Biliary infection was found in 57/181 patients undergoing biliary surgery. The majority of the organisms (87%) were aerobic bacteria, particularly *Escherichia coli*, *Streptococcus faecalis*, and *Klebsiella aerogenes*. An analysis of 282 patients revealed that when organisms were found in the bile at operation, the incidence of wound sepsis (38%) and septicemia (16%) was significantly greater than in patients with sterile bile (10% and 5%, resp.). After choledochotomy, wound infection and septicemia were significantly more common in patients with bacteria in the T-tube drain (45% and 22%, resp.) than in patients in whom the bile remained sterile throughout the drainage period (7% and 0%, resp.). Gram-negative aerobic organisms were uniformly sensitive to gentamicin. Gram-positive aerobic bacteria and anaerobic bacteria were resistant to this antibiotic and all but two of these organisms were resistant to ampicillin. When the effects of gentamicin (80 mg/dose, i.m.) or rifamide (150 mg/dose, i.m.) therapy were evaluated in 150 consecutive patients, a significant ($p<0.05$) reduction in wound sepsis (6% versus 22% for controls) and septicemia (2% versus 14% for controls) was demonstrated only in patients receiving gentamicin. Unlike gentamicin, serum levels of rifamide were inadequate. The only patients who benefited from antibiotic cover were those in whom the bile was infected at the time of operation. Patients with infected bile can be identified by preoperative duodenal aspiration, operative Gram staining of bile, or by analysis of the clinical presentation and operative findings. High-risk patients requiring preoperative antibiotic therapy include those >70 yr of age, jaundiced patients, those requiring emergency operation, patients with recent rigors, those with previous biliary operations, and patients known to have choledocholithiasis. Preoperative antibiotic treatment is concluded to reduce biliary operation morbidity.

7203 PRIMARY CARCINOMA OF THE GALLBLADDER.

(Fre.) Henry, X.; de Lestang-Labrousse, M.; Stoppa, R.; Banti, B. (Clinique chirurgicale universitaire, C.H.U., place V. Pauchet, 80030 Amiens, France). *J. Chir. (Paris)* 113(4):383-394; 1977.

Twenty-four cases of primary carcinoma of the gallbladder were analyzed and compared with those reported in the literature. This group was among 875 patients operated for gallbladder disease. Cholelithiasis seemed to be a predisposing factor, and it was present in 18 patients. Macroscopically, the carcinoma was localized in 1 patient, confined in 2, and of a hepatovesicular form in 21. Histologically, 15 were well-differentiated adenocarcinomas, 4 mucosecreting glandular epitheliomas, 2 epidermoid epitheliomas, and 1, an unknown type. Similar to the literature cases, the lymph system was also affected. Hepatic involvement was seen in 21 patients, and hepatic metastases in 8. Other affected organs included the bile duct (25%), pancreas (11%), stomach (9.5%), duodenum (8%), colon (5%), and abdomen (2.5%). The main symptoms were pain, emaciation, fever, icterus, nausea and vomiting, constipation, and external and digestive hemorrhaging. Eight patients had elevated alkaline phosphatase levels associated with a disturbance of BSP retention. Radiological examinations gave indefinite results. Eight p.o. cholecystographies and 10 i.v. cholangiographies were performed; the latter showed the absence of bladder opacification (8) and normal bile ducts (5). Gastrointestinal transit revealed compression of the bulb (4) and antrum (2) and filling of the large gastric curve (1). Overall, there is no diagnostic method of choice. The preferred surgical procedure is cholecystectomy with or without hepatic resection or lymphatic curettage. Four of the 24 patients benefitted from this procedure, with 1 surviving 6 yr and 3 surviving 9, 4, and 3 months, resp. Due to a poor prognosis of this carcinoma, the following pathological classification has been suggested: 0, I, II, II a and b, and IV a and b, in relation to tumor spread. Cholecystectomy seems to be the best method for preventing bladder carcinoma in any case of cholelithiasis without contraindications.

7204 SURGICAL PROBLEMS IN PRIMARY SCLEROSING CHOLANGITIS.

(Eng.) Salembier, Y. (69, rue de la Louviere, 59000-Lille, France). *Int. Surg.* 62(6/7):328-331; 1977.

The cases of five patients with sclerosing cholangitis are presented. The cases of the first two patients, women aged 21 and 22 yr, illustrated the typical evolution of the disease. The level of jaundice varied initially but finally ended in a continuous biliary retention. Their symptoms also included pruritus and attacks of cholangiolitis. The clinical picture in both patients was that of obstructive jaundice. Duodenoscopy and retrograde cholangiography showed narrowed and irregular bile ducts. The patients developed cirrhosis and died after episodes of gastrointestinal bleeding or colitis, 15 and 11 yr, resp., after the initial symptoms appeared. Radiology revealed an abnormal bile duct in one patient and a strictured, moniliform bile duct in the other. The segmentary interlobular bile ducts were surrounded by rings of fibrosis, resulting in chronic obstruction of the cholangioles. The remaining three cases illustrated difficulties encountered in the diagnosis of sclerosing cholangitis. In one of these patients, symptoms of stenosis were present, and no stones were found in the gallbladder. The symptoms recurred after cholecystectomy, and a second operation revealed severe pediculitis constricting the biliary duct with stones in dilated intrahepatic ducts. The diagnosis of another patient was complicated by the development of bile duct carcinoma. The last patient had cholangiolitis with pericholangiolitis, and xanthomatosis, features typical of primary biliary cirrhosis; the differential diagnosis between primary biliary cirrhosis and sclerosing cholangitis was difficult. Histologic studies, the presence of cholangiolitis, and obstructive pericholangiolitis indicated the correct diagnosis.

7205 UNDETECTED CHOLEDOCHOLITH. (Ger.) Schmidt, H. D. (Chirurgische Univ.-Klinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):106-118; 1977.

Reintervention for undetected choledocholith was necessary in 81/3,618 patients operated on for cholelithiasis of the extrahepatic bile ducts. Papillary stenosis was found in 16/81 cases. Cholangitis was diagnosed in 30 patients, and only 10 had no history of jaundice. In most cases, the first intervention consisted of cholecystectomy. The interval between the onset of symptoms and first intervention averaged 20 months, ranging from a few days to 34 yr. Residual calculi were detected by i.v. cholangiography, cholangiotomography, or percutaneous transhepatic cholangiography. Reintervention consisted of bougienage of the papilla with primary closure (46 cases), T drainage (14), papillotomy (2), elimination of the biliodigestive anastomosis (7), second resection of the cystic duct stump (7), and hepaticojejunostomy (5). Litholysis with chenodeoxycholic acid was unsuccessful in two patients, and both were subsequently reoperated. Postoperative complications included pancreatitis (1 case), purulent peritonitis (3), pneumonia (3), and healing by second intention (8). Postoperative mortality was 4.9% for all 81 patients and 2.4% for those with choledocholith without stricture. The findings indicate that in view of the lack of experience with chemical litholysis, endoscopic papillotomy and mechanical extraction surgery are the methods of choice for undetected choledocholith.

7206 FREQUENCY OF GALLSTONE DISEASE IN A WELL-DEFINED SWEDISH POPULATION: A PROSPECTIVE NECROPSY STUDY IN MALMO. (Eng.) Lindstrom, C. G. (Univ. Lund, General Hosp., Malmo, Sweden). *Scand. J. Gastroenterol.* 12(3):341-346; 1977.

The frequency of gallstone disease (gallstone at necropsy or postoperative state of gallstone disease) in unselected necropsy material consisting of 2,218 subjects from Malmo, Sweden was 44% (368 men, 607 women). Gallstones were found in 306 of the men and in 498 of the women. The stones were situated in the gallbladder in 763, the common bile duct in 100, the cystic duct in 48, the hepatic duct in 15, intrahepatically in 5, and within the intestine in 1 case. Of 763 subjects with cholecystolithiasis, 203 had 1 stone, 275 had 2-10 stones, 135 had 11-30 stones, 83 had 31-100 stones, and 63 had >100 stones. Among 192 patients who had undergone surgery (usually cholecystectomy) for gallstones, 21 had residual gallstones in the remaining bile ducts after surgery. Chronic cholecystitis was found in 16.6% of the subjects. Cancer of the gallbladder was seen in 20 subjects, cancer of the bile ducts in 12. Gallstone disease was the immediate or contributory cause of death in 31 subjects.

7207 PRIMARY INTRAHEPATIC GALLSTONES. (Eng.) Pridgen, J. E., Jr.; Aust, J. B.; McInnis, W. D. (Univ. Texas at San Antonio, Health Science Center, 7703 Floyd Curl Dr., San Antonio, TX 78284). *Arch. Surg.* 112(9):1037-1043; 1977.

Five new cases of Caroli's disease are reported. The disease is characterized by congenital segmental dilation of the intrahepatic bile ducts, which produces a variety of symptoms and, usually, primary intrahepatic gallstones. The diagnoses were made by intrahepatic cholangiography and confirmed by a surgical specimen of the left lobe of the liver in patients 1 and 2, autopsy in 3, and an intrahepatic cholangiogram in 4 and 5. A left-sided lobectomy of the liver was performed in patients 1 and 2. Cholecystectomy, removal of common duct stones, and choledochoduodenostomy or, preferably, Roux-en-Y choledochojejunostomy were performed in patients 3, 4, and 5. Patients 1 and 3 died > 5 yr after their original surgery; patients 2, 4, and 5 are alive at 6 yr, 13 yr, and 7 months, resp., after treatment. This is a more encouraging prognosis than that usually reported in the literature.

7208 EXTRAHEPATIC BILIARY LITHIASIS IN CHILDREN. RESULTS OF A SURVEY OF 100 CASES FROM SEVERAL MEDICAL CENTERS. (Fre.) Battin, J.; Auzerie, J.; Fortier-Beaulieu, M.; Mage, K. (Hopital des Enfants, 168 cours de l'Argonne, 33077 Bordeaux Cedex, France). *Med. Infant. (Paris)* 83(5):537-557; 1976.

A series of 100 children with extrahepatic biliary lithiasis was studied. The main symptoms were acute abdominal pain, vomiting, diarrhea, and icterus. The lithiasis was discovered preoperatively in 84% of the children, by simple abdominal radiography in 59%, and by specific biliary opacification in 25%. Treatment was usually surgical, and the results were generally favorable. There was only one fatality. The etiology of the lithiasis was traceable in 50% of the children (this is usually possible in only 10% of adults). Hemolytic anemias were responsible in 24 cases, hepatic abnormalities in 5, calcemic bile in 1, biliary duct malformation in 11, and ileal resections and other intestinal malabsorption syndromes in 9. Children with primitive lithiasis showed frequent hereditary or ethnic predispositions.

Since 64% of calculi in children are radiopaque, all children with suspicious symptoms should undergo simple abdominal x-ray examinations followed by, if necessary, p.o. opacification of the biliary tree. Venous opacification should not be performed routinely.

7209 SYMPTOMATOLOGY OF LITHIASIS OF THE COMMON BILE DUCT.

(Fre.) Martin, D. (No affiliation given). *J. Med. Lyon* 57(1306):593-596; 1976.

The symptomatology and diagnosis of common bile duct lithiasis are presented based on the data of 148 case records. Overall, 65% of the cases occurred in women, and most of the patients were ≥60 yr old. Obesity (both sexes) and multiparity were also predisposing factors. There was a family history of biliary lithiasis in 10% of the patients, and 14% had had a prior cholecystectomy, which indicates that this procedure did not afford total prophylaxis. Clinical symptoms included epigastric or hypochondrial pain (88%), icterus (77%), fever (75%), shivers (45%), pruritus (30%), vomiting (25%), and emaciation (25%). Only 2.8% of the patients had a distended bladder. Biological tests revealed generally elevated conjugated bilirubin and alkaline phosphatase levels. Contrast radiography was used in 62% of the patients (icterus prevented its use in the others), and it confirmed the diagnosis in 40% of those tested. An abnormal bile duct was seen in 60%. No radiological abnormalities of the bile duct were seen in 1% of the patients. The mortality rate of the operated patients was 2.7%, compared with 19% of the unoperated patients. The latter died of angiocholitis (9%), peritoneal perforation (3%), and cardiorespiratory insufficiency (7%).

7210 65 REINTERVENTIONS FOR POSTCHOLECYSTECTOMY COMMON DUCT GALLSTONES.

(Fre.) Mallet-Guy, P. (No affiliation given). *Lyon Chir.* 73(3):176-183; 1977.

In the period 1942-1974, 311/1,272 operations for calculi of the principal biliary system were performed for recurrent or overlooked calculi. Sixty-five of these reinterventions, all in patients who had cholecystectomies with simple extirpation of the gallbladder but without exploration of the common bile duct were analyzed. In 59/65 patients, the primary biliary surgery had been performed without peroperative radiologic and manometric controls, and the bile duct stones had probably been overlooked. In the other six reinterventions, the stones were believed to be recurrent, since peroperative controls and functional signs, history, and radiographs prior to initial surgery were negative for common duct calculi. The presence of common bile duct calculi was manifested by the development of postoperative biliary fistulas in 4 patients, by nonspecific pain or weight loss in 20, and by recurring biliary crisis with icterus and fever in 41. I.v. cholangiography does not always reveal the stones. Reintervention was always performed under radiologic and manometric controls for precise location of the calculi; in 31/65 patients, a choledochoduodenostomy was performed. Four of the 20 patients operated between 1943 and 1952 died, but no deaths have occurred in the 45 operated since 1952. Only 9/53 patients followed-up required further surgery.

7211 PROBLEMS OF CHOLECYSTECTOMY FOR LITHIASIS. ANALYSES OF STATISTICS FOR 1,000 CASES.

(Fre.) Devic, G.; Debouvry, J.; Garde, J. (46 bld de la Republique, F 38200 Vienna, Austria). *Lyon Chir.* 73(3):170-175; 1977.

From 1964 to 1976, cholecystectomies were performed in 1,000 patients with lithiasis of the common bile duct by similar methods with the exception that peroperative radiological and manometric controls were not used in 57 patients (emergency surgery, catheterization difficult or inadvisable). The average age of the 150 men and 850 women was 52 and 45 yr, resp. Obesity was present in 13.6% (weight >30% of ideal), hypertension in 8.7%, histological alterations in the liver in 40% (usually not serious), and acute pancreatitis in 27 patients. There were 10 deaths, all patients with acute cholecystitis. Complications were most likely to occur in patients >60 yr old, in those treated medically for >8 days, and in those with acute cholecystitis. They included postoperative infections in 45, evisceration in 4, and peroperative injury of the biliary pedicle in 6 (2 arterial, 2 of a healthy duct, and 2 of involved duct). Sixty-four patients had symptomless calculi of the common duct, and in 62 the calculi were discovered at surgery by exploration or radiographs. Diagnosis and treatment of anatomical or functional biliary stasis, compression of the common duct by the pancreatic nodules, and fibrosis of the sphincter of Oddi are also discussed.

7212 DESATURATION OF BILE AND CHOLESTEROL GALLSTONE DISSOLUTION WITH CHENODEOXYCHOLIC ACID.

(Eng.) Hofmann, A. F. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Am. J. Clin. Nutr.* 30(6):993-1000; 1977.

The use of chenodeoxycholic acid for the desaturation of bile and the dissolution of cholesterol gallstones is discussed. When chenodeoxycholic acid comprises >70% of the biliary bile acids, the amount of cholesterol secreted in bile falls, and the bile becomes cholesterol unsaturated. If cholesterol gallstones are present and they are exposed to this unsaturated bile, they will dissolve in 4-24 months in most patients. The effective p.o. dose of chenodeoxycholic acid for gallstone patients appears to be 12-15 mg/kg, even in nonobese patients. This range is successful in 50-70% of the patients. Extensive clinical experience indicates that chenodeoxycholic acid therapy is safe in humans, despite unequivocal toxicity in several nonhuman primates. When chenodeoxycholic acid therapy is stopped, the bile becomes resaturated and stones may recur. When gallstones do recur, they respond promptly to chenodeoxycholic acid, but the optimal mode of management for patients with recurrent stones after a previous successful medical treatment has not yet been defined. Since cholecystectomy is a rapid, safe, effective, and usually permanent treatment for all gallstones, the value of medical therapy with chenodeoxycholic acid is uncertain at present, except for patients in whom surgery is inadvisable.

7213 CHOLELITHOLYTIC ACTION OF CHENODEOXYCHOLIC ACID WITH LONG-TERM TREATMENT. (Ita.)

Mereto, G. C. (Servizio di Anestesia e Rianimazione, Ospedali Civili di Genova, Genoa, Italy). *Minerva Gastroenterol.* 22(2):168-172; 1976.

Sixteen patients with radiotransparent gallstones were treated with chenodeoxycholic acid on a 4-day on, 3-day-off regimen of 0.75-1.0 g/day. Five patients were treated for ≥6 months and 11 for 3-4 months. There were no drug-related increases in SGOT, alkaline phosphatase, or bilirubin in any of the patients after 3 months of treatment. Five of the 11 patients treated for 3-4 months showed no radiologic changes in their gallstones. However, the stones disappeared in two patients treated for 6 months, and they were greatly reduced in two others. The two patients whose stones disappeared were put on maintenance therapy of 0.5 g/day on alternate weeks, and the stones did not reappear. There were no adverse reactions to treatment, except for a mild diarrhea in six patients that was controlled by adjusting the dosage. Most patients reported subjective improvement of symptoms, especially digestive difficulties. Chenodeoxycholic acid appears to be an effective treatment for gallstones.

7214 PLASMA ENZYMES IN THE DIFFERENTIAL DIAGNOSIS OF CHOLESTATIC SYNDROMES. (Ger.)

Klein, U. E. (Abteilung fur Allgemeine Innere Medizin, Zentrum Konservative Medizin I der Universitat, Schittenhelmstrasse 12, D-2300 Kiel, W. Germany). *Med. Klin.* 72(9):337-342; 1977.

Studies of the diagnostic significance of plasma alkaline phosphatase (AP) levels are reviewed. Concurrent changes in the total AP and liver AP (LAP) activities indicate a hepatic origin of disease, but an isolated increase of enzyme activity indicates that it has an osseous origin. There is a significant positive correlation between AP and LAP activities ($r=+0.662$, $p<0.001$) in normal subjects. An increased AP level against the background of a normal LAP level indicates skeletal disease, but an increased LAP level without an increased AP level may indicate a long-standing obstruction syndrome. The increase in AP and LAP activities that is frequently observed during pregnancy is hepatogenic only when there is a simultaneous rise in γ-glutamyltranspeptidase activity.

7215 CHOLESTASIS IN PREGNANCY. (Fre.)

Merger, C.; Chadeyron, P. A.; Levy, J. (Cheverny III, 122, rue du Commandant Rolland, F 13008, Marseille, France). *J. Gynecol. Obstet. Biol. Reprod. (Paris)* 6(3):357-366; 1977.

The diagnosis and characteristics of cholestasis in 20 pregnant women are presented. Pruritus was observed in 18 patients; in 2 it was preceded by conjunctival subicterus and in 1 by vomiting. Icterus occurred in 11 patients between 30-35 weeks of pregnancy; hepatomegaly was noted in 3. Treatment with cholestyramine was effective in 6/13 patients. Laboratory examinations revealed frank biliary retention in all patients. Total bilirubin level ranged from 12 to 45 mg; alkaline phosphatase levels were consistently elevated (90-190 IU); and total cholesterol levels ranged from 2.6 to 5.6 g. Although cytolysis was noted in all patients, it was never marked, and hepatocellular function was normal. However, all patients had abnormal BSP-clearance tests. Four patients had twin pregnancies, which suggests that there may be a relationship between twin pregnancies and cholestasis. Maternal prognosis was good except in one patient in whom hemorrhage during delivery was accompanied by hypoprothrombinemia. In contrast, only four infants reached full term; the remainder were born prematurely. Pregnancy was prolonged 1-5 weeks in six patients by a β-mimetic tocolytic agent (Ritodrine). The amniotic fluid was discolored in nine patients. Fetal cardiac rhythm was often bradycardiac. Of the 25 infants born, 4 died (3/4 were twins). Most infants had an Apgar score of 7-9 in the first minute, 9-10 in the fifth minute. Arterial blood pH at birth was mostly low. Anemia was present in 10/21 surviving infants and 13 had neonatal icterus. Cholestasis of pregnancy is frequently associated with twin pregnancy and the prognosis for the fetus is especially affected by prematurity. β-Mimetic drugs are useful for the treatment of threatened premature labor and are of no danger to the mother.

7216 IATROGENIC BILE DUCT LESIONS. (Ger.)

Ehlert, C. P.; Schmidt, H. D. (Allgemeinchirurg. Klinik, Nordwestkrankenhauses Sanderbusch, D-2945 Sande, W. Germany). *Z. Gastroenterol.* 15(2): 119-125; 1977.

General clinical, diagnostic, and therapeutic aspects of iatrogenic lesions of the extrahepatic bile ducts are discussed on the basis of 31 cases that occurred following surgery on these structures. The lesion is usually caused by squeezing, tangential injury, or total dissection. Biliary fistula and bile duct stenosis are possible consequences of iatrogenic lesions. With serum bilirubin levels of up to 5 mg% and an intact liver parenchyma, i.v. infusion cholangiography is usually sufficient for diagnosing the lesions. Percutaneous transhepatic cholangiography is indicated only at serum bilirubin levels >5 mg%. Local intervention, e.g., suture of a leak, removal of ligation, or end-to-end anastomosis of a dissected duct, is possible only if the lesion is discovered intraoperatively. Lesions discovered later require biliodigestive anastomosis or, if no extrahepatic duct is available for the anastomosis, hepaticocholangioenterostomy. Partial liver resection with subsequent reconstruction of the stenosing duct is reserved for cases of cholangitis that have led to liver abscess. The biliodigestive anastomosis should be in the form of a hepaticojejunostomy in view of the considerable risk of stenosis.

7217 MALIGNANT OBSTRUCTIVE JAUNDICE. CURRENT STATUS OF SURGICAL MANAGEMENT.

(Ger.) Schmidt, H. D.; Ruckert, R.; Brunner, H. (Chirurgische Univ.-Klinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):89-98; 1977.

Preliminary results of the surgical treatment of 424 patients with obstructive jaundice due to malignant tumors are presented. Carcinomas of the gallbladder (84 cases), bile ducts (68), papilla (25), and head of the pancreas (247), were diagnosed. Among the 152 patients with bile duct and gallbladder carcinomas, the carcinoma was limited to the organ in 12 cases only; 78 patients had regional lymph node metastases, and 62 had distant metastases. Exploratory laparotomy was performed in 101 cases, cholecystectomy in 21, extended cholecystectomy in 3, biliodigestive anastomosis in 2, and tumor bougienage with a T drain in 23. The average survival time was 6 months. Only 60/272 patients with carcinoma of the head of the pancreas and papilla were operable; partial duodenopancreatectomy was performed in 54 cases and total duodenopancreatectomy in 6. Postoperative mortality was 18%. The other patients underwent palliative surgery (gastroenteral anastomosis) and their average survival time was 6 months.

7218 CYSTADENOMA OF THE BILE DUCT AS THE CAUSE OF RECURRENT OBSTRUCTIVE JAUNDICE.

(Ger.) Gronniger, J.; Ruckert, K.; Seitz, W. (Chirurgische Univ.-Klinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):99-105; 1977.

Two cases of long-standing intermittent obstructive jaundice due to benign bile duct tumor (cystadenoma) are reported. A 30-yr-old woman developed intermittent jaundice during the first 3 yr after cholecystectomy. A cholecystogram was negative at that time. Choledochotomy was performed 12 yr after the first surgery with the tentative diagnosis of extrahepatic obstruction due to a postoperative adhesion tumor. A pedunculated, partly cystic, partly solid intraductal tumor was found in the resected common bile duct. The patient is now symptom-free 1 yr after surgery. A 50-yr-old woman who underwent cholecystectomy for cholelithiasis 7 yr previously developed intermittent obstructive jaundice 1 yr later. A pedunculated cystadenoma of the common bile duct was removed at exploratory laparotomy. The patient remains symptom-free after surgery. The findings indicate that benign bile duct tumors should be considered a possible cause of recurrent intermittent obstructive jaundice.

7219 CONTRALATERAL DISPLACEMENT OF ABDOMINAL VISCERA BY A RETROPERITONEAL LIPOSARCOMA: ULTRASONIC DEMONSTRATION.

(Eng.) Kim, E.; Goldman, S. M.; Minkin, S. D.; Salik, J. O. (Sinai Hosp. Baltimore, Inc., Belvedere at Greenspring Ave., Baltimore, MD 21215). *J. Clin. Ultrasound* 5(2):117-120; 1977.

The case of a patient with contralateral displacement of the kidney, gallbladder, and liver by an encapsulated, well-differentiated, low-grade liposarcoma is presented. The patient, a 27-yr-old woman, presented with a right upper quadrant mass, 2 months after the delivery of a normal child. An abdominal ultrasound examination demonstrated a large, complex mass in the right upper quadrant extending at least to the midline. The right kidney, easily identified because of its characteristic sonographic appearance, was displaced to the midline. The bulk of the liver appeared to lie more to the left than is normally seen. The gallbladder was immediately to the left of the liver. An i.v. pyelogram and a p.o. cholecystogram confirmed the displacement of the kidney and gallbladder, resp., and an upper gastrointestinal series, barium enema, and liver scan confirmed the size and location of a large right-sided retroperitoneal mass. A large liposarcoma was found and removed at exploratory surgery. The tumor extended from just below the right hemidiaphragm, posterior to the liver, and crossed the midline. This is the first case in which not only the ipsilateral kidney but also the liver and gallbladder were pushed contralaterally by a large tumor. Because benign or slowly growing malignancies allow time for the normal intraabdominal organs to "wander" from their usual anatomical positions, the ultrasonographer must be alerted to the possibility of mass lesions displacing these organs across the midline.

7220 SPONTANEOUS PERFORATION OF BILE DUCTS.

(Eng.) Donald, J. W.; Ozment, E. D., Jr. (192 Louiselle St., Mobile, AL 36607). *Am. Surg.* 43(8):524-527; 1977.

The cases of two patients with spontaneous perforation of the bile ducts are presented. In the first patient, a 67-yr-old woman, the perforation occurred in the distal common hepatic duct. Laparotomy revealed severe acute cholecystitis and cholelithiasis, and a large amount of bile-stained and cloudy fluid was seen in the peritoneal cavity. The perforation occurred in the anterior wall of the common hepatic duct near the apparent junction with the cystic duct. After the gallbladder was removed, the cystic duct was found to have a common wall with the common hepatic duct for a distance of 3.0 cm. An impacted stone was removed from the distal end of the cystic duct at the point of entry into the common duct; the perforation was approximately 1 cm proximal to this point. The common duct contained purulent bile and some thick sediment, but no definite stone was found in the common duct. In the second patient, an 87-yr-old woman, the perforation occurred in an anomalous branch of a small superficial hepatic duct. Laparotomy revealed a large amount of free bile and purulent material in the peritoneal cavity. The gallbladder was distended, acutely inflamed, and contained many stones. The perforation occurred in a small superficial biliary radical on the inferior surface of the liver; the anomalous duct radical was ligated. The common duct and hepatic ducts contained stones. The authors conclude that choledochal calculi associated with infected bile and increased pressure in the proximal ductal system are the most common etiological factors in spontaneous perforation of biliary ducts. Free bile or bile-stained fluid in the peritoneal cavity with an intact gallbladder should alert the surgeon to the possibility of bile duct perforation.

7221 CHOLELITHIASIS AFTER MITRAL VALVE REPLACEMENT IN A TEEN-AGER. (Eng.) Holt, R. W. (2475 Virginia Ave. N.W., Washington, DC 20037). *South. Med. J.* 70(9):1135; 1977.

7222 ULTRASOUND DIAGNOSIS OF COMMON BILE DUCT DILATATION. (Eng.) Lee, T. G.; Henderson, S. C.; Ehrlich, R. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park R., Portland, OR 97201). *Radiology* 124(3):793-797; 1977.

7223 INTRAPERITONEAL DRAIN IN CHOLELITHIASIS OPERATIONS. (Eng.) Borgstrom, S.; Truedson, H. (Dept. Surgery, Univ. Umea, Umea, Sweden). *Acta Chir. Scand.* (Suppl. 475):1-23; 1977.

7224 ULTRASONIC FRAGMENTATION OF LARGE RISIDUAL [sic] BILIARY TRACT STONE. (Eng.) Bean, W. J.; Davies, H.; Barnes, F. (East Jefferson General Hosp., 4200 Houma Blvd., Metairie, LA 70011). *J. Clin. Ultrasound* 5(3):188-190; 1977.

7225 CONGENITAL CYSTIC DILATATION OF THE COMMON BILE DUCT AS A CAUSE OF PRIMARY BILE DUCT STONE. (Eng.) Matsumoto, Y.; Uchida, K.; Nakase, A.; Honjo, I. (Kyoto Univ. Medical Sch., Sakyo-ku, Kyoto, Japan). *Am. J. Surg.* 134(3):346-352; 1977.

7226 KNOTTED DRAINAGE TUBE: AN UNUSUAL POSTOPERATIVE COMPLICATION. (Eng.) Downing, R.; Wilkinson, A.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Br. J. Surg.* 64(9): 652; 1977.

7227 ATYPICAL CHOLESONOGRAMS IN PRIMARY AND SECONDARY MALIGNANT DISEASE OF THE BILIARY TRACT. (Eng.) Cunningham, J. J. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *J. Clin. Ultrasound* 5(4):264-267; 1977.

7228 PANCREATIC RETENTION CYST: A CAUSE OF OBSTRUCTIVE JAUNDICE. (Eng.) Loludice, T. A.; Jarmolych, J.; Buhac, I. (Veterans Admin. Hosp., Albany, NY). *JAMA* 238(8):889-890; 1977.

7229 GRAY-SCALE ULTRASOUND: UTILITY PREOPERATIVELY AND POSTOPERATIVELY IN A PATIENT WITH OBSTRUCTIVE JAUNDICE. (Eng.) Robinson, S. H.; Hayt, D. B.; Reynolds, B.; Patel, H. (Misericordia Hosp. Medical Center, 600 E. 233rd St., Bronx, NY 10466). *Arch. Surg.* 112(9):1137-1138; 1977.

7230 PERFORATION OF THE GALLBLADDER WITH MASSIVE INTRAPERITONEAL HEMORRHAGE. (Eng.) Saha, S. P.; Irons, R. P.; Couture, M. M. (2121 Nicholasville Rd., Lexington, KY 40503). *Int. Surg.* 62(6/7):351; 1977.

7231 EARLY POSTOPERATIVE ABDOMINAL COMPLICATIONS AND REOPERATIONS AFTER GALLBLADDER, COLONIC AND GASTRIC SURGERY [ABRIDGED]. (Eng.) Ward-McQuaid, J. N. (Mansfield and District General Hosp., West Hill Drive, Mansfield, Nottinghamshire, NG18 1PH, England). *Proc. R. Soc. Med.* 70(6):384-387; 1977.

7232 SURGERY FOR GALLBLADDER DISEASE IN THE ELDERLY. (Eng.) Gaines, R. D. (Creighton Univ. Sch. Medicine, Omaha, NB). *Geriatrics* 32(6): 71-74; 1977.

7233 ROUTINE UPPER GASTROINTESTINAL EXAMINATION IN PREOPERATIVE CHOLECYSTECTOMY PATIENTS. (Eng.) Mullen, J. T.; Watts, M. A.; Ehrlich, F. E. (7339 Ruthven Rd., Norfolk, VA 23505). *South. Med. J.* 70(5):553-554; 1977.

7234 NEW OBSERVATIONS ON THE CHOLANGIOGRAPHIC PSEUDOCALCULUS DEFECT: A CASE REPORT. (Eng.) Dent, D. M.; Cullis, S. N. R.; Funston, M. R. (Dept. Surgery, Univ. Cape Town, Cape Town, South Africa). *S. Afr. Med. J.* 51(22):809-810; 1977.

7235 SERIAL SCINTIGRAPHY OF CHOLEDOCHAL CYSTS USING ^{131}I-ROSE BENGAL AND ^{131}I-BROMSULPHALEIN. (Eng.) Oshiumi, Y.; Nakayama, C.; Morita, K.; Numaguchi, Y. N.; Koga, I.; Matsuura, K. (Faculty Medicine, Kyushu Univ., Maidashi 3-1-1, Higashi-Ku, Fukuoka 812, Japan). *Am. J. Roentgenol.* 128(5): 769-771; 1977.

LIVER AND BILIARY TRACT

7236 GALLBLADDER DISEASE IN CYSTIC FIBROSIS. (Eng.) L'Heureux, P. R.; Isenberg, J. N.; Sharp, H. L.; Warwick, W. J. (Univ. Minnesota Hosp., Minneapolis, MN 55455). *Am. J. Roentgenol.* 128(6): 953-956; 1977.

7237 A BIOPSY STUDY OF GALLSTONES IN NIGERIAN IGBOS. (Eng.) Onuigbo, W. I. B. (General Hosp., Enugu, Nigeria). *Digestion* 15(4):353-355; 1977.

7238 INCIDENCE OF CHOLELITHIASIS IN INDIA. (Eng.) Gupta, S. (2-Medical Enclave, Banaras Hindu Univ. Campus, Varanasi-221005, India). *Int. Surg.* 62(3):169-171; 1977.

See also, 6848, 6857, 6860, 6861, 6953, 6997, 7075, 7077, 7088, 7105, 7116, 7192, 7247.

GENERAL

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7240 HISTOGENESIS OF SALIVARY GLAND NEOPLASMS. (Eng.) Regezi, J. A.; Batsakia, J. G. (Univ. Michigan Sch. Dentistry, Ann Arbor, MI 48109). *Otolaryngol. Clin. North Am.* 10(2):297-307; 1977.

7241 SELECTED CONTROVERSIAL LESIONS OF SALIVARY TISSUES. (Eng.) Batsakis, J. G.; Regezi, J. A. (Univ. Michigan Medical Center, Pathology Building, 1335 E. Catherine St., Ann Arbor, MI 48109). *Otolaryngol. Clin. North Am.* 10(2):309-328; 1977.

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7243 SERUM MAGNESIUM STUDY IN CHOLERA AND NON-CHOLERIC GASTRO-ENTERITIS. (Eng.) Dutta, J. K.; Chadha, S. K. (Infectious Diseases Hosp., Delhi, India). *Trans. R. Soc. Trop. Med. Hyg.* 71(3):263-264; 1977.

7244 MALNUTRITION AND GASTROENTERITIS IN THE GAMBIA. (Eng.) Rowland, M. G. M.; McCollum, J. P. K. (Dunn Nutrition Unit, Univ. Cambridge, Milton Rd., Cambridge, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(3):199-203; 1977.

7245 A COMPARISON OF THE PATHOGENESIS OF PROTEIN-ENERGY MALNUTRITION IN UGANDA AND THE GAMBIA. (Eng.) Whitehead, R. G.; Coward, W. A.; Lunn, P. G.; Rutishauser, I. (Dunn Nutrition Unit, Univ. Cambridge, Milton Rd., Cambridge, CB4 1XJ, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(3):189-195; 1977.

7246 ACUTE AND CHRONIC INFLAMMATORY DISEASES OF THE SALIVARY GLANDS: DIAGNOSIS AND MANAGEMENT. (Eng.) Travis, L. W.; Hecht, D. W. (Univ. Michigan Medical Sch., Ann Arbor, MI 48109). *Otolaryngol. Clin. North Am.* 10(2):329-338; 1977.

7247 CHEMOTHERAPY, ADJUVANT TO SURGERY, FOR GASTROINTESTINAL CANCER. (Eng.) Higgins, G. A. (No affiliation given). *Clin. Gastroenterol.* 5(3):795-808; 1976.

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GENERAL

Parasitology

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GENERAL

Regional Enteritis

7275 TREATMENT OF CROHN'S DISEASE BY LEVAMISOLE (STUDY OF 10 CASES). (Fre.) Bertrand, J.; Renoux, G.; Vandooren, M. (Service de Medecine D, CHR, 2, bd Tonnelle, 37043 Tours Cedex, France). *Ann. Gastroenterol. Hepatol. (Paris)* 13(4):361-366; 1977.

Ten patients with Crohn's disease localized in the ileum were treated with levamisole (150 mg, 3 times/week for 8-30 months). Favorable clinical improvement was noted in four of six active cases of Crohn's disease: one showed radiological improvement, and three had a stabilization of disease. The disease worsened in the other two patients, but one showed improvement for 1 yr before failure occurred. Four patients with inactive disease had no recurrence after 24, 18, 18, and 10 months, resp. Immunological tests showed constant improvement in nine of the patients. Side-effects, which included insomnia, nervousness, malaise, palpitations, and drunkenness, developed in five patients, but they did not cause termination of therapy.

7276 CROHN'S DISEASE IN CHILDHOOD. (Eng.) O'Donoghue, D. P.; Dawson, A. M. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Arch. Dis. Child.* 52(8):627-632; 1977.

Clinical experience with 32 patients with Crohn's disease that started in childhood (before the age of 16) is presented. Abdominal pain, diarrhea, and weight loss were the most frequent presenting symptoms, occurring in 21, 18, and 13 patients, resp. However, unexplained fever was a presenting symptom in seven patients and was the dominant symptom in two patients; growth retardation was a presenting symptom in six patients and was the dominant symptom in two patients. Stunted growth was the most frequent physical abnormality when patients were first seen at the hospital, occurring in nine cases. Only six patients were correctly diagnosed after the initial series of investigations, and the mean delay in diagnosis was 2.9 yr. This delay was principally caused by a failure to consider the diagnosis and thus, to perform a barium follow-up examination. Diffuse disease (combined discontinuous small and large bowel involvement) was seen in 13 of the 32 patients. Large bowel involvement alone was observed in seven patients, and isolated small bowel disease was seen in only four patients. By 6 yr, 81% of the 32 patients had experienced a primary relapse (median relapse time, 17 months); of these patients, 73% experienced a further recurrence at 6 yr, with a median relapse time of 27 months. The recurrence rates at 6 yr for medically and surgically induced remissions were 85 and 61%, resp., with median relapse times of 16 and 48 months, resp. Because the MRT is much longer for surgically treated patients, surgery is recommended at an early stage of the disease.

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See also, 6953, 7050, 7062.

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ABANDOWITZ, H.M.
6680*
ABDEL-RAHMAN, M.S.
6793
ABE, H.
7093*
ADJEPON-YAMOAH, K.K.
7084*
ADLER, R.
7145*
ADRIANOV, N.V.
6839
AGARWAL, S.K.
7158
AILHAUD, G.
6817*
AINSWORTH, T.E.
7159
AJDUKIEWICZ, A.
6977*
AKHTAR, M.
6944
AL'TSHULER, B.A.
6924
ALAM, B.S.
6720
ALAM, S.Q.
6720
ALAVI, A.
6959
ALBARET, P.
7079*
ALBERT, J.
6982*
ALBOU, J.C.
7075*, 7199*
ALEXANDER-WILLIAMS, J.
7017, 7226
LFIDI, R.J.
6854*
LFORD, B.A.
7024
LHAVA, E.M.
6988
LLEN, W.D.
6818*
LPERT, E.
7088*
LSABTI, E.A.K.
7131
LTMAN, R.P.
7088*
MATRUDA, J.M.
6770*
MDRUP, E.
6743
MIC, J.
6775*
MMANN, R.
6887, 7073
MOURY, R.A.
7015
NANYEV, V.G.
6892
NDERSON, C.M.
6992
NDRES, J.M.
7088*
ANDREWS, R.
6726*
ANFOSSI, G.
7040
ANGORN, I.B.
7132
ANICHINI, P.
7178*
AONUMA, S.
6732
APPLETON, D.R.
6876*
ARAKI, E.
7097*
ARAUJO, F.G.
6790
ARCHAMBAULT, A.
6884
ARTEMOV, C.T.
6859
ARUIN, L.I.
6843
ASANO, K.
6792
ASANO, M.
6789
ASHCRAFT, K.W.
7015
ASPELING, R.L.
7030
ASSOR, D.
7011
ATHANASOULIS, C.A.
6756*, 6874*
ATRYZEK, V.
6810
AURICCHIO, S.
6953
AUST, J.B.
7207*
AUSTIN, E.
7109*
AUZERIE, J.
7208*
AXELSSON, C.K.
7013
AYNSLEY-GREEN, A.
6714*, 7108*
AZMY, A.
7014
BABA, S.
6744*
BACHEV, I.I.
6908
BACK, A.
7159
BADER, C.
6936
BAERT, A.
7083
BAIDO, V.P.
6909
BAKER, C.A.
7125
BAKER, P.
6996
BAKER, S.J.
6982*
BALAN, M.M.
6825
BALDWIN, R.W.
6800
BALDY-MOULINIER, M.
7182*
BALTHAZAR, E.J.
7129
BANTI, B.
7203*
BARBE, C.
7102*
BARNES, F.
7224
BARONI, L.
7148*
BARRETT, F.F.
7272
BARRETT, P.J.
6878*
BARTEL, J.
6873
BASTL, C.
7271
BATAILLE, D.
6820*
BATSAKIS, J.G.
7240, 7241, 7259
BATTIN, J.
7208*
BAUDET, B.
6937, 6938
BAUDET, P.
7079*, 7089*
BAUER, J.J.
7023
BAUM, S.
6756*, 6959
BAZIGOU, H.
7134
BEAN, W.J.
7224
BEAUBERNARD, C.
6779*
BECCARIA, A.
7072
BECCARIA, E.
7072
BECKER, D.P.
7114*
BECKER, M.
6985
BEDFORD, A.
7014
BEHAR, A.
7181*
BELAICHE, J.
6902, 6941*
BELL, F.P.
6776*
BELOHLAVEK, D.
6746*
BELSEY, R.
6866
BEN BOUALI, A.
7079*, 7089*
BENHAMOU, J.P.
7115*, 7143

BENNETT, J.R.
6865
BENO, I.
6910
BENUA, R.S.
6958*
BERETVAS, G.
6905
BERGER, O.
7046
BERGERON, M.
6813*
BERMAN, M.
6828*
BERNACKI, E.
6750
BERNIER, J.J.
6902, 6941*
BERNSTEIN, L.
7281
BERSTAD, T.
7076*
BERTHEZENE, M.
6901
BERTRAM, H.P.
6974
BERTRAND, J.
7275*
BERVAR, M.
7041
BETTELHEIM, R.
6852*
BEVEN, E.G.
6956
BEZAHLER, G.
7281
BHAT, P.
6982*
BHATTACHARYYA, S.
7158
BIANCA, T.
6932
BIANCHI, L.
7150*
BIERY, D.N.
6959
BIJLEVELD, R.T.
6907
BINDER, H.J.
7271
BINGEN, A.
6786
BINSTADT, D.H.
6945
BIRGER JENSEN, K.
6927
BIRNBAUM, W.B.
6862*
BISMUTH, J.
6779*
BISSELL, D.M.
6778*
BJORN-RASMUSSEN, E.
6691*
BLAGOVIDOV, D.F.
7071
BLAISDELL, F.W.
7028
BLAKEY, T.M.
7058
BLANCKAERT, N.
7135
BLAZHEVICH, N.V.
6839
BLEWITT, R.W.
7140*
BLOOM, S.R.
6714*, 6746*
BLUM, A.L.
6904
BOCQUET, L.
6972
BOESBY, S.
6863*
BOISVERT, F.
7157*
BONDARENKO, P.G.
6892
BONE, G.
6876*
BONFIGLIO, S.
6932
BONFILIO, A.C.
6739
BONINO, F.
7156*
BONOMI, U.
6840
BOOTH, C.C.
6995
BORGSTROM, S.
7223
BORIES, P.
7182*
BOSANAC, P.R.
6916*
BOSIO, G.
7148*
BOSSECKERT, H.
6883
BOUCHER, L.A.
7159
BOURGIE, J.
7196*
BOURRY, J.
6752
BOYER, J.
7089*
BOZYMSKI, E.M.
6703
BRADBURY, K.
7140*
BRADFORD, N.M.
6760*
BRAILSKI, C.
6929
BRAMSTON, B.
7191
BRANCH, R.
7091*
BRANDSTATTER, G.
6971
BRANDT, D.E.L.
7146*
BRANDT, L.
7281
BRAUTBAR, N.
7181*
BRAVO, J.F.
7121
BREMER, H.J.
7252
BREMNER, C.G.
6867
BREMNER, I.
6805
BRET, M.
6869
BRINKLEY, D.M.
7099*
BRISEID, G.
6814*
BRISEID, K.
6814*
BRITTON, D.C.
6876*, 7055
BROCCHI, A.
7178*
BRODERSEN, R.
6764*
BROOKS, C.M.
6916*
BRUHN, M.S.
6727*
BRUNNER, H.
7217*
BRUNNER, P.
6827
BRUNSER, O.
7262
BRYER, J.V.
7132
BRYLA, J.
6804
BUCH ANDREASEN, P.
7144
BUCHANAN, G.R.
7133*
BUDD, D.C.
7035
BUGAJSKI, J.
6729*
BUHAC, I.
7228
BULIGESCO, L.
7090*
BURDON, D.W.
7017
BURNETT, W.
6737
BURROW, H.
7140*
BUSUTTIL, R.W.
7009
BUXTON, A.E.
7272
CADALBERT, M.
6903
CALI, R.
6935
CALNE, R.Y.
7117*
CAMENISCH, R.
7085*

CAMILLERI, J.P.
7115*
CAMPBELL, J.R.
7086*
CANLAS, N.
7155*
CAPUSSOTI, R.
7049
CARACTA, P.F.
6969
CARCHIETTI, E.
6930
CARGILL, J.M.
6915*
CARLSCO, B.
7256
CARRIER, J.
7012
CASSAN, P.
7082
CASTELL, D.O.
6708
CASTELO, H.B.
7040
CASTRO, G.
6944
CATTAN, D.
6902
CAWDERY, H.M.
7056
CAYEN, M.N.
6808
CERF, M.
6940*, 6972
CERVEN, J.
6910
CHADEYRON, P.A.
7215*
CHADHA, S.K.
7243
CHALLACOMBE, D.N.
6979*, 6996
CHAMPAULT, G.
6697*
CHANG, W.C.
6794
CHAUN, H.
7119
CHAYVIALLE, J.A.
6759*
CHEGUILLAUME, J.
7089*
CHEN, C.
7192
CHENG, F.C.Y.
7185*
HERKACUI, M.
6754
HERRUAUD, C.
7079*
HEW, C.S.
6738
HIARINI, A.
7151*
HIBA, S.
7161
HOPPIN, J.
6781*
CHORVATHOVA, V.
6910
CHRISTENSEN, J.
6701, 6704
CHUMAKOVA, A.V.
6893
CHUNG, E.B.
7058
CHUNG, W.B.
7119
CIOCCA, M.
7124
CIONTEA, M.
7090*
CLAIN, D.J.
7191
CLARKE, J.R.
7064*
CLARKE, N.A.
7146*
CLAUDE, J.R.
6767
CLAUSEN, B.
7013
CLEMENT, P.B.
7001*
COCCIA, P.F.
7024
COCHRAN, R.C.
7035
COCHRANE, A.M.G.
7099*
COCKEL, R.
6913*
COELHO, P.M.Z.
6790
COHEN, M.
7281
COHEN, M.M.
7270
COHEN, R.J.
7126
COLBERT, D.A.
6810
COLLINS, P.W.
6727*
COMBE, E.
6713*
COMPERNOLLE, F.
7135
CONLON, S.
7032
CONNOLLY, C.E.
7112*
COOPERBERG, P.L.
7270
COPPULA, W.
7012
CORNET, A.
6926
CORNETT, J.W.D.
7030
CORNWELL, E.E.
7058
COUPLAND, G.A.E.
6880
COURI, C.
6793
COUTURE, M.M.
7230
COVE-SMITH, J.R.
7004
COWARD, W.A.
6802, 7245
COWEN, A.
6737
CRADDOCK, V.M.
6799
CRAXI, A.
7151*
CREAGAN, E.T.
7051
CRONIN, T.G., JR.
7044
CULLIS, S.N.R.
7234
CUNNINGHAM, J.J.
7227
CURRARINO, G.
6954
CUSHNER, S.
6716*
CUTHBERT, D.
7119
CZARNOWSKA-MISZTAL, E.
6696
CZEREDA, T.
6890
DABELS, J.
7074
DAGORN, J.C.
6775*
DAJANI, E.Z.
6727*
DALY, J.M.
6944
DAN, E.M.
7090*
DANEK, L.
6729*
DANIEL, E.E.
6706
DANILOV, M.V.
7071
DANN, R.W.
6959
DAO, M.
7089*
DARUP, K.
6848
DAUTREBANDE, J.
7083
DAVIDSON, M.
7281
DAVIES, H.
7224
DAVIES, J.D.
6977*
DAVIES, M.G.
6761*
DAVIES, R.L.
6731, 6829*
DAVIS, J.B.
7011
DAVIS, M.
7141*, 7190

DAWKINS, P.D.
6956
DAWSON, A.M.
7276*, 7287
DAWSON, J.
7282
DE CARLE, D.J.
6704
DE CIUTIIS, D.
6930
DE GROOTE, G.
7279
DE LESTANG-LABROUSSE, M.
7203*
DE MAJO, A.
7081
DE MELLO, J.B.
6934
DE MONTALIER, H.
7082
DE WEVER, I.
6699
DEBOUVRY, J.
7211*
DEBRAY, C.
6940*, 6972, 7070
DEBRAY, D.
7070
DECHAKAISAYA, S.
7111*
DECKER, R.
7155*
DEL FAVA, R.L.
7044
DEL VALLE, A.
6894
DELEZE, G.
7105*
DEMBROW, V.D.
7059
DENNIS, M.B.
6733
DENT, D.M.
7234
DEROIDE, J.P.
7082
DESAI, N.
7127
DESCOS, L.
6905
DESMYTER, J.
7279
DESPLACES, A.
6781*
DEVI, P.U.
6833*
DEVIC, G.
7211*
DEWITTY, R.L.
7058
DEYHLE, P.
6887, 7073
DHAR, J.K.
7142*
DI MAMBRO, M.
7081
DI NOLA, F.
7148*
DIAZ FLORES, L.
6894
DIAZ, M.
7149*
DIBAR, E.
7124
DIEZ CASCON, A.
6933
DIEZ-CASCON MENENDEZ, E.
6933
DIMITROV, B.
6929
DINNER, M.
7007
DISERENS, H.
6939*
DLATON, J.W., JR.
7175
DODDS, W.J.
6701
DODION, J.
7135
DOLETSKII, S.I.
6924
DOMINGO, N.
6775*
DOMSCHKE, S.
6746*, 6837
DOMSCHKE, W.
6746*, 6837
DONALD, D.E.
6762*
DONALD, J.W.
7220*
DONATI, A.
6932
DOWNING, R.
7017, 7226
DREESMAN, G.R.
7160
DRISKILL, D.R.
6727*
DRITZ, S.K.
7159
DUBUC J.
6808
DUDRICK, S.J.
6944
DUMMER, P.M.H.
6946
DUTTA, J.K.
7243
DUTTON, G.J.
6807
DVORNIK, D.
6808
DYBING, E.
7136*
EASTWOOD, M.A.
7060
EBERLEIN, W.
6928
EDMONDSON, J.W.
6758*
EDWARDS, C.R.W.
7287
EECKHOLT, C.
6699
EGGINK, W.F.
7120
EGOZI, I.
7059
EHLERT, C.P.
7216*
EHRLICH, F.E.
7233
EHRLICH, R.
7222
EKELUND, K.
6745*
EKSTRAND, T.
7256
ELASHOFF, J.D.
6914*
ELHARRAR, M.
6721
ELLINGER, S.
7143
ELLIOTT, J.G.
6773*, 6774*
ELMAN, A.
6898
ELONEN, E.
6687*
ELPIDIO, M.
6740
ENGQUIST, S.
7047
ERDMAN, J.W., JR.
6773*, 6774*
ERIKSSON, C.J.P.
6831*
ESCARTIN, P.
7189*
ESCOURROUS, J.
6754
EUSEBIO, E.B.
7010
EVANS, K.T.
6731, 6829*
EVANS, C.T.
7018
EVERS, G.
6873
FAHRENKRUG, J.
6819*
FAIRMAN, M.J.
6978*
FAITEL'BERG, R.O.
6825
FAIVRE, J.
6901
FALCHI, S.
7178*
FALOON, W.W.
6942*
FARBER, E.
6801
FARLEY, A.
6884
FAUSTO, N.
6810
FEGELER, K.
6974
FELDMANN, G.
7115*

FERNANDEZ-LOPEZ, V. 6817*
FESCE, A. 6841
FEVERY, J. 7135
FEVRE, D.I. 6878*
FIELDING, J.F. 7043
FIESSINGER, J.N. 7115*
FILICE, H. 7149*
FILIMONOW, G.P. 7187*
FILIPPINI, L. 7085*
FILLIT, H. 7281
FINLAYSON, N.D.C. 7084*
FISCHBACH, H. 6985
FISCHER, K.C. 7113*
FISCHER, M. 6736, 7110*
FLAMANT, Y. 6898
FLATMARK, A. 7098*
FLOOD, M.S. 6942*
FLORES, A. 7149*
FOEMMEL, R. 7155*
FOERSTER, C.F. 6702
FOGLER, R. 7019
FOGLIA, R.P. 7009
FONTANGES, R. 6842
FORMENTO, E. 7072
FORREST, J.A.H. 7084*
FORTIER-BEAULIEU, M. 7208*
FOWLER, E.F. 6782*
FOX, B. 6726*
FOX, W.P. 6970
FRANCILLON, J. 6937, 6938
FRANKL, H.D. 6914*
FRANSSILA, K. 6831*
FRAUMENI, J.F., JR. 7188*
FREEARK, R.J. 7029
FREEMAN, M. 7173*
FREITAG, H. 6885
FRETHEIM, B. 7098*
FREUND, H. 7042
FREXINOS, J. 6754
FRIK, W. 7197*
FROESCH, E.R. 6948
FROHLICH, J. 6795
FROLICH, J. 7119
FROLICH, R. 6736
FROST, F. 6917*
FUCHS, C.G. 7200*
FUCHS, H.F. 7065
FUJISAWA, Y. 6777*
FUJIWARA, T. 7161
FULLER, J.W. 7037
FUNDING, L. 6764*
FUNSTON, M.R. 7234
FURNEMONT, E. 6889
GAGNON, R.F. 7064*
GAINES, R.D. 7232
GALIAN, A. 6941*
GALL, D.G. 7261
GALLO, V. 7049
GANGAROSA, E.J. 7264
GANGL, A. 6695
GARCIA, A.C. 6998*
GARDE, J. 7211*
GARDNER, E.J. 7053
GARDNER, M.J. 7284
GARRARD, W.F. 7159
GARRIDO, A., JR. 6934
GATES, G.A. 7254
GAUTVIK, K.M. 7076*
GAYLOR, J.L. 6791
GEBBERS, J.C. 7067
GEISSINGER, H.D. 6680*
GELERNT, I.M. 7023
GELLEI, B. 7106*
GEMAR ANTUNEZ, E. 6933
GEMENDE, G. 7107*
GEMENDE, I. 7107*
GENEVA, L. 6836*
GENOVA, G. 7151*
GEORGIEV, G. 6836*
GERDIL, F. 7102*
GERLACH, U. 6847
GEROK, W. 6795
GERSH, I. 7106*
GERTSCH, P. 6939*
GHIRARDI, P. 6803
GIACOSA, A. 6896
GIARDINA, N. 6935
GIDAY, Z. 6981*
GIERCKSKY, K.E. 6919*
GIL, J.D. 7189*
GILLESPIE, P.E. 6878*
GILLIES, P.J. 6776*
GINTER, E. 6780*
GIOVINETTO, A. 6935
GIRARD, M. 6921
GIROUX, Y. 6884
GITZELMANN, R. 7108*
GLABAI, V.P. 7071
GLADER, B.E. 7133*
GLASS, G.B.J. 6725*
GLAVIN, G.B. 6835*
GLOVER, J.L. 7005

GLUSHKO, L.F.
6822
GNEKOW, W.
7266
GOHEER, M.A.
6807
GOLDBERG, H.I.
6950
GOLDMAN, M.
6716*
GOLDMAN, R.L.
7126
GOLDMAN, S.M.
7219*
GOLFERINI, A.
7049
GOLOFEEVSKY, V.Y.
6685
GONCETTE, L.
7083
GONZALES, L.
6854*
GOSALVEZ, M.
7189*
GOSSELIN, D.
6884
GOSSET, F.
7070
GOTCH, F.M.
7064*
GOTO, S.
6877*
GOUERCU, H.
6940*, 7070
GOYAL, R.K.
6707
GRABNER, G.
6695
GRABSKI, D.A.
6964
GRAHAM, J.
7010
GRAIVIER, L.
6954
GRAMLING, J.
7020
GRANDITSCH, G.
6994
GRANDJEAN, J.P.
6938
GRANGE, D.
6779*
GRASSLE, B.
6798
GRAY, S.
6739
GREEN, J.R.B.
7287
GREEN, P.H.R.
6878*, 7274
GREENALL, M.J.
7140*
GREENBAUM, A.L.
6715*
GREENGARD, C.
6812
GREIG, M.
6880
GRIMAUD, J.A.
6759*
GRONNIGER, J.
7218*
GROW, J.R.
7020
GRZEBIENIAK, Z.
6936
GUADAGNINO, V.
6930
GUBETTA, L.
7049
GUDAT, F.
7150*
GUDE, H.E.
7278
GUDMAND-HOYER, E.
6917*
GUEVIN, R.
7157*
GUIZAR-VAZQUEZ, J.
7263
GULACSIK, C.
6733
GUMAA, K.A.
6715*
GUNSELMANN, W.
6827
GUNTZ, M.
7079*
GUPTA, S.
7238
GURMAN, E.G.
6823
GURSKY, J.M.
6911*
GUZMAN, L.G.
6969
GVANTSELADZE, V.I.
6895
HAAGA, J.R.
6854*
HABIB, C.M.
6716*
HADJIGEORGIOU, E.
7134
HADLEY, G.P.
7132
HAECKI, W.H.
6746*
HAENEY, M.R.
6966
HAERTEL, M.
6856*
HAFKENSCHEID, J.C.M.
6816*
HAGLUND, U.
6832*
HAHN, R.G.
7051
HAJAC, T.
6718
HAKKINEN, H.M.
6831*
HALEK, J.
6858
HALGRIMSON, C.G.
7116*
HALL, L.
6710
HALL, W.T.
7146*
HALLBERG, L.
6691*
HALSE, S.A.
6879*
HAMILTON, J.R.
7261
HAMILTON, R.
7251
HAMMAKER, L.E.
6778*
HAMPEL, N.
7106*
HAND, J.
6729*
HANSEN, O.H.
6722*
HANSON, R.F.
6766*
HANTZSCHEL, U.
7074
HARDIN, C.A.
6963
HARELL, G.S.
7266
HARPER, A.M.
6755*
HARPER, N.E.
6954
HARRINGTON, D.P.
6960, 7267
HARRIS, E.J.
6804
HASHIHIRA, S.
7078*
HASHIMOTO, K.
6771*
HASSELGREN, P.C.
7047
HATA, Y.
7096*, 7103*
HATTERY, R.R.
6853*
HAUSSLER, E.
6826
HAVELKA, J.
6900
HAVRILLA, T.R.
6854*
HAYS, M.T.
6828*
HAYSLETT, J.P.
7271
HAYT, D.B.
7229
HEATON, K.W.
6947
HECHT, D.W.
7246
HECKER, R.
7031
HEGGE, F.N.
6772*
HEIMANN, P.
7063*

HEIRWEGH, K.P.M.
7135
HELLEMANS, J.
6699
HELLIER, M.D.
6982*
HEMS, D.A.
6761*
HENDERSON, S.C.
7222
HENDRIKS, R.
6830*
HENMI, K.
6679*
HENRICHSEN, L.
6927
HENRIKSEN, F.W.
7013
HENRY, X.
7203*
HERINGTON, A.C.
6796
HERMRECK, A.S.
6963
HERRMANN, M.
6753, 6849
HERSEY, S.J.
6738
HERTZER, N.R.
6956
HETLAND, L.B.
6793
HEUSER, E.T.
7145*
HEYKANTS, J.
6830*
HEYWORTH, M.R.
7064*
HIDAYET, A.M.
7184*
HIDAYET, M.A.
7184*
HIDAYET, N.M.
7184*
HIETANEN, E.
6763*
HIGGINS, G.A.
7247
HILL, D.
6737
HILL, L.M.
7153*
HILLBOM, M.E.
6831*
HINES, C., JR.
6991
HINKEL, G.K.
7166*
HIRSCH, H.C.
7200*
HIRSCH-MARIE, H.
6972
HITCHCOCK, C.T.
6963
HIXON, H.H.
7061
HJELT, K.
6989
HOFFMAN, N.E.
6762*, 7092*
HOFMANN, A.F.
6762*, 7212*
HOGAN, T.F.
6952
HOHENLEITNER, F.J.
6728*
HOLDER, T.M.
7015
HOLDSWORTH, C.D.
7050
HOLLAND, P.V.
7147*
HOLLINGER, F.B.
7160
HOLMES, G.K.T.
6913*
HOLT, R.W.
7221
HONJO, I.
7225
HOEFNAGLE, J.
7167*
HOPFER, U.
6688*
HOPPE-SEYLER, G.
6795
HORAK, J.
6858
HORNE, C.H.W.
6782*
HOSHINO, J.
6767*
HOTHERSALL, J.S.
6715*
HOUSSET, E.
7115*
HULLO, A.
6869
HUMPHRIES, A.W.
6956
HUMPHRIES, T.J.
6708
HUNT, J.H.
6878*
HURVITZ, H.
7042
HUSEMANN, B.
6827
HUSSON, J.M.
7115*
HYLAND, G.
6783*
ICARDI, A.
6896
INOUE, M.
6888
IRETON, H.J.C.
7092*
IRONS, R.P.
7230
ISENBERG, J.I.
6914*
ISENBERG, J.N.
7236
ISHAK, K.G.
7142*
ISHIKAWA, K.
6789
ISRASENA, S.
7111*
ITO, H.
7161
ITOH, S.
6850*
IVANOFF, B.
6842
JACKSON, L.
7091*
JACOBSON, M.P.
7121
JACOBY, H.I.
6739
JACQUESON, A.
6787
JAHNKE, R.W.
7266
JALAN, K.N.
7158
JAMES, A.H.
7284
JAMES, A.M.
6851*
JANSEN, A.
6871
JARMOLYCH, J.
7228
JAUS, H.
6798
JEKIC, M.
7046
JENNY, S.
6887
JENSEN, D.M.
6709
JENSEN, J.
6958
JENSEN, K.B.
6917*
JENSEN, K.M.
7045
JEWEL, K.L.
7038
JEWELL, W.R.
6963
JOFFE, N.
7036
JOHANSEN, A.
6722*
JOHANSSON, C.
6745*
JOHNSON, A.G.
6726*
JOHNSON, J.A.
6919*
JONES, K.G.
6785
JORGE, A.
7149*
JORGE, A.D.
6894
JORGENSON, H.S.
6743
JOUBAUD, F.
7089*

JUNG, C.J.
6727*
JUSSILA, J.
6988
KACHAEVA, L.N.
6924
KADIR, S.
6874*
KADUK, B.
6827
KAHLMETER, G.
7283
KALPOYIANNIS, N.
7134
KALRA, T.M.S.
7118
KALYANARAMAN, U.
7285
KAMADA, T.
7093*
KAMME, C.
7283
KARCZ, D.
6860
KARJALAINEN, P.
6988
KARWOWSKI, A.
6844
KASAI, Y.
7096*, 7103*
KATHER, H.
6735
KATZ, D.
6856*
KAUFMAN, S.L.
6960
KEIGHLEY, M.R.B.
7017, 7202*
KELLETT, M.J.
7054
KEMMER, C.
7166*
KEMPERS, R.D.
7153*
KERZNER, B.
7251
KHRAMKOVA, N.I.
6846
KIBLER, J.
6890
KIESOW, L.A.
6770*
KIJIMA, T.
6888
KIKUCHI, K.
7103*
KIKUCHI, S.
7093*
KIM, E.
7219*
KIMURA, T.
6815*
KINAST, H.
6768*
KINOSHITA, H.
7198*
KINTZEL, J.E.
6916*
KINZLMEIER, H.
6885
KIRCHNER, J.P.
7142*
KIRKPATRICK, J.R.
7016
KIRN, A.
6721, 6786
KISELEV, Y.I.
6909
KISHI, S.
6925
KISHIMOTO, H.
6789
KITAEV, V.V.
6909
KITAGAWA, A.
6955
KITAMURA, Y.
6925
KLEIN, U.E.
7214*
KLETT, U.
6684
KLIMENKO, E.D.
6749
KLIMOV, P.K.
6845
KLOCKARS, M.
7062*
KNIPP, J.
6942*
KNUTRUD, O.
7098*
KOBLER, E.
6887
KOEP, L.
7116*
KOGA, I.
7235
KOLTUSHKINA, G.G.
6823
KONTUREK, S.J.
6711
KOPELOVICH, L.
7032
KORKUSCHKO, O.W.
6748
KOROT'KO, G.F.
6751
KOSLOWSKA, K.
6719
KOSTULAK, A.
6719
KOVALCIK, P.
7277
KRAG, E.
6689*, 6917*
KRALIK, J.
6900
KRAMER, S.
7114*
KRATOCHVIL, P.
6971
KREEL, I.
7023
KREEL, L.
6856*
KREMER, D.
7063*
KRICUN, M.E.
6943
KRISTENSEN, E.M.
6879*
KROGER, H.
6767*
KROL, R.
6711
KRONMAN, J.H.
6716*
KRYSL, I.
6886
KSHIRSAGAR, V.
7020
KUBICKOVA, Z.
6923
KUHNE-HEID, R.
6883
KUHNE, U.
6767*
KUIKEN, L.
7173*
KURCHATOV, M.K.
6924
KUSTRZYCKI, A.
6890
KUTTER, E.
6928
KUTZ, K.
6788
KUZIN, N.M.
6909
L'HEUREUX, P.R.
6945, 7024, 7236
L'HIRONDEL, C.
6940*
LABADARIOS, D.
7190
LABAS, P.
6897
LABURTHE, M.
6820*
LACHANCE, P.A.
6773*, 6774*
LAFONT, H.
6775*
LAI, H.Y.
7012
LAIRON, D.
6775*
LAITINEN, M.
6763*
LAKE, A.M.
7257
LAM, S.K.
7185*
LAM, W.K.
7185*
LAMBERT, R.
6759*, 6901, 6931
LANDOR, J.H.
6740
LANE, R.H.S.
7033
LANTER, B.
7019

LAROSE, L.
6747*
LARSEN, J.K.
6722*
LARSON, S.M.
6772*
LATASTE, J.
7075*, 7077*, 7199*
LAUTT, W.W.
6757*
LEAKEY, J.E.A.
6807
LEE, C.Y.
7039
LEE, J.C.K.
7118
LEE, S.J.
6705
LEE, T.G.
7222
LEFFALL, L.D., JR
7058
LEGER, L.
6697*
LEGOUT, J.
6697*
LEGOUX, M.
6694*
LEGUIT, P., JR.
6975
LEHMANN, H.U.
7165*
LEHTOLA, J.
6724*
LEIBERMAN, D.P.
6755*
LEMAIRE, M.C.
6694*
LENKEI, R.
7090*
LEOPOLD, G.R.
7025
LEPIDI, A.
6821
LEPRINCE, C.
6693*
LESBROS, F.
6901
LEUSCHNER, F.
6849
LEVI, A.J.
7286
LEVINE, E.
7091*
LEVINE, J.B.
7193
LEVITT, R.G.
6855*
LEVY, B.S.
7163
LEVY, J.
7215*
LI, T.K.
6758*
LICASTRO, R.
7124
LICHTIG, C.
7106*
LIEBMAN, W.M.
6741
LIEDTKE, C.M.
6688*
LIFSHITZ, F.
6993
LILLY, J.R.
7088*
LIM, M.S.
7036
LIN, J.I.
6969
LINDENBRATEN, L.D.
7187*
LINDNER, A.
6969
LINDNER, A.E.
6949
LINDSTROM, C.G.
7206*
LING, C.
7155*
LINGUITI, C.M.
6728*
LINSS, W.
6684
LIU, H.Y.
6981*
LIVNI, N.
7181*
LOEWI, G.
7286
LOGAN, R.
7122
LOLUDICE, T.A.
7228
LOMBECK, I.
7252
LONG, S.S.
7253
LONGMIRE, W.P., JR.
7009
LOON, N.
7191
LOPASSO, F.
6934
LORENZ, W.
6736
LOSOWSKY, M.S.
6978*
LOUIS, A.
6754
LOYGUE, J.
6872
LUBER, U.
7065
LUCCIONI, P.
7082
LUKAC, M.
6897
LUMENG, L.
6758*
LUNDGREN, K.D.
6964
LUNDGREN, O.
6832*
LUNN, P.G.
7245
MACCARTY, R.L.
6853*
MACDONALD, I.A.
7280
MACDONALD, J.S.
7242
MACHALSKI, M.
7066
MACHANEK, M.
6768*
MACKENZIE, C.
7251
MACLENNAN, I.C.M.
7064*
MADDEN, D.L.
7146*
MAGE, K.
7208*
MAHALANABIS, D.
7158
MAHLER, D.J.
6772*
MAHNOVSKI, V.
7145*
MAIER, K.P.
6795
MAILLARD, J.N.
6898
MAITRA, T.K.
7158
MAJEKODUNMI, A.E.
7162
MAKINO, N.
6877*
MAKLANSKY, D.
6949
MALKEROVA, N.N.
7071
MALLEGOL, D.
7030
MALLET-GUY, P.
7210*
MALLET-GUY, Y.
7102*
MANGLA, J.C.
7118
MARCHE, C.
6940*, 6972
MARCHETTI, G.
6803
MARCUS, W.M.
7153*
MARGULIS, A.R.
7054
MARIER, G.
6884
MARIETTI, G.
7148*
MARINI, W.
6868
MARKS, C.G.
7055
MARQUARDT, H.
6881
MARSHAK, R.F.
6949
MARTIN, D.
7209*

MARTIN, T.R.
6733, 6734
MARTY, A.T.
6862*
MARUYAMA, Y.
7006
MARZO, A.
6803
MASFERRER SALA, L.
6933
MASON, E.
7272
MASON, G.R.
6698*
MASSA, F.
7072
MASTERS, Y.F.
6730*
MATHE, Z.
6899
MATHIAS, J.R.
7048
MATHIE, R.T.
6755*
MATOLC, N.H.
7027
MATSUDA, M.
6934
MATSUI, Y.
6888
MATSUMOTO, Y.
7225
MATSUOKA, A.
6815*
MATSUURA, K.
7235
MATUCHANSKY, C.
6902
MATURE, J.
7163
MAURICE, M.
7115*
MAY, B.
7201*
MAYER, B.S.
7086*
MAYER, C.J.
6700
MAZANEK, E.
7066
MAZURIN, A.V.
6924
MCANULTY, P.A.
6806
MCCALLUM, R.W.
6709
MCCOLLUM, J.P.K.
7244
MCCONNELL, R.B.
7239
MCCOY, G.D.
7260
MCCREADY, V.R.
6852*
MCGHEE, E.
6755*
MCGIVAN, J.D.
6760*
MCINNIS, W.D.
7207*
MCLEAN, P.
6715*
MCLEISH, A.R.
7017
MCMICHAEL, H.B.
6986
MEANEY, T.F.
6854*
MEEK, E.M.
6834*
MEIER ZU EISSEN, P.
7200*
MEJEAN, C.
6693*
MELANDER, A.
7283
MELNICK, J.L.
7160
MENDES-MOURAO, J.
6760*
MENDES-PEREIRA, E.
6712*
MENDISCVA, A.
6929
MENGUY, R.
6730*
MENUCK, L.
7002*
MERETO, G.C.
7213*
MERGER, C.
7215*
MERLO, L.
6803
MERTENS, B.F.
7121
METILDI, L.A.
7035
MEUWISSEN, J.H.E.T.
7273
MEYER, H.J.
6736
MEYER ZUM BUSCHENFELDE, K.H.
7087*
MICCI, C.
7194
MICHEL, H.
7182*
MICHEL, S.L.
7109*
MICHIELS, M.
6830*
MIDDLETON, P.
7251
MIKHAIL, A.A.
6835*
MIKI, H.
6771*
MIKUS, L.
6780*
MILITAREV, J.M.
7026
MILSOM, J.P.
7171*
MIMURA, T.
6732
MINAIRE, Y.
6905
MINIAILENKO, M.I.
6843
MINKIN, S.D.
7219*
MIR, S.S.
6698*
MIRZA, A.H.
6912*
MITCHELL, C.H.
7258
MITCHELL, C.S., JR.
6912*
MITCHELL, J.R.
7136*
MITCHELL, W.D.
7060
MITROPOL'SKII, A.N.
7068
MITZNEGG, P.
6746*
MODIGLIANI, E.
6941*
MODIGLIANI, R.
6941*
MODIS, L.
6718
MOERTEL, C.G.
7051
MOLLER, B.B.
6958
MOLLER, C.
7062*
MOLLER JENSEN, O.
6879*
MONTARIOL, T.
6898
MOORE, B.F.
6981*
MOORE, D.B.
7022
MORAVEC, R.
6897
MOREIRA, A.
6934
MORENZ, J.
7165*
MORGAN, M.Y.
7171*
MORGENSTERN, L.
7109*
MORICCA, F.
6906
MORIN, M.E.
7125
MORISSET, J.
6747*
MORITA, I.
6794
MORITA, K.
7235
MORKBAK, N.K.
6879*
MORLAND, J.
7174*
MOROZOV, I.A.
6843

MORRIS, A.I. 6710
MORRIS, K.E. 7000*
MORSON, B.C. 7008
MOSIMANN, R. 6939*
MOSLI, P.R. 6802
MOULINIER, B. 6901
MOUSSEAU, R. 7196*
MOWAT, A.P. 7094*
MUKHERJEE, T.M. 7031
MULLEN, J. 7277
MULLEN, J.T. 7233
MULLER, M. 6883
MULLER-WIELAND, K. 7067
MUNCK, O. 6989
MUNDON, F.K. 7146*
MUNK, J.F. 7034
MUNSTER, W. 6873
MURAKAMI, E. 6777*
MUROTA, S.I. 6794
MURRAY-LYON, I.M. 7099*
MURY, B. 7070
MUTO, N. 6732
MYERSON, P.J. 7130
N'GUYEN, R. 7040
NADAL, A. 6933
NAGASAKI, T. 6850*
NAGAYO, T. 6875*
NAGCHAUDHURI, J. 6686*
NAGLER, J. 6997*
NAGY, G.S. 6878*
NAHUM, H. 6973
NAHUM, P. 6973
NAITO, Y. 6797
NAKAO, K. 6955
NAKAO, T. 7161
NAKASE, A. 7225
NAKAYAMA, C. 7235
NAKAZAWA, S. 6797
NALBONE, G. 6775*
NARASINGA RAO, B.S. 6692*
NARVAEZ, R. 7006
NAYLOR, E.W. 7053
NEERHOLT, R.C. 7086*
NEGREL, R. 6817*
NELSON, E.R. 6862*
NEMER, F.D. 7018
NEUVONEN, P.J. 6687*
NEVALAINEN, T.J. 6682*
NEWCOMBE, R.G. 6834*
NEWSTEAD, G. 6852*
NICOLOPOULOS, D. 7134
NIELSEN, I.L. 6958
NIRMUL, D. 7132
NIS, G. 6842
NISHI, S. 7096*
NISHIDA, T. 6777*
NISHIOKA, K. 6999*
NITSCHE, J. 7066
NORDGARD, K. 7063*
NORREDAM, K. 7101*
NOUSIA-ARVANITAKIS, S. 7127
NOVAK, B. 6858
NOVY, S.B. 7045
NUESCH, H.J. 6887
NUMAGUCHI, Y.N. 7235
NYFORS, A. 7139*
NYLANDER, B. 6745*
O'BRIEN, M.J. 7112*
O'CONNELL, M.J. 7051
O'DONNELL, W.W. 7045
O'DONOGHUE, D.P. 7276*, 7287
O'HARA, V.S. 7039
O'LEARY, J.P. 6965
O'MAILLE, E.R.L. 6784
O'NEIL, M.B. 7022
ODDSSON, E. 6689*
OH, K.S. 7113*
OHRADKA, B. 6897
OKA, Y. 6955
OKAZAKI, N. 7097*
OLDAG, D. 6873
OLIARO, A. 7072
OLU MABAYOJE, J. 7162
ONG, G.B. 7185*
ONISHI, N. 6732
ONSTAD, A. 7076*
ONUIGBO, W.I.B. 7237
OPITZ, K. 6974
ORCHARD, R. 6726*
ORITSU, S. 6888
ORLANDO, R.C. 6703
ORMSBEE, H.S., III 6698*
ORNSHOLT, J. 6743
ORR, J.M. 6884
OSHITA, H. 6732
OSHIUMI, Y. 7235
OSSINO, C. 6935
OTSUKI, M. 6744*
OTTO, H.F. 7067
OVERTURF, G.D. 7248
OYE, I. 6814*
OZMENT, E.C., JR. 7220*

PAGLIARO, L.
7151*
PAIS, M.J.
6943
PALMER, R.D.
7159
PAPP, J.
6899
PAPPO, R.
6727*
PARK, J.
7122
PARKINS, R.A.
6726*
PARKS, A.G.
7033
PARRISH, R.M.
7128
PARTENSKY, C.
6905, 6931, 7102*
PASQUIER, P.
6937, 6938
PASSOUANT, P.
7182*
PATEL, C.C.
7265
PATEL, H.
7229
PATEL, J.C.
6697*
PAUMGARTNER, G.
7105*
PAVELKA, M.
6695
PEDERSEN, H.
6927
PEDERSEN, T
6722*
PELLEGRINO, J.
6790
PENA-AGUILAR, M.T.
7263
PENTIKAINEN, P.J.
6687*
PEREIRA, L.H.
6790
PERERA, H.
6983
PEREZ-ELIZALDE, R.
7149*
PERLBERGER, R.R.
7120
PERROT, E.
6869
PERSIGEHL, M.
7197*
PETERSON, W.L.
6914*
PETZOLD,, H.
7177*
PEYROL, S.
6759*
PHANEUF, D.
7157*
PHILLIPS, C.A.
7279
PICATOSTE, R.
6894
PIMBLETT, K.A.
6710
PION, R.
6712*, 6713*
PIPER, D.W.
6880
PIRSON, Y.
6759*
PLADSON, T.R.
7128
PLUMB, J.A.
6804
POCOCK, S.J.
7060
PODKOWICZ, K.
6750
POLAK, L.L.
6936
POLEYNARD, G.C.
6862*
POLLACK, R.
7032
POLLARD, E.
6737
POLOSATOV, M.V.
6845
POLTORAK, J.L.
6861
PONETTE, E.
7083
POPIELA, T.
6860
POPOV, C.S.
6836*
POPOVICI, Z.
6681*
POPPE, S.
6826
POROKHNIA, N.P.
7068
PORTER, P.
6818*
POSO, A.R.
6831*
POSTOLOV, P.M.
6909
POTTAGE, A.
7122
POULSEN, S.S.
6742
POURRIAT, J.L.
6697*
POWELL, D.W.
6703
PRESCOTT, L.F.
7084*
PRESSER, D.H.
7145*
PRESTON, F.E.
7050
PREZYNA, A.P.
7285
PRICE, M.R.
6800
PRIDGEN, J.E., JR.
7207*
PRINGOT, J.
7083
PROBSTHAIN, A.R.
7166*
PROTASEVITSCH, N.N.
7026
PROTELL, R.L.
6733
PRUGNAUD, J.
6712*
PRYOR, A.C.
7126
PUGH, S.F.
7286
PULATOV, A.S.
6822
PUTNAM, C.W.
7116*
RAFLA, A.
7249
RAGLAND, J.B.
7173*
RAHBEK, I.
6917*
RAIA, A.A.
6934
RAINSFORD, K.D.
7250
RAKHIMOV, K.R.
6824
RAKOWSKA, M.
6696
RAMBAUD, J.C.
6902
RAMENOFSKY, M.L.
7255
RAMSAY, L.
7091*
RANDOLPH, M.F.
7000*
RANSOME-KUTI, C.
6990
RASK-MADSEN, J.
6689*, 6917*
RASMUSSEN, P.A.
6989
RATTAN, S.
6707
RAUGSTAD, T.S.
7063*
READ, L.
7004
REDDY, B.S.
7260
REGEZI, J.A.
7240, 7241
REICH, H.
6974
REILLY, R.R.
6862*
REIMANN, H.J.
6736
REINHARDT, G.F.
7180*
REITAMO, J.J.
7062*
REITAMO, S.
7062*
RENGER, F.
7165*

RENOUX, G.
7275*
RESS, W.D.W.
6834*
REUTER, A.
6928
REYNOLDS, B.
7229
REYNOLDS, E.S.
6811
REYNOLDS, K.
6726*
RHATIGAN, R.M.
7052
RHODES, J.
6834*
RIBET, A.
6754
RICE, G.C.
6755*
RICH, M.
7059
RICHARDSON, C.T.
6914*
RICHER, G.
7157*
RICHLIN, D.M.
7138*
RICKHAM, P.P.
6961
RIMOIN, D.L.
6911*
RINELLA, P.
6935
RING, E.J.
6756*
RINGHEIM, F.
7063*
RIOTTOT, M.
6693*
RITCHIE, J.K.
7055
RITTMANN, K.
6848
RIVER, E.
7159
RIZZETTO, M.
7049, 7156*
ROBERT, D.
6842
ROBERTS, E.E.
6731, 6829*
ROBERTS, G.M.
6731, 6829*
ROBERTSON, K.
6979*, 6996
ROBINETTE, C.D.
7188*
ROBINSON, R.G.
7145*
ROBINSON, S.H.
7229
ROCHWARGER, A.M.
6997*
ROESSNER, A.
6847
ROMEN, W.
6798
ROMSDAHL, M.M.
6999*
ROSALKI, S.B.
7172*
ROSCH, J.
7086*
ROSCHLAU, G.
7166*
ROSEN, Y.
7192
ROSENBERG, I.H.
6987
ROSSANDER, L.
6691*
ROSSELIN, G.
6820*
ROSSI, I.
7189*
ROSTENBERG, I.
7263
ROTTER, J.I.
6911*
ROTTHAUWE, H.W.
6985
ROUSSOUW, J.E.
7190
ROUX, G.
6781*
ROWLAND, M.G.M.
7244
ROZIN, D.G.
6751
RUBIN, J.
7051
RUBULIS, A.
6942*
RUCKERT, K.
7218*
RUCKERT, R.
7217*
RUDINSKAYA, T.D.
6846
RUFINO, F.
6881
RUOFF, H.J.
6723*
RUTISHAUSER, I.
7245
RUTKOWSKA, U.
6696
RYAN, C.J.
6755*
RYAN, F.P.
7050
RYDER, R.W.
7272
RYSS, E.S.
6922
SABESIN, S.M.
7173*
SACQUET, E.
6693*
SADO, T.
6771*
SADYKOV, B.A.
6824
SAEKI, S.
6744*
SAFFOS, R.C.
7052
SAFRANY, L.
6899
SAGEL, S.S.
6855*
SAGLIOCCO, M.
6930
SAHA, S.P.
7230
SAITO, M.
6777*
SAKAKIBARA, A.
6815*
SAKUDA, D.H.
7123
SALEMBIER, Y.
7204*
SALIK, J.O.
7219*
SALOMON, F.
6779*
SALTZMAN, D.B.
7138*
SAMA, S.K.
7169
SAMLOFF, I.M.
6741
SANCHEZ, D.
7149*
SANDERSON, J.
7060
SANTIAGO, S.M., JR.
7175
SARLES, H.
6752
SARLES, J.C.
7040
SARNA, S.K.
6706
SASSIER, P.
6813*
SAUBERLI, R.
6887
SAUBIER, E.C.
6905, 7102*
SAUNDERS, J.H.B.
6915*
SAVTSCHENKO, A.P.
7187*
SAWYERS, J.L.
6918*
SCARANO, V.R.
7037
SCHAFFALITZKY DE MUCKADELL,
O.B6819*
SCHEIBLE, W.
7025
SCHEIN, P.S.
7242
SCHERRER, A.
6973
SCHILLER, M.
7042
SCHIMMELPFENNIG, W.
7095*
SCHIPPER, H.L.
6884

SCHJONSBY, H.
7063*
SCHMAL, A.
6736
SCHMIDT, G.
6928
SCHMIDT, H.D.
7205*, 7216*, 7217*
SCHNEIDER, S.
6939*
SCHOLLMEYER, P.
6795
SCHUBEL, B.
6873
SCHULTE, A.
6788
SCHULZE, K.
6701
SCHUMANN, Z.
6848
SCHUTT, A.J.
7051
SCHUTTE, A.G.
7020
SCHWARTZ, S.
7118
SCOTT, B.B.
6978*
SCOTT, G.
6964
SCOTT, W.W., JR.
7267
SCOTTI, D.M.
6943
SEAMAN, W.B.
6968
SEEFF, L.B.
7167*
SEGAL, A.W.
7286
SEGGIE, J.
7191
SEGOVIA, J.M.
7189*
SEIFERT, E.
7201*
SEIGNEURIC, C.
7183*
SEITZ, W.
7218*
SEKI, H.
6925
SENEWIRATNE, B.
6983
SERPAULT, P.
7077*
SERRERO, G.
6817*
SEWELL, R.B.
7092*
SHARMA, R.K.
6686*
SHARP, H.L.
7236
SHEEDY, P.F.
6853*
SHEEHAN, B.A.
6756*
SHEFT, D.J.
6950
SHENKMAN, N.S.
6749
SHEPPARD, M.C.
6913*
SHERLOCK, S.
7170, 7171*
SHERMAN, C.D.
6942*
SHEVCHENKO, B.F.
6892
SHINNERS, J.
6880
SHIOSAKA, S.
6815*
SHIRAHA, Y.
7198*
SHUPPE, N.G.
6839
SIDDIQI, M.
6809
SIEBERT, G.
6798
SIEGELMAN, S.S.
6960, 7267
SILVERBERG, M.
7164
SILVERSTEIN, F.E.
6733
SILVIS, S.E.
6734
SIMEK, L.
6897
SIMEON, B.
6903
SIMMONDS, R.J.
6851*
SIMMONS, J.T.
6756*
SIMON, B.
6735
SIMSON, J.A.V.
6717*
SIMSTEIN, L.
7277
SINATRA, F.R.
7258
SINGH, A.
7057
SINGH, D.S.
7169
SINGH, G.
7169
SINGH, R.
7057
SIPPONEN, P.
6724*
SIVA PRASAD, J.
6692*
SJOGREN, H.O.
7003
SKIELLO, G.
6767*
SKOVGAARD, S.
6920*
SLOMIANY, A.
6725*
SLOMIANY, B.L.
6725*
SMALLWOOD, R.A.
7092*
SMITH, A.L.
7094*
SMITH, J.N.
7176
SMITH, R.N.
7005
SMITH, S.Z.
6951
SMITH, W.G.
7048
SOBUE, K.
6797
SOEHENDRA, N.
6857, 7195*
SOKOLOV, L.K.
7071
SONSINO, E.
6972
SOTER, C.S.
7036
SPANO, C.
7151*
SPENCE, J.T.
6791
SPIRICHEV, V.B.
6839
SPIVAK, V.P.
6892
SPOTTI, D.
6868
SRIVASTAVA, U.
6765*
STANDAERT, L.O.
7179*
STANLEY, M.M.
7180*
STANLEY, R.J.
6855*
STARZL, T.E.
7116*
STATON, A.J.
6770*
STEELE, M.
7028
STEIGMANN, F.
7155*
STEIN, T.
6783*
STEPHENS, D.H.
6853*
STERN, G.
7019
STILLGER, E.
7197*
STOCKINGER, L.
6695
STOECKINGER, J.M.
7018
STONE, J.
7031
STOPPA, R.
7203*
STORCH, W.
7152*, 7177*

STOTZNER, H.
7166*
STRAY, O.
7063*
STRIFE, J.L.
7113*
STUBY, K.
7073
STURDEVANT, R.A.L.
6911*, 6914*
STURM, G.
6798
SUAREZ, P.
7263
SUEMATSU, T.
7093*
SUGA, S.
6877*
SUMITHRAN, E.
7154*
SUN, D.C.H.
6912*
SUNDSTROM, C.
7047
SUNG, J.P.
7039
SUNSHINE, P.
7258
SUZUKI, H.
6771*, 6875*
SVENDSEN, L.B.
6722*
SWEENEY, G.D.
6785
SWENSON, R.M.
7253
SZABO, A.C.
6704
SZABO, S.
6742
SZKILLADZIOWA, W.
6696
SZKLARZ, E.
6936
TABUCHI, K.
7104*
TAKAYAMA, M.
6850*
TAKEMURA, T.
6888
TAKENAKA, M.
7080
TALLETT, S.
7251
TAMURA, Z.
6877*
TANAKA, I.
6888
TANAKA, J.
6732
TANDLER, B.
7269
TANIMIZU, I.
6850*
TARQUINI, B.
7178*
TASSI, G.C.
7049
TASWELL, H.F.
7153*
TAUSCHEL, H.D.
6753
TAYLOR, D.M.
6852*
TAYLOR, S.A.
7056
TEDESCHI, M.V.
6810
TEELE, R.
7113*
TELISCHI, M.
7155*
TERASAKI, P.
6911*
TERESCHTSCHENKO, W.P.
6748
TERRIS, G.
6926
THALER, H.
7137*
THAMBIPILLAI, S.
6983
THANGAPREGASSAM, M.J.
6779*
THEMANN, H.
6847
THEORET, G.
6765*
THEVENIN, M.
6787
THOENI, R.F.
7002*
THOMA, R.
6903
THOMAS, A.J.
6761*
THOMAS, C.
6739
THOMAS, E.
7194
THOMAS, G.E.
7191
THOMPSON, H.R.
7055
THOMSON, A.W.
6782*
THOR, P.J.
6711
THOUVENOT, J.
6694*
TIMPERLEY, W.R.
7050
TIMPL, R.
6994
TISSOT, E.
6937, 6938
TODANI, T.
7104*
TODD, G.J.
6864*
TOLENTINO, M.
7020
TOMMASI, S.
7178*
TOOTHILL, C.
6978*
TOSELLI, M.
7156*
TOUILLON, C.
6759*
TOURNUT, R.
6882
TRAGL, K.H.
6768*
TRAVIS, L.W.
7246
TRITTO, V.A.
7081
TRUEDSON, H.
7223
TRUELOVE, S.C.
7064*
TRUHAUT, R.
6787
TSIMMERMAN, Y.S.
6859
TSUDA, Y.
7198*
TSUNEKAWA, H.
6877*
TSUTSUMI, A.
7104*
TUBBS, R.
6854*
TULASSAY, Z.
6899
TURELLO, V.
6896
TURGANBAEV, A.
6870
TURKEL, S.B.
7248
TURNBERG, L.A.
6710
TURNER, K.S.
6703
TURNER, R.C.
6714*
TYTGAT, G.N.
6975
UCHIDA, K.
7225
UCHIDA, Y.
6847
UCHINO, J.
7096*, 7103*
UEDA, K.
6955
UENO, I.
6792
UFBERG, M.H.
6916*
UGOLEV, A.M.
6823, 6838
URSING, B.
7283
USPENSKY, V.M.
6685
V. TONGEREN, J.H.M.
7273
VADALA, G.
6932
VAINSHTEIN, S.G.
6893

VAN HUSEN, N.
6847
VAN LANGENBERG, A.
7021
VAN ROSSUM, J.M.
6769*
VAN URK, H.
7120
VANDOOREN, M.
7275*
VANTRAPPEN, G.
6699, 7279
VAVROS, B.
6900
VEGLIC, V.
7148*
VEITH, N.M.
6796
VERHOEVEN, A.G.M.
6975
VERME, G.
7156*
VERRENGIA, L.
6930
VESELY, K.T.
6923
VIALLET, A.
7157*
VIDER, M.
7006
VIGNAL, J.
6937, 6938
VIJAYA SARATHY, C.
6692*
VISCONTI, G.P.
6868
VOS, L.J.M.
7069
VU NGOC HUYEN
6781*
VUOJCLAHTI, P.
6988
WACHSMUTH, I.K.
7272
WACK, R.
7095*
WAHID, H.A.
7184*
WAHNER, H.W.
6853*
WAICKMAN, F.J.
6984
WAKABAYASHI, A.
7078*
WAKABAYASHI, T.
6789
WALIKE, B.C.
6980*
WALIKE, J.W.
6980*
WALKER, W.A.
7088*, 7257
WALSH, J.H.
6709
WALTMAN, A.C.
6756*
WANTUCH, C.
6729*
WARD-MCQUAID, J.N.
7231
WARNET, J.M.
6787
WARWICK, W.J.
7236
WASHBURN, J.W.
7163
WASHINO, M.
6877*
WATANABE, Y.
7104*
WATANANUKUL, P.
7111*
WATERFALL, W.E.
6706
WATNE, A.L.
7012
WATT-BOCLSEN, S.
7268
WATTS, M.A.
7233
WEAVER, R.M.
7045
WEBB, G.B.
7280
WEBER, H.P.
6985
WEIHRAUCH, T.R.
6702
WEINBERGER, H.A.
6957
WEINER, E.
7019
WEISBRODT, N.W.
6705
WEISBURGER, J.H.
6881, 7260
WEISS, H.
6793
WEISS, M.
7277
WEISSBERG, D.L.
7025
WERKMAN, H.P.T.
7273
WERNER, B.
6857
WERTKIN, M.G.
7023
WEXLER, M.J.
7186*
WHEELER, M.H.
6834*
WHICHER, J.T.
6977*
WHITCOMB, F.F.
7168
WHITE, J.F.
6690*
WHITEHEAD, R.G.
7245
WHITTON, P.D.
6761*
WICK, G.
6994
WICKS, A.C.B.
7191
WIEGLEB, J.
6849
WILKINSON, A.
7226
WILLIAMS, C.N.
7280
WILLIAMS, G.C.
6766*
WILLIAMS, G.M.
7260
WILLIAMS, J.A.
6683*
WILLIAMS, J.P.G.
6806
WILLIAMS, R.
7094*, 7099*, 7117*, 7141*,
7190
WILLIAMS, R.B.
6805
WILLIAMSON, D.H.
6714*, 7108*
WILLS, J.
7138*
WILSON, R.J.
6966
WISE, L.
6783*
WISHART, G.J.
6807
WITTE, S.
6976
WITTING, U.
6847
WOGAN, G.N.
7100*
WOJNAR, J.
7066
WOJTACHA-WENCEL, B.
7066
WOLFF, G.
6891
WOLFMAN, E.F., JR.
7027
WOOD, J.
6701
WOOD, J.D.
6700
WORK, W.P.
7259
WORMSLEY, K.G.
6915*
WRIGHT, N.A.
6876*
WULFF, H.R.
6927
WYNDER, E.L.
7260
WYNNE, J.M.
6962
YAGI, K.
7093*
YAKIMENKO, E.F.
6846
YAMADA, K.
6797
YAMAMOTO, Y.
6797

YAMASE, H.
  6797
YAMASHIRU, K.
  6875*
YANTCHEV, I.
  6836*
YAW, P.B.
  7005
YEH, S.D.J.
  6998*
YIH, T.D.
  6769*
YOSHICA, A.
  6815*
YOSHICA, T.
  6771*, 7097*
YOSHINO, M.
  7097*
YCLNG, B.W.
  6805
YOUSUFZAI, S.Y.K.
  6809
YUU, H.
  6744*
ZALEWSKI, J.
  6750, 7066
ZASTRCW, R.
  7074
ZBORALSKE, F.F.
  7054
ZEMBALA, M.
  6890
ZIKRIA, B.A.
  6864*
ZIMMERMAN, H.B.
  7095*
ZITTCUN, J.
  6902
ZUGEHCR, M.
  7165*
ZYMALSKA, J.
  6890

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

- ABDOMEN
  - ULTRASONOGRAPHY, 7270

- ABSORPTION
  - ALKALOIDS, 6803
  - ANEMIA, PERNICIOUS
    - VITAMIN B12, 6989
  - ANTIBIOTICS
    - FOOD, 6687*
  - BILE ACIDS AND SALTS
    - DIET, 6693*
    - MICROORGANISMS, 6693*
  - CARBOHYDRATES
    - CHILD, 6993
    - REVIEW, 6986
  - COENZYMES
    - REVIEW, 6987
  - COLON
    - SODIUM, 6816*
  - DIARRHEA
    - SODIUM, 6816*
  - DIET
    - IRON, 6692*
  - DRUG EFFECTS ON
    - ANTIBIOTICS, 6825
    - HISTAMINE, 6825
  - FOLIC ACID
    - REVIEW, 6987
  - GLUCOSE
    - DRUG EFFECTS ON, 6825
  - INTESTINE, SMALL
    - AMINO ACIDS, 6686*
    - CELLS, 6690*
    - DRUG EFFECTS ON, 6825
    - GLUCOSE, 6825
  - INTESTINES
    - FATS, 6695
  - IRON
    - DIETARY FACTORS, 6691*

- ACHALASIA
  - ESOPHAGUS
    - SURGERY, 6872

- ACHLORHYDRIA
  - MORPHOLOGY, 6885

- ACID SECRETION
  - SEE ALSO HYPERCHLORHYDRIA, SECRETION
  - DRUG EFFECTS ON
    - H2 RECEPTOR ANTAGONISTS, 6915*
  - DUODENUM
    - ULCER, PEPTIC, 6926
  - GASTRITIS, 6722*
    - CELLS, 6896
  - STOMACH
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6738
    - AMINO ACIDS, 6740
    - ATROPINE, 6729*
    - BARIUM, 6731
    - CELLS, 6738
    - DRUG EFFECTS ON, 6737, 6915*
    - H2 RECEPTOR ANTAGONISTS, 6915*
    - HORMONE EFFECTS ON, 6727*, 6740, 6743
    - PARASYMPATHOLYTICS, 6737
    - PENTAGASTRIN, 6743
    - PROSTAGLANDINS, 6727*

- ACID SECRETION (continued)
  - STOMACH (continued)
    - SECRETION, 6739
    - SEROTONIN, 6729*
    - ULCER, PEPTIC, 6926
    - VAGOTOMY, 6743
  - STOMACH DISEASES, 6722*
  - ULCER
    - BACTERIA, 6732

- ACIDITY
  - DUODENUM
    - SECRETIN, 6819*

- ACIDS
  - FATTY LIVER
    - HYPOLIPEMIC AGENTS, 6809
  - LIVER
    - CHOLESTEROL, 6808
    - PHOSPHOLIPIDS, 6808
    - TRIGLYCERIDES, 6808
  - OBESITY
    - SURGERY, 6942*

- ACRODERMATITIS
  - DRUG THERAPY
    - ZINC, 6974

- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - GLUCONEOGENESIS
    - ADENOSINE TRIPHOSPHATE, 6804
  - INTESTINE, SMALL
    - DRUG EFFECTS ON, 6814*
  - JEJUNUM
    - DRUG EFFECTS ON, 6814*
  - LIVER
    - GLUCONEOGENESIS, 6804
    - VITAMIN C, 6765*
  - PROTEINS
    - SYNTHESIS, 6768*
  - STOMACH
    - ACID SECRETION, 6738
    - ADRENERGIC RECEPTOR AGONISTS, 6723*
    - ADRENERGIC RECEPTOR BLOCKADERS, 6723*

- ADENOSINE TRIPHOSPHATASE
  - COLON
    - BILE ACIDS AND SALTS, 6816*
  - ULCER
    - STRESS, 6730*

- ADENOSINE TRIPHOSPHATE
  - GLUCONEOGENESIS
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6804
    - GLUCAGON, 6804

- ADENYL CYCLASE
  - STOMACH
    - SECRETION, 6735

- ADOLESCENCE
  - CHOLELITHIASIS
    - RESPIRATORY SYSTEM, 7221
  - INFLAMMATORY BOWEL DISEASES
    - ENDOCRINE DISEASES, 7287

ADRENERGIC RECEPTOR AGONISTS
  ODDI'S SPHINCTER
    MOTILITY, 6848
  STOMACH
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*
    GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*

ADRENERGIC RECEPTOR BLOCKADERS
  STOMACH
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*
    GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*

AFLATOXINS
  LIVER
    NEOPLASMS, 7100*

ALBUMINS
  BILIRUBIN
    BINDING, 6764*
    FATTY ACIDS, 6764*
  FATTY ACIDS
    BINDING, 6764*
  GASTRECTOMY
    METABOLISM, 6910
  HEPATITIS, CHRONIC
    ANTIBODIES, 7090*
  LIVER CIRRHOSIS
    ANTIBODIES, 7090*
  LIVER DISEASES
    ANTIBODIES, 7090*

ALCOHOLISM
  DIAGNOSIS
    AMINO ACIDS, 7171*
    PLASMA, 7171*
  ENZYMES
    REVIEW, 7172

ALCOHOLS
  ANTILIPEMIC AGENTS
    DRUG EFFECTS ON, 6831
  LIVER
    FIBROSIS, 7139*
    METABOLISM, 7174*
    MORPHOLOGY, 7174*
  LIVER CIRRHOSIS, 7191
    DRUG-INDUCED, 7139*

ALKALOIDS
  ABSORPTION, 6803
  EXCRETION, 6803
  INTESTINAL ABSORPTION
    AMINO ACIDS, 6686*

ALPHA 1 ANTITRYPSIN
  DEFICIENCY
    DISEASES ASSOCIATED WITH, 7119
  LIVER
    DEFICIENCY, 7119

ALPHA-CHAIN DISEASE
  INTESTINE, SMALL
    LYMPHOMA, 6977*

ALPHA-CHAIN DISEASE (continued)
  LYMPHOMA
    DIAGNOSIS, 6977*
  MALABSORPTION SYNDROMES, 6977*
    DIAGNOSIS, 6977*

ALPHA FETOPROTEIN
  CELLS
    ULTRASTRUCTURE, 6759*
  HEPATITIS, INFECTIOUS
    RADIOIMMUNOASSAY, 7089*
  LIVER
    NEOPLASMS, 7089*, 7096*, 7104*
    ULTRASTRUCTURE, 6759*
  LIVER CIRRHOSIS
    RADIOIMMUNOASSAY, 7089*
  STOMACH
    NEOPLASMS, 7089*
  URINARY SYSTEM
    NEOPLASMS, 7131

AMEBIASIS
  EPIDEMIOLOGY
    TRANSMISSION, 7274

AMINES
  COLON
    GARDNER'S SYNDROME, 6999*
    NEOPLASMS, 6999*
  DUODENUM
    MORPHOLOGY, 6742
    ULCER, 6742
  ESOPHAGUS
    MOTILITY, 6707
    SPHINCTER, 6707
  RECTUM
    GARDNER'S SYNDROME, 6999*
    NEOPLASMS, 6999*
  SYNTHESIS
    NUTRITION, 6806

AMINO ACIDS
  ALCOHOLISM
    DIAGNOSIS, 7171*
  AMINO TRANSFERASES
    TRANSPORT, 6758*
  CHEMICAL COMPOSITION
    FECES, 6713*
  DIET
    DEFICIENCY, 6815*
  DIGESTION
    DIET, 6712*
  HEPATOCYTES
    TRANSPORT, 6760*
  INTESTINAL ABSORPTION
    ALKALOIDS, 6686*
  INTESTINE, SMALL
    ABSORPTION, 6686*
    ENZYMES, 6815*
  KIDNEYS
    SYNTHESIS, 6777*
  LIVER
    METABOLISM, 6761*
    PERFUSION, 6761*
    PROTEINS, 6761*
    SYNTHESIS, 6777*
  LIVER INJURY
    DIAGNOSIS, 7171*
  STOMACH
    ACID SECRETION, 6740

- AMINO ACIDS (continued)
  - SYNTHESIS
    - DIETARY FACTORS, 6777*
  - TRANSPORT
    - LIVER, 6758*

- AMINO TRANSFERASES
  - AMINO ACIDS
    - TRANSPORT, 6758*

- AMMONIA
  - LIVER DISEASES
    - KERNICTERUS, 7182*

- AMYLASES
  - BLOOD, 6822
  - INTESTINE, SMALL, 6823
    - SECRETION, 6822
  - SALIVARY GLANDS
    - DENTISTRY, 6716*
  - SERUM
    - AGE FACTORS, 6744*
    - CHILD, 6744*
    - INFANT, 6744*
  - URINE
    - AGE FACTORS, 6744*
    - CHILD, 6744*
    - INFANT, 6744*

- ANALGESICS AND ANTIPYRETICS
  - DUODENUM
    - MORPHOLOGY, 6884
  - LIVER DISEASES
    - DRUG METABOLISM, 7084*
  - STOMACH
    - MORPHOLOGY, 6884

- ANDROGENS
  - FATTY LIVER
    - FUNGI, 6787
    - METALS, 6787

- ANEMIA
  - IRON
    - DEFICIENCY, 6696
    - METABOLISM, 6696

- ANEMIA, APLASTIC
  - DISEASES ASSOCIATED WITH, 7111*
  - LIVER
    - NECROSIS, 7111*

- ANEMIA, PERNICIOUS
  - VITAMIN B12
    - ABSORPTION, 6939
    - RADIONUCLIDES, 6989

- ANEMIA, SICKLE CELL
  - COMPLICATIONS
    - HYPERBILIRUBINEMIA, 7133*
  - HYPERBILIRUBINEMIA
    - PROGNOSIS, 7133*

- ANESTHESIA
  - HEMORRHAGE
    - VASOPRESSIN, 6874*
  - STOMACH
    - SEROTONIN, 6728*

- ANEURYSM
  - DISEASES ASSOCIATED WITH
    - HEPATITIS, 7138*
  - HEMATOBILIA
    - BLEEDING, 7129
  - LIVER
    - DISEASES ASSOCIATED WITH, 7138*
    - DRUG-INDUCED, 7138*
    - HEPATITIS, 7138*

- ANGIOGRAPHY
  - CIRCULATION
    - NEOPLASMS, 7267
  - COLON
    - CIRCULATION, 6681*
  - HEMATOBILIA
    - DIAGNOSIS, 7120
    - THERAPY, 7120
  - HEPATITIS
    - CHILD, 7086*
  - INTESTINE, SMALL
    - NECROSIS, 6960
  - LIVER CIRRHOSIS
    - CHILD, 7086*
  - LIVER DISEASES
    - CHILD, 7086*
    - NEOPLASMS, 7086*
  - PANCREATIC DISEASES
    - DIAGNOSIS, 7070
    - TOMOGRAPHY, 6854*
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 7083

- ANOMALY
  - ANORECTUM
    - COLON, 7057
  - GALLBLADDER
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - ILEUM
    - UROGENITAL SYSTEM, 6970
  - KIDNEYS
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - LIVER
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - STOMACH
    - ENDOSCOPY, 7072
    - RADIOLOGY, 7072
    - SURGERY, 7072

- ANOMALY, CONGENITAL
  - CARDIOVASCULAR SYSTEM
    - DEGLUTITION DISORDERS, 6873
  - LIVER, 7113*

- ANORECTUM
  - SEE ALSO ANUS, RECTUM
  - COLON
    - ANOMALY, 7057

- ANTACIDS
  - ULCER, PEPTIC
    - DRUG THERAPY, 6914*

- ANTI-INFLAMMATORY AGENTS
  - FATTY LIVER
    - DRUG THERAPY, 7121
  - LIVER
    - GRANULOMA, 7142*
  - LIVER INJURY
    - DRUG-INDUCED, 7142*
  - STOMACH
    - MORPHOLOGY, 6724*
  - TOXICITY
    - PREVENTION, 7250

- ANTIBIOTICS
  - ABSORPTION
    - DRUG EFFECTS ON, 6825
    - FOOD, 6687*
  - BILIARY TRACT
    - BACTERIAL INFECTIONS, 7202*
  - COLITIS
    - CHILD, 7000*
    - DRUG-INDUCED, 7000*
  - COLON
    - SEPSIS, 7017
  - INTESTINE, LARGE
    - SURGERY, 7056

- ANTIBODIES
  - CELIAC DISEASE
    - CHILD, 6994
  - HEPATITIS
    - ETHNIC FACTORS, 7157*
  - HEPATITIS, CHRONIC
    - ALBUMINS, 7090*
    - DIAGNOSIS, 7165*
  - HEPATITIS, INFECTIOUS
    - ETHNIC FACTORS, 7157*
  - LIVER CIRRHOSIS
    - ALBUMINS, 7090*
    - DIAGNOSIS, 7165*
  - LIVER DISEASES
    - ALBUMINS, 7090*
    - DIAGNOSIS, 7165*
    - MITOCHONDRIA, 7177*

- ANTIDIARRHEALS
  - RADIOIMMUNOASSAY
    - TECHNIQUES, 6830*

- ANTIGENS
  - DUODENUM
    - ULCER, PEPTIC, 6911*
  - HEPATITIS
    - ETHNIC FACTORS, 7157*
  - HEPATITIS, INFECTIOUS
    - BIOPSY, 7156*
    - BLOOD, 7150*
    - DIAGNOSIS, 7150*
    - ETHNIC FACTORS, 7157*
    - HEPATITIS, CHRONIC, 7156*
    - LIVER, 7150*
    - PROGNOSIS, 7150*
  - HEPATOCYTES
    - MEMBRANES, 6846
  - ULCER, PEPTIC
    - ETIOLOGY, 6911*
    - GENETIC FACTORS, 6911*

- ANTISPASMODICS
  - SEE ALSO PARASYMPATHOLYTICS

- ANUS
  - SEE ALSO ANORECTUM, RECTUM
  - COLON
    - NEOPLASMS, 7019
  - CYSTS
    - SURGERY, 7055
  - INTEGUMENTARY SYSTEM
    - NEOPLASMS, 7011
  - PAGET'S DISEASE, 7020
  - SPHINCTER
    - SURGERY, 7033

- APPENDICITIS
  - APPENDIX
    - GASES, 7036
  - CECUM
    - NEOPLASMS, BENIGN, 7034
  - LAPAROTOMY
    - CROHN'S DISEASE, 7277

- APPENDIX
  - GASES
    - APPENDICITIS, 7036

- ASCITES
  - LIVER CIRRHOSIS
    - THERAPY, 7179*
  - LIVER DISEASES, ALCOHOLIC
    - SHUNT, 7180*
  - SHUNT
    - THERAPY, 7180*

- ASPIRIN
  - DUODENUM
    - MORPHOLOGY, 6884
  - STOMACH
    - MORPHOLOGY, 6884

- ATRESIA
  - COLON, 7037
  - INTESTINES
    - FISSURE, 7015
  - STOMACH
    - FISSURE, 7015

- ATROPHY
  - PANCREAS, 6749

- ATROPINE
  - STOMACH
    - ACID SECRETION, 6729*
    - PEPSIN, 6729*
    - SECRETION, 6729*

- AUSTRALIA ANTIGEN
  - CHOLESTASIS
    - IMMUNITY, 7151*
  - HEPATITIS, CHRONIC
    - BIOPSY, 7152*
    - IMMUNITY, 7151*
  - HEPATITIS, INFECTIOUS
    - BIOPSY, 7152*, 7156*
    - BLOOD, 7150*
    - CHILD, 7161
    - DIAGNOSIS, 7150*
    - EPIDEMIOLOGY, 7162, 7163
    - HEPATITIS, CHRONIC, 7156*
    - IMMUNOLOGY, 7164

- AUSTRALIA ANTIGEN (continued)
  - HEPATITIS, INFECTIOUS (continued)
    - LIVER, 7150*
    - REVIEW, 7164
    - TRANSMISSION, 7164
  - HISTOCHEMISTRY
    - TECHNIQUES, 7154*
  - LIVER
    - HISTOCHEMISTRY, 7154*
    - NEOPLASMS, 7151*
  - LIVER CIRRHOSIS
    - BIOPSY, 7152*
    - IMMUNITY, 7151*
  - LIVER DISEASES
    - BIOPSY, 7152*
  - OCCUPATIONAL FACTORS
    - EPIDEMIOLOGY, 7155
  - TRANSMISSION
    - PREGNANCY, 7153*

- BACTERIA
  - CECUM, 6680*
  - CHOLECYSTECTOMY
    - MORPHOLOGY, 7200*
  - FECES
    - DIETARY FACTORS, 6713*
  - INTESTINES, 6840, 6841
    - INFANT, 7253
  - ULCER
    - ACID SECRETION, 6732

- BACTERIAL INFECTIONS
  - BILIARY TRACT
    - ANTIBIOTICS, 7202*
    - PREVENTION, 7202*
    - SURGERY, 7202*

- BARIUM
  - CECUM
    - PERITONITIS, 7039
  - COLON
    - POLYPS, 7002*
  - ILEUM
    - CECUM, 7054
    - ENEMA, 6851*
  - INTESTINE, SMALL
    - RADIOLOGY, 6829*
  - POLYPS
    - ENEMA, 7002*
  - RECTUM
    - PERITONITIS, 7039
  - STOMACH
    - ACID SECRETION, 6731
    - PERITONITIS, 7039
    - RADIOLOGY, 6829*

- BARRETT'S SYNDROME
  - ESOPHAGUS
    - DISEASES ASSOCIATED WITH, 6862*
    - NEOPLASMS, MALIGNANT, 6862*

- BICARBONATE SECRETION
  - SEE ALSO ACID SECRETION, SECRETION
  - PANCREAS
    - CHOLAGOGUES AND CHOLERETICS, 6753
    - DRUG EFFECTS ON, 6753

- BILE
  - CHOLELITHIASIS
    - CHENODEOXYCHOLIC ACID, 7212*
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 7105*
  - CROHN'S DISEASE
    - BILE ACIDS AND SALTS, 7280
  - HEPATITIS
    - BILE ACIDS AND SALTS, 7105*
  - LIPOPROTEINS
    - ELECTROPHORESIS, 6775*
  - LIVER DISEASES
    - BILE ACIDS AND SALTS, 7280
  - SECRETION
    - PROSTAGLANDINS, 6745*

- BILE ACIDS AND SALTS
  - ABSORPTION
    - DIET, 6693*
    - MICROORGANISMS, 6693*
  - CHOLELITHIASIS
    - CHOLESTEROL, 6788
    - THERAPY, 6788
  - CHOLESTASIS
    - BILE, 7105*
    - INFANT, 7105*
    - SERUM, 7105*
  - COLON
    - ADENOSINE TRIPHOSPHATASE, 6816*
    - ION TRANSPORT, 6816*
  - CROHN'S DISEASE
    - BILE, 7280
  - DIARRHEA
    - ETIOLOGY, 6816*
  - GASTROINTESTINAL DISEASES
    - METABOLISM, 6947
  - HEPATITIS
    - BILE, 7105*
    - INFANT, 7105*
    - SERUM, 7105*
  - INTESTINE, SMALL
    - ION TRANSPORT, 6689*
  - INTESTINES
    - DISEASE, 7280
  - JEJUNUM
    - ION TRANSPORT, 6689*
  - LIVER
    - NECROSIS, 7092*
  - LIVER DISEASES
    - BILE, 7280
    - CLEARANCE STUDY, 7092*
    - DIAGNOSIS, 7092*
  - OBESITY
    - SURGERY, 6942*
  - SECRETION
    - REVIEW, 6784
  - SYNTHESIS
    - ENTERECTOMY, 6762*
  - TRANSPORT
    - DIET, 6693*
    - MICROORGANISMS, 6693*

- BILE DUCTS
  - CALCULI
    - ULTRASOUND, 7224
  - CHOLANGIOGRAPHY
    - DIAGNOSIS, 6861
    - TECHNIQUES, 7196*

BILE DUCTS (continued)
  CHOLELITHIASIS
    PROGNOSIS, 7207*
  DILATATION
    CHOLELITHIASIS, 7207*
  ENDOSCOPY
    CHOLANGIOGRAPHY, 6860
    DIAGNOSIS, 6860
  JAUNDICE, OBSTRUCTIVE
    NEOPLASMS, BENIGN, 7218*
  MANOMETRY
    CHOLANGIOGRAPHY, 7198*
    SURGERY, 7198*
    TECHNIQUES, 7198*
  OBSTRUCTION
    MORPHOMETRY, 6847
    SIMULATION, 6847
    ULTRASTRUCTURE, 6847
  PERFORATION, 7220*
  SURGERY
    IATROGENESIS, 7216

BILIARY TRACT
  BACTERIAL INFECTIONS
    ANTIBIOTICS, 7202*
    PREVENTION, 7202*
  NEOPLASMS
    DRUG-INDUCED, 6797
  SURGERY
    BACTERIAL INFECTIONS, 7202*

BILIARY TRACT DISEASES
  DIAGNOSIS
    CHOLANGIOGRAPHY, 7071
    ENDOSCOPY, 7071

BILIRUBIN
  ALBUMINS
    BINDING, 6764*
  CRIGLER-NAJJAR SYNDROME
    METABOLISM, 7135
  FATTY ACIDS
    ALBUMINS, 6764*
  METABOLISM
    NEONATE, 7135

BLEEDING
  SEE ALSO HEMORRHAGE
  DUODENUM
    VARICES, 6900
  GASTROINTESTINAL SYSTEM
    ENDOSCOPY, 6734, 6899
    RADIOLOGY, 6899
    THERAPY, 6734
    TISSUE ADHESIVES, 6734
  HEMATOBILIA
    ANEURYSM, 7129
  INTESTINE, SMALL
    SCANNING, SCINTILLATION, 6959
  LIVER
    COLLAGEN, 7109*
    NEOPLASMS, 7118
    THERAPY, 7109*
  LIVER CIRRHOSIS
    VARICES, 7185*
  STOMACH
    THERAPY, 6733
    TISSUE ADHESIVES, 6733
    ULCER, 6733
    VARICES, 6900

BLEEDING (continued)
  ULCER
    THERAPY, 6733
    TISSUE ADHESIVES, 6733

BLOOD
  AMYLASES, 6822
  HEPATITIS, INFECTIOUS
    ANTIGENS, 7150*
    AUSTRALIA ANTIGEN, 7150*
  LIPASE, 6822

BONES
  COLON
    NEOPLASM METASTASIS, 7006
  LACTOSE INTOLERANCE
    CALCIUM, 6988
    MINERALS, 6988
  NEOPLASM METASTASIS
    RADIONUCLIDES, 6998*
    SCANNING, SCINTILLATION, 6998*
  RECTUM
    NEOPLASM METASTASIS, 7006

BUDD-CHIARI SYNDROME
  DIAGNOSIS
    REVIEW, 7095

CALCIUM
  LACTOSE INTOLERANCE
    BONES, 6988

CALCULI
  SEE ALSO COMMON BILE DUCT CALCULI
  BILE DUCTS
    ULTRASOUND, 7224
  COMMON BILE DUCT
    DILATATION, 7225
  MANOMETRY
    SURGERY, 7198*
  PANCREAS
    PANCREATITIS, CHRONIC, 7078*

CARBOHYDRATES
  ABSORPTION
    CHILD, 6993
    REVIEW, 6986
  CHILD
    REVIEW, 6993
  DIGESTION
    CHILD, 6993
    ELECTROPHYSIOLOGY, 6659
    REVIEW, 6986
  LIVER
    PROTEINS, 6761*
  METABOLISM, 6948
  SALIVARY GLANDS
    CYTOLOGY, 6717*
    HISTOCHEMISTRY, 6717*
    SECRETION, 6717*
    ULTRASTRUCTURE, 6717*

CARCINOEMBRYONIC ANTIGEN
  COLON
    NEOPLASMS, 7049
  STOMACH, 6883

- CARCINOGENS
  - LIVER
    - NEOPLASMS, 6801, 7100*
- CARCINOID TUMOR
  - LIVER
    - NEOPLASM METASTASIS, 7102*
- CARDIOVASCULAR SYSTEM
  - SEE ALSO CIRCULATION
  - ANOMALY, CONGENITAL
    - DEGLUTITION DISORDERS, 6873
- CATHARTICS
  - HEPATITIS, NONVIRAL, 7140*
  - LIVER INJURY, 7140*
- CECUM
  - SEE ALSO COLON, INTESTINE, LARGE
  - BACTERIA, 6680*
  - BARIUM
    - PERITONITIS, 7039
  - ILEUM
    - BARIUM, 7054
  - INFLAMMATION
    - CHILD, 7044
    - LEUKEMIA, 7044
  - MORPHOLOGY, 6680*
  - NEOPLASMS, BENIGN
    - APPENDICITIS, 7034
  - RADIOLOGY
    - TECHNIQUES, 7054
  - ULTRASTRUCTURE, 6680*
- CELIAC DISEASE
  - CHILD
    - ANTIBODIES, 6994
    - COLLAGEN, 6994
  - DUODENUM
    - HYPERPLASIA, 6979*
  - ETIOLOGY
    - GLUTAMYLTRANSPEPTIDASE, 6978*
  - IMMUNOLOGY, 6995
  - INTESTINE, SMALL
    - HYPERPLASIA, 6979*
    - MORPHOLOGY, 6995
  - SEROTONIN
    - EXCRETION, 6996
    - URINE, 6996
- CHENODEOXYCHOLIC ACID
  - CHOLELITHIASIS
    - BILE, 7212*
    - SOLUBILITY, 7212*
    - SURGERY, 7212*
    - THERAPY, 7213*
  - TOXICITY, 6771*
- CHILD
  - CARBOHYDRATES
    - ABSORPTION, 6993
    - DIGESTION, 6993
    - REVIEW, 6993
  - CECUM
    - INFLAMMATION, 7044
  - CELIAC DISEASE
    - ANTIBODIES, 6994
    - COLLAGEN, 6994
- CHILD (continued)
  - CHOLELITHIASIS
    - ETIOLOGY, 7208*
    - PROGNOSIS, 7208*
    - RADIOLOGY, 7208*
    - RESPIRATORY SYSTEM, 7221
    - SURGERY, 7208*
  - COLITIS
    - ANTIBIOTICS, 7000*
  - CROHN'S DISEASE
    - PROGNOSIS, 7275*
    - RECURRENCE, 7275*
    - SURGERY, 7275*
  - DIARRHEA
    - INFECTION, 7261
    - REVIEW, 6953
  - ENDOSCOPY
    - REVIEW, 6953
  - GASTROENTERITIS
    - VIRUS DISEASES, 7251
  - HEPATITIS
    - ANGIOGRAPHY, 7086*
  - HEPATITIS, CHRONIC
    - HEPATOCYTES, 7166*
    - ULTRASTRUCTURE, 7166*
  - HEPATITIS, INFECTIOUS
    - AUSTRALIA ANTIGEN, 7161
    - EPIDEMIOLOGY, 7161
  - HORMONES, GASTROINTESTINAL
    - REVIEW, 6953
  - HYPERTENSION, PORTAL
    - SCANNING, SCINTILLATION, 7094*
  - INFLAMMATORY BOWEL DISEASES
    - ENDOCRINE DISEASES, 7287
    - REVIEW, 6953
  - INTESTINAL ABSORPTION
    - REVIEW, 6953
  - INTESTINE, SMALL
    - DIGESTION, 6953
  - INTUSSUSCEPTION
    - ETIOLOGY, 7042
    - THERAPY, 7042
  - JAUNDICE, OBSTRUCTIVE
    - SCANNING, SCINTILLATION, 7094*
  - LIVER
    - NEOPLASMS, 7096*
    - NEOPLASMS, MALIGNANT, 7103*
  - LIVER CIRRHOSIS
    - ANGIOGRAPHY, 7086*
    - SCANNING, SCINTILLATION, 7094*
  - LIVER DISEASES
    - ANGIOGRAPHY, 7086*
    - NEOPLASMS, 7086*
    - SCANNING, SCINTILLATION, 7094*
  - MALABSORPTION SYNDROMES
    - REVIEW, 6992
    - VITAMIN B12, 6985
  - MANOMETRY
    - REVIEW, 6953
  - NUTRITION DISORDERS
    - INTESTINES, 7262
  - ORGAN CULTURE
    - REVIEW, 6953
  - PATHOLOGY
    - REVIEW, 6953
  - SERUM
    - AMYLASES, 6744*
  - ULCER, PEPTIC
    - FAMILIAL FACTORS, 6924

- CHILD (continued)
  - URINE
    - AMYLASES, 6744*

- CHLORIDES
  - INTESTINE, SMALL
    - CELLS, 6690*

- CHOLAGOGUES AND CHOLERETICS
  - PANCREAS
    - BICARBONATE SECRETION, 6753
  - PREGNANCY, 6849
  - TOXICOLOGY, 6849

- CHOLANGIOGRAPHY
  - BILE DUCTS
    - DIAGNOSIS, 6861
    - MANOMETRY, 7198*
    - TECHNIQUES, 7196*
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 7071
  - COLON
    - NEOPLASM METASTASIS, 6997*
    - NEOPLASMS, MALIGNANT, 6997*
  - ENDOSCOPY
    - BILE DUCTS, 6860
    - COMPLICATIONS, 7071, 7195*
    - TECHNIQUES, 7195*
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 7083
  - PSEUDO-OBSTRUCTION
    - COMMON BILE DUCT, 7234

- CHOLANGITIS
  - ENDOSCOPY
    - TECHNIQUES, 7201*
    - THERAPY, 7201*
  - SCLEROSIS
    - DIAGNOSIS, 7204*
    - SURGERY, 7204*

- CHOLECYSTECTOMY
  - BACTERIA
    - MORPHOLOGY, 7200*
  - CHOLECYSTITIS
    - COMPLICATIONS, 7226
    - DRAINAGE, 7226
    - MORPHOLOGY, 7200*
  - CHOLELITHIASIS
    - COMPLICATIONS, 7211*
    - STATISTICAL STUDY, 7211*
  - COMMON BILE DUCT CALCULI
    - RECURRENCE, 7210*
  - DRAINAGE
    - TECHNIQUES, 7226
  - RADIOLOGY, 7233

- CHOLECYSTITIS
  - CHOLECYSTECTOMY
    - COMPLICATIONS, 7226
    - DRAINAGE, 7226
    - MORPHOLOGY, 7200*

- CHOLECYSTOGRAPHY
  - CONTRAST MEDIA
    - TECHNIQUES, 7197*
  - CYSTIC FIBROSIS
    - GALLBLADDER DISEASES, 7236

- CHOLELITHIASIS
  - ADOLESCENCE
    - RESPIRATORY SYSTEM, 7221
  - BILE
    - CHENODEOXYCHOLIC ACID, 7212*
  - BILE DUCTS
    - DILATATION, 7207*
    - PROGNOSIS, 7207*
  - CHENODEOXYCHOLIC ACID
    - SURGERY, 7212*
    - THERAPY, 7213*
  - CHILD
    - ETIOLOGY, 7208*
    - PROGNOSIS, 7208*
    - RADIOLOGY, 7208*
    - RESPIRATORY SYSTEM, 7221
    - SURGERY, 7208*
  - CHOLECYSTECTOMY
    - COMPLICATIONS, 7211*
    - STATISTICAL STUDY, 7211*
  - CHOLESTEROL
    - BILE ACIDS AND SALTS, 6788
    - THERAPY, 6788
  - EPIDEMIOLOGY, 7206, 7237, 7238
  - GALLBLADDER
    - NEOPLASMS, 7203*
  - PANCREATITIS
    - SURGERY, 7075*
  - PREVENTION
    - VITAMIN C, 6780*
  - RESPIRATORY SYSTEM
    - SURGERY, 7221
  - SOLUBILITY
    - CHENODEOXYCHOLIC ACID, 7212*
  - SURGERY
    - RECURRENCE, 7205
    - TECHNIQUES, 7223
  - THERAPY
    - BILE ACIDS AND SALTS, 6788

- CHOLERA
  - GASTROENTERITIS
    - SERUM, 7243
  - IMMUNOLOGY, 6842

- CHOLESTASIS
  - AUSTRALIA ANTIGEN
    - IMMUNITY, 7151*
  - BILE ACIDS AND SALTS
    - BILE, 7105*
    - INFANT, 7105*
    - SERUM, 7105*
  - ENZYMES
    - DIAGNOSIS, 7214
  - IATROGENESIS, 7106*
  - LIVER CIRRHOSIS
    - DIAGNOSIS, 7194
  - PREGNANCY
    - PREMATURITY, 7215*
  - SURGERY
    - DIAGNOSIS, 7106*
    - ETIOLOGY, 7106*

- CHOLESTEROL
  - CHOLELITHIASIS
    - BILE ACIDS AND SALTS, 6788
    - THERAPY, 6788

CHOLESTEROL (continued)
- LIVER
  - ACIDS, 6808
  - ENZYMES, 6791
  - METABOLISM, 6791
  - NEOPLASMS, 7097*
  - SYNTHESIS, 6773*, 6791, 6808
- LIVER CIRRHOSIS
  - SERUM, 7097*
- OBESITY
  - SURGERY, 6942*

CHOLIC ACID
- SYNTHESIS, 6766

CIRCADIAN RHYTHM
- LIVER
  - ENZYMES, 6791
- LIVER CIRRHOSIS
  - GASTRIN, 7178*
- PANCREAS
  - SECRETION, 6750
- SERUM
  - GASTRIN, 7178*

CIRCULATION
- SEE ALSO CARDIOVASCULAR SYSTEM
- ANGIOGRAPHY
  - NEOPLASMS, 7267
- COLON
  - ANGIOGRAPHY, 6681*
  - MORPHOLOGY, 6681*
- LIVER
  - CLEARANCE STUDY, 6755*
  - FETUS, 7184*
  - MORPHOLOGY, 7184*
  - NERVOUS CONTROL, 6757*
  - VASOPRESSIN, 6756*
- LIVER CIRRHOSIS
  - FETUS, 7184*
  - MORPHOLOGY, 7184*, 7187*

CLOSTRIDIUM
- DIARRHEA
  - ENTERITIS, 7268

COENZYMES
- ABSORPTION
  - REVIEW, 6987
- LIVER, 6776*
- LIVER INJURY, 6798
- MALABSORPTION SYNDROMES
  - REVIEW, 6987

COLITIS
- ANTIBIOTICS
  - CHILD, 7000*
- DRUG-INDUCED
  - ANTIBIOTICS, 7000*

OLITIS, ULCERATIVE
- COLON, 7008
- ENDOSCOPY
  - BIOPSY, 7065
- HORMONES, ADRENAL CORTEX, 7066
- INFLAMMATION
  - HISTOCHEMISTRY, 7067
  - ULTRASTRUCTURE, 7067

COLITIS, ULCERATIVE (continued)
- LYSOZYMES, 7062*
- RADIOLOGY, 7065
- RECTUM
  - DRUG EFFECTS ON, 7064*
  - MORPHOLOGY, 7031
  - NEOPLASMS , 7008
- REMISSION
  - DRUG EFFECTS ON, 7064*
- SURGERY, 7063*
- THERAPY, 7063*
- VIRUS DISEASES, 7279

COLLAGEN
- CELIAC DISEASE
  - CHILD, 6994
- LIVER
  - BLEEDING, 7109*

COLON
- SEE ALSO CECUM, INTESTINE, LARGE
- ABSORPTION
  - SODIUM, 6816*
- ADENOSINE TRIPHOSPHATASE
  - BILE ACIDS AND SALTS, 6816*
- ANORECTUM
  - ANOMALY, 7057
- ANUS
  - NEOPLASMS, 7019
- ATRESIA, 7037
  - COLITIS, ULCERATIVE, 7008
  - ETIOLOGY, 7008
  - POLYPS, 7008
  - PREVENTION, 7008
- CIRCULATION
  - ANGIOGRAPHY, 6681*
  - MORPHOLOGY, 6681*
- CYSTS, 7014
- DIVERTICULITIS
  - FISTULA, 7059
- DIVERTICULUM
  - EPIDEMIOLOGY, 7060
- GARDNER'S SYNDROME
  - AMINES, 6999*
- HEMORRHAGE, 7045
  - THERAPY, 6874*
- INTESTINE, SMALL
  - NUCLEIC ACIDS, 6813
- INTUSSUSCEPTION
  - NEOPLASMS, 7035
- ION TRANSPORT
  - BILE ACIDS AND SALTS, 6816*
- NEOPLASM METASTASIS
  - BONES, 7006
  - CHOLANGIOGRAPHY, 6997*
  - DIAGNOSIS, 6997*
  - RADIONUCLIDES, 6998*, 7006
  - SCANNING, SCINTILLATION, 6998*
- NEOPLASMS
  - AMINES, 6999*
  - CARCINOEMBRYONIC ANTIGEN, 7049
  - DIARRHEA, 7040
  - HEMORRHAGE, 7040
  - IMMUNOLOGY, 7003, 7051
  - MORHOLOGY, 7052
  - PROGNOSIS, 7051
  - SURGERY, 7009
  - ULTRASTRUCTURE, 7032

- COLON (continued)
  - NEOPLASMS, MALIGNANT
    - CHOLANGIOGRAPHY, 6997*
    - NEOPLASM METASTASIS, 6997*
  - PERFORATION
    - ENDOMETRIOSIS, 7001*
    - PREGNANCY, 7001*
  - POLYPS
    - BARIUM, 7002*
    - COLONOSCOPY, 7002*
  - RECTUM
    - GARDNER'S SYNDROME, 6999*
    - NEOPLASMS, 6999*, 7008, 7009, 7040, 7051
  - SEPSIS
    - ANTIBIOTICS, 7017
  - SURGERY
    - COMPLICATIONS, 7231
    - INFECTION, 7046
    - SEPSIS, 7017
    - TECHNIQUES, 7016
  - WOUNDS AND INJURIES
    - COMPLICATIONS, 7005
    - REVIEW, 7029
    - SURGERY, 7027
    - SURVIVAL, 7005
    - THERAPY, 7028

- COLONOSCOPY
  - COLON
    - POLYPS, 7002*
  - COMPLICATIONS
    - HEMORRHAGE, 7010
    - OBSTRUCTION, 7010
    - PERFORATION, 7010
    - RISK FACTORS, 7010

- COLOSTOMY
  - TECHNQUES
    - COMPLICATIONS, 7023

- COMMON BILE DUCT
  - CHOLANGIOGRAPHY
    - PSEUDO-OBSTRUCTION, 7234
  - DILATATION
    - CALCULI, 7225
    - ULTRASONOGRAPHY, 7222
  - SPHINCTER
    - CONTRACTION, 7234
    - PSEUDO-OBSTRUCTION, 7234

- COMMON BILE DUCT CALCULI
  - SEE ALSO CALCULI
  - CHOLECYSTECTOMY
    - RECURRENCE, 7210*
  - COMPLICATIONS
    - PERFORATION, 7220*
  - DIAGNOSIS, 7209*
  - ENDOSCOPY
    - TECHNIQUES, 7201*
    - THERAPY, 7201*
  - JAUNDICE, OBSTRUCTIVE
    - ULTRASONOGRAPHY, 7229
  - MANOMETRY
    - SURGERY, 7198*
  - SURGERY
    - PROGNOSIS, 7209*
  - ULTRASOUND, 7224

- CONTRACEPTIVES, ORAL
  - LIVER
    - NEOPLASMS, MALIGNANT, 7126

- CONTRAST MEDIA
  - CHOLECYSTOGRAPHY
    - TECHNIQUES, 7197*
  - ENDOSCOPY
    - DUODENUM, 6859
    - STOMACH, 6859
  - ILEUM
    - TECHNIQUES, 6851*

- COPPER
  - LIVER
    - FETUS, 6805

- CRIGLER-NAJJAR SYNDROME
  - BILIRUBIN
    - METABOLISM, 7135

- CROHN'S DISEASE
  - SEE ALSO ENTERITIS, ENTERITIS, REGIO
  - BILE
    - BILE ACIDS AND SALTS, 7280
  - CHILD
    - PROGNOSIS, 7275*
    - RECURRENCE, 7275*
    - SURGERY, 7275*
  - DIET
    - RISK FACTORS, 7284
  - DRUG METABOLISM
    - DIETARY FACTORS, 7283
  - DRUG THERAPY
    - COMPLICATIONS, 7286
    - ILEUM, 7276*
  - EPIDEMIOLOGY
    - REVIEW, 7282
  - ETIOLOGY
    - REVIEW, 7282
  - GENETICS
    - REVIEW, 7282
  - INTESTINE, SMALL
    - NEOPLASMS, 7278
    - SIMULATION, 7278
  - LAPAROTOMY
    - APPENDICITIS, 7277
  - LYSOZYMES, 7062*
  - NEOPLASMS
    - ILEUM, 7278
  - UROGENITAL SYSTEM
    - NEOPLASMS, 7285
  - VIRUS DISEASES, 7279

- CYSTIC FIBROSIS
  - GALLBLADDER DISEASES
    - CHOLECYSTOGRAPHY, 7236
  - MECONIUM
    - DIAGNOSIS, 7127

- CYSTS
  - ANUS
    - SURGERY, 7055
  - COLON, 7014
  - GALLBLADDER
    - SCANNING, SCINTILLATION, 7235
  - JAUNDICE, OBSTRUCTIVE
    - PANCREAS, 7228

CYSTS (continued)
- LIVER
  - ULTRASONOGRAPHY, 7123
- MANOMETRY
  - SURGERY, 7198*

CYTOCHROMES
- LIVER CIRRHOSIS
  - MITOCHONDRIA, 7189*

DEFECATION
- SEE ALSO EXCRETION

DEGLUTITION DISORDERS
- CARDIOVASCULAR SYSTEM
  - ANOMALY, CONGENITAL, 6873

DIARRHEA
- ABSORPTION
  - SODIUM, 6816*
- CHILD
  - INFECTION, 7261
  - REVIEW, 6953
- CLOSTRIDIUM
  - ENTERITIS, 7268
- COLON
  - NEOPLASMS, 7040
- DRUG THERAPY, 7030
- ENTEROCOLITIS, NECROTIZING
  - ESCHERICHIA COLI, 7272
- ETIOLOGY
  - BILE ACIDS AND SALTS, 6816*
  - ION TRANSPORT, 6816*
- GASTROENTERITIS
  - NUTRITION DISORDERS, 7244
- IMMUNOLOGY
  - REVIEW, 7264
- INFANT
  - INFECTION, 7261
  - REVIEW, 7258, 7261
  - THERAPY, 7261
- PATHOLOGY
  - REVIEW, 7264
- PYLOROPLASTY
  - COMPLICATIONS, 6936
- RECTUM
  - NEOPLASMS, 7040
- VAGOTOMY
  - COMPLICATIONS, 6936

DIET
- AMINO ACIDS
  - DEFICIENCY, 6815*
  - DIGESTION, 6712*
- BILE ACIDS AND SALTS
  - ABSORPTION, 6693*
  - TRANSPORT, 6693*
- CROHN'S DISEASE
  - RISK FACTORS, 7284
- HEPATITIS, INFECTIOUS
  - HORMONES, 7148*
  - THERAPY, 7148*
- IRON
  - ABSORPTION, 6692*
  - SIMULATION, 6692*
- NEOPLASMS
  - EPIDEMIOLOGY, 7260
  - REVIEW, 7260

DIET (continued)
- STEATORRHEA
  - THERAPY, 7074
- STOMACH
  - SEROTONIN, 6728*

DIGESTION
- AMINO ACIDS
  - DIET, 6712*
- CARBOHYDRATES
  - CHILD, 6993
  - ELECTROPHYSIOLOGY, 6699
  - REVIEW, 6986
- CHILD
  - INTESTINE, SMALL, 6953
- FATS
  - ELECTROPHYSIOLOGY, 6699
- HORMONES, GASTROINTESTINAL
  - ILEUM, 6820*
  - JEJUNUM, 6820*
- PROTEINS, 6826
  - ELECTROPHYSIOLOGY, 6699

DISTENTION
- STOMACH
  - GASES, 6933
  - VAGOTOMY, 6933

DIURETICS
- METABOLISM
  - LIVER DISEASES, 7091*

DIVERTICULITIS
- COLON
  - FISTULA, 7059

DIVERTICULUM
- COLON
  - EPIDEMIOLOGY, 7060

DOPAMINE
- LIVER DISEASES
  - KERNICTERUS, 7182*

DRAINAGE
- CHOLECYSTECTOMY
  - TECHNIQUES, 7226
- CHOLECYSTITIS
  - CHOLECYSTECTOMY, 7226
- LIVER
  - TRANSPLANTATION, 7117*

DRUG-INDUCED
- COLITIS
  - ANTIBIOTICS, 7000*
- DUODENUM
  - ULCER, 6742
- HEPATITIS, CHRONIC
  - SIMULATION, 6781*
- LIVER
  - ANEURYSM, 7138*
  - FIBROSIS, 7139*
  - GRANULOMA, 7142*
  - NEOPLASMS, 6799, 6800
- LIVER CIRRHOSIS
  - AGE FACTORS, 7139*
  - ALCOHOLS, 7139*

- DRUG-INDUCED (continued)
  - LIVER INJURY
    - ANTI-INFLAMMATORY AGENTS, 7142*
    - BIOCHEMISTRY, 7136*
    - REVIEW, 7137*, 7141*
    - THERAPY, 7141*
    - TOXINS, 7137*
  - NEOPLASMS
    - BILIARY TRACT, 6797

- DRUG METABOLISM
  - CROHN'S DISEASE
    - DIETARY FACTORS, 7283
  - LIVER DISEASES
    - ANALGESICS AND ANTIPYRETICS, 7084*

- DRUG THERAPY
  - ACRODERMATITIS
    - ZINC, 6974
  - CROHN'S DISEASE
    - COMPLICATIONS, 7286
    - ILEUM, 7276*
  - DIARRHEA, 7030
  - DUODENUM
    - ULCER, PEPTIC, 6914*, 6917*
  - ENTEROCOLITIS, 7004
  - FATTY LIVER
    - ANTI-INFLAMMATORY AGENTS, 7121
  - GASTROINTESTINAL SYSTEM
    - HEMORRHAGE, 7186*
  - H2 RECEPTOR ANTAGONISTS
    - COMPLICATIONS, 6916*
  - JAUNDICE
    - NEONATE, 7134
  - LIVER
    - NEOPLASMS, 7099*
  - LIVER DISEASES
    - COMPLICATIONS, 7122
  - NEOPLASMS
    - REVIEW, 7247
    - SURGERY, 7247
  - STOMACH
    - NEOPLASMS, 6877*
    - ULCER, PEPTIC, 6915*, 6927
  - ULCER
    - STOMACH, 6880
  - ULCER, PEPTIC
    - ANTACIDS, 6914*
    - CHEMICAL PROPERTIES, 6928
    - COMPLICATIONS, 6927
    - EDEMA, 6927
    - GASTRODUODENITIS, 6930
    - H2 RECEPTOR ANTAGONISTS, 6904, 6916*, 6917*
    - HYPERTENSION, 6927

- DUMPING SYNDROME
  - SURGERY
    - TECHNIQUES, 6892
  - ULCER, PEPTIC
    - SURGERY, 6918*
    - VAGOTOMY, 6918*, 6934

- DUODENUM
  - SEE ALSO ILEUM, INTESTINE, SMALL, JEJUNUM
  - ACIDITY
    - SECRETIN, 6819*

- DUODENUM (continued)
  - CELLS
    - HYPERPLASIA, 6979*
  - ENDOSCOPY, 6868, 6971
    - CONTRAST MEDIA, 6859
  - ENZYMES
    - FATTY ACIDS, 6763*
  - HYPERPLASIA
    - CELIAC DISEASE, 6979*
  - INTESTINAL OBSTRUCTION
    - ETIOLOGY, 7113*
    - NEONATE, 7113*
  - MORPHOLOGY
    - AMINES, 6742
    - ANALGESICS AND ANTIPYRETICS, 6884
    - ASPIRIN, 6884
    - DRUG EFFECTS ON, 6742, 6884
  - MOTILITY
    - NERVOUS CONTROL, 6698*
  - NEOPLASM METASTASIS
    - POLYPS, 6969
  - NEOPLASMS
    - ENDOSCOPY, 6976
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 6975
    - THERAPY, 6975
  - PATHOLOGY
    - ULCER, 6957
  - PEUTZ-JEGHER'S SYNDROME
    - POLYPS, 6969
  - POLYPS
    - PEUTZ-JEGHER'S SYNDROME, 6969
  - STOMACH
    - EROSIONS, 6844
  - ULCER
    - AMINES, 6742
    - DRUG-INDUCED, 6742
  - ULCER, PEPTIC, 6925
    - ACID SECRETION, 6926
    - AGE FACTORS, 6913*
    - ANTIGENS, 6911*
    - DIAGNOSIS, 6913*
    - DRUG THERAPY, 6914*, 6917*
    - ENDOSCOPY, 6913*
    - ETIOLOGY, 6911*
    - FAMILIAL FACTORS, 6923
    - GASTRECTOMY, 6934
    - GENETIC FACTORS, 6911*
    - H2 RECEPTOR ANTAGONISTS, 6917*
    - PANCREAS FUNCTION TESTS, 6929
    - PATHOLOGY, 6921
    - PERFORATION, 6920*
    - PYLOROPLASTY, 6918*
    - SURGERY, 6905, 6918*, 6919*, 6931
    - THERAPY, 6905, 6921, 6931
    - VAGOTOMY, 6905, 6918*, 6919*, 6934
  - VARICES
    - BLEEDING, 6900
    - DIAGNOSIS, 6900
    - SURGERY, 6900
    - THERAPY, 6900

- DYSPEPSIA
  - ULCER, PEPTIC, 6919*

- DYSTROPHY
  - STOMACH, 6843

- EDEMA
  - ULCER, PEPTIC
    - DRUG THERAPY, 6927
- ELECTROLYTES
  - SPRUE, TROPICAL
    - TRANSPORT, 6982*
- ELECTRON TRANSPORT
  - SEE ALSO ION TRANSPORT
- ELECTROPHORESIS
  - BILE
    - LIPOPROTEINS, 6775*
- ELECTROPHYSIOLOGY
  - DIGESTION
    - CARBOHYDRATES, 6699
    - FATS, 6699
    - PROTEINS, 6699
  - ESOPHAGUS
    - MOTILITY, 6703, 6705
    - TECHNIQUES, 6703
  - GASTROINTESTINAL SYSTEM
    - MOTILITY, 6700
  - INTESTINE, SMALL
    - SOMATOSTATIN, 6711
    - SURGERY, 6697*
  - STOMACH
    - PHOSPHOLIPIDS, 6726*
    - SPHINCTER, 6882
    - ULCER, PEPTIC, 6909
    - VAGOTOMY, 6909
- ENDOCRINE DISEASES
  - GASTROENTERITIS, 6966
  - INFLAMMATORY BOWEL DISEASES
    - ADOLESCENCE, 7287
    - CHILD, 7287
- ENDOMETRIOSIS
  - COLON
    - PERFORATION, 7001*
  - COMPLICATIONS
    - PERFORATION, 7001*
  - SIGMOID
    - PERFORATION, 7001*
- ENDOSCOPY
  - BILE DUCTS
    - CHOLANGIOGRAPHY, 6860
    - DIAGNOSIS, 6860
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 7071
  - CHILD
    - REVIEW, 6953
  - CHOLANGIOGRAPHY
    - COMPLICATIONS, 7071, 7195*
    - TECHNIQUES, 7195*
  - CHOLANGITIS
    - TECHNIQUES, 7201*
    - THERAPY, 7201*
  - COLITIS, ULCERATIVE
    - BIOPSY, 7065
  - COMMON BILE DUCT CALCULI
    - TECHNIQUES, 7201*
    - THERAPY, 7201*
  - CONTRAST MEDIA
    - DUODENUM, 6859
    - STOMACH, 6859
- ENDOSCOPY (continued)
  - DUODENUM, 6868, 6971
    - NEOPLASMS, 6976
  - ESOPHAGUS, 6868
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 6734, 6899
  - PANCREAS
    - NEOPLASMS, MALIGNANT, 7073
  - PANCREATIC DISEASES
    - DIAGNOSIS, 7071
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 7082
  - PANCREATOGRAPHY
    - COMPLICATIONS, 7071, 7195*
    - TECHNIQUES, 7195*
  - STENOSIS
    - TECHNIQUES, 7201*
    - THERAPY, 7201*
  - STOMACH
    - ANOMALY, 7072
    - HEMORRHAGE, 6897
    - NEOPLASMS, MALIGNANT, 6887, 6901
  - ULCER, PEPTIC
    - AGE FACTORS, 6913*
    - DIAGNOSIS, 6913*
    - DUODENUM, 6913*
    - STOMACH, 6913*
  - VATER'S PAPILLA
    - DIAGNOSIS, 6857
    - DISEASE, 6857
    - SURGERY, 6857
- ENDOTOXINS
  - LIVER
    - ENZYMES, 6778*
- ENEMA
  - ILEUM
    - BARIUM, 6851*
  - POLYPS
    - BARIUM, 7002*
- ENTERECTOMY
  - BILE ACIDS AND SALTS
    - SYNTHESIS, 6762*
  - LIVER FUNCTION TESTS, 6783*
- ENTERITIS
  - SEE ALSO CROHN'S DISEASE
  - DIARRHEA
    - CLOSTRIDIUM, 7268
- ENTERITIS, REGIONAL
  - SEE ALSO CROHN'S DISEASE
  - GLOBULINS, 7281
- ENTEROCOLITIS
  - DRUG THERAPY, 7004
  - HIRSCHSPRUNG'S DISEASE, 7061
- ENTEROCOLITIS, NECROTIZING
  - ESCHERICHIA COLI
    - DIARRHEA, 7272
  - HEMATOLOGY
    - REVIEW, 7265
  - HUMORAL FACTORS
    - REVIEW, 7257
  - INFANT, 7255

- EROSIONS
  - STOMACH
    - DUODENUM, 6844
- ESCHERICHIA COLI
  - ENTEROCOLITIS, NECROTIZING
    - DIARRHEA, 7272
- ESOPHAGEAL DISEASES
  - EPIDEMIOLOGY
    - RADIOLOGY, 6870
- ESOPHAGEAL REFLUX
  - ESOPHAGUS
    - STRICTURE, 6865
  - HIATAL HERNIA
    - SURGERY, 6363*
- ESOPHAGITIS
  - HIATAL HERNIA
    - PROGNOSIS, 6867
    - REVIEW, 6867
    - SURGERY, 6867
    - THERAPY, 6867
- ESOPHAGUS
  - ACHALASIA
    - SURGERY, 6872
  - BARRETT'S SYNDROME
    - DISEASES ASSOCIATED WITH, 6862*
    - NEOPLASMS, MALIGNANT, 6862*
  - ELECTROPHYSIOLOGY
    - TECHNIQUES, 6703
  - ENDOSCOPY, 6868
  - LIVER CIRRHOSIS
    - VARICES, 7185*
  - MANOMETRY
    - TECHNIQUES, 6701, 6702
  - MOTILITY
    - AMINES, 6707
    - DRUG EFFECTS ON, 6707, 6708
    - ELECTROPHYSIOLOGY, 6703, 6705
    - GASTRIN, 6709
    - HORMONE EFFECTS ON, 6709
    - MANOMETRY, 6701, 6702
    - MUSCLES, 6705, 6706
    - NERVOUS CONTROL, 6706, 6707
    - RADIOLOGY, 6869
    - REFLUX, 6708
    - TEMPERATURE, 6704
  - NEOPLASMS
    - EPIDEMIOLOGY, 6870
    - RADIOLOGY, 6870
  - NEOPLASMS, MALIGNANT
    - DISEASES ASSOCIATED WITH, 6862*
  - REFLUX
    - DRUG EFFECTS ON, 6708
  - SPHINCTER
    - AMINES, 6707
    - DRUG EFFECTS ON, 6707
    - GASTRIN, 6709
    - HORMONE EFFECTS ON, 6709
    - NERVOUS CONTROL, 6707
  - STRICTURE
    - ESOPHAGEAL REFLUX, 6865
    - REVIEW, 6865
  - SURGERY
    - TECHNIQUES, 6871
- ESOPHAGUS (continued)
  - VARICES
    - HEMORRHAGE, 6897
- EXCRETION
  - ALKALOIDS, 6803
  - CELIAC DISEASE
    - SEROTONIN, 6996
- FATS
  - SEE ALSO LIPIDS, TRIGLYCERIDES
  - DIGESTION
    - ELECTROPHYSIOLOGY, 6699
  - INTESTINES
    - ABSORPTION, 6695
  - OBESITY
    - SURGERY, 6942*
- FATTY ACIDS
  - ALBUMINS
    - BINDING, 6764*
  - BILIRUBIN
    - ALBUMINS, 6764*
  - DEFICIENCY
    - PANCREATITIS, 7080
  - DUODENUM
    - ENZYMES, 6763*
  - SALIVARY GLANDS
    - DEFICIENCY, 6720
- FATTY LIVER
  - ACIDS
    - HYPOLIPEMIC AGENTS, 6809
  - ANTI-INFLAMMATORY AGENTS
    - DRUG THERAPY, 7121
  - FUNGI
    - ANDROGENS, 6787
    - HORMONE EFFECTS ON, 6787
  - LIPIDS
    - TRANSPORT, 6802
  - METALS
    - ANDROGENS, 6787
    - HORMONE EFFECTS ON, 6787
  - PROTEINS
    - DEFICIENCY, 6802
- FECES
  - AMINO ACIDS
    - CHEMICAL COMPOSITION, 6713*
  - DIETARY FACTORS
    - BACTERIA, 6713*
    - NITROGEN, 6713*
  - OBESITY
    - SURGERY, 6942*
- FEEDING
  - STOMACH
    - SEROTONIN, 6728*
- FERRITIN
  - HEPATOCYTES
    - METABOLISM, 6772*
- FETUS
  - INTESTINE, SMALL
    - PERFORATION, 6962

- FETUS (continued)
  - LIVER
    - CIRCULATION, 7184*
    - COPPER, 6805
    - ENZYMES, 6807
    - ZINC, 6805
  - LIVER CIRRHOSIS
    - CIRCULATION, 7184*
  - PANCREAS
    - NERVOUS CONTROL, 6747*
    - SECRETION, 6747*

- FIBROSIS
  - LIVER
    - AGE FACTORS, 7139*
    - ALCOHOLS, 7139*
    - DRUG-INDUCED, 7139*

- FISSURE
  - INTESTINES
    - ATRESIA, 7015
  - LIVER
    - SCANNING, SCINTILLATION, 7130
  - STOMACH
    - ATRESIA, 7015

- FISTULA
  - COLON
    - DIVERTICULITIS, 7059
  - STOMACH
    - SEROTONIN, 6728*

- FOLIC ACID
  - ABSORPTION
    - REVIEW, 6987
  - MALABSORPTION SYNDROMES
    - REVIEW, 6987
  - MENETRIER'S DISEASE
    - MALABSORPTION SYNDROMES, 6902

- FOOD
  - ABSORPTION
    - ANTIBIOTICS, 6687*
  - INTESTINES
    - HORMONES, 6838
  - STOMACH
    - NEOPLASMS, 6881

- FUNGI
  - FATTY LIVER
    - ANDROGENS, 6787
    - HORMONE EFFECTS ON, 6787
  - LIVER INJURY
    - TOXICITY, 7143

- GALLBLADDER
  - ANOMALY
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - CYSTS
    - SCANNING, SCINTILLATION, 7235
  - EPITHELIUM
    - ULTRASTRUCTURE, 6682
  - HYPERTENSION
    - INFARCTION, 7192
  - NEOPLASMS
    - CHOLELITHIASIS, 7203*
    - DIAGNOSIS, 7203*
    - SURGERY, 7203*

- GALLBLADDER (continued)
  - PERFORATION
    - HEMORRHAGE, 7230
  - SURGERY
    - AGE FACTORS, 7232
    - COMPLICATIONS, 7231

- GALLBLADDER DISEASES
  - CYSTIC FIBROSIS
    - CHOLECYSTOGRAPHY, 7236

- GALLSTONES
  - SEE ALSO CHOLELITHIASIS

- GARDNER'S SYNDROME
  - COLON
    - AMINES, 6999*
    - RECTUM, 6999*
  - DIAGNOSIS
    - SURGERY, 7012
  - GENETICS, 7053
  - POLYPS
    - REVIEW, 7013
  - RECTUM
    - AMINES, 6999*

- GASES
  - APPENDIX
    - APPENDICITIS, 7036
  - INTESTINE, SMALL, 6973
  - PERITONEUM
    - INTESTINE, SMALL, 6968
  - STASIS
    - VAGOTOMY, 6933
  - STOMACH
    - DISTENTION, 6933

- GASTRECTOMY
  - COMPLICATIONS, 6907, 6908, 6937
  - DUODENUM
    - ULCER, PEPTIC, 6934
  - METABOLISM
    - ALBUMINS, 6910
    - NITROGEN, 6910
    - PROTEINS, 6910
  - STOMACH
    - MOTILITY, 6908
    - ULCER, PEPTIC, 6938
  - TECHNIQUES, 6906
  - ULCER, PEPTIC
    - COMPLICATIONS, 6934

- GASTRIN
  - ESOPHAGUS
    - MOTILITY, 6709
    - SPHINCTER, 6709
  - GASTRITIS, 6896
  - GASTROINTESTINAL SYSTEM
    - CELLS, 6679*
  - IMMUNOGLOBULINS, 6845
  - LIVER CIRRHOSIS
    - CIRCADIAN RHYTHM, 7178*
  - PROTEINS, 6845
  - SERUM
    - CIRCADIAN RHYTHM, 7178*

- GASTRITIS
  - ACID SECRETION, 6722*
  - AGE FACTORS, 6891

- GASTRITIS (continued)
  - CELLS
    - ACID SECRETION, 6896
    - MITOSIS, 6722*
  - CYTOLOGY
    - IMMUNOLOGY, 6894
  - DISEASES ASSOCIATED WITH
    - ULCER, PEPTIC, 6878*, 6893
  - GASTRIN, 6896
  - HEMORRHAGE
    - SURGERY, 6898
    - THERAPY, 6898
  - MORPHOLOGY, 6895
  - PATHOLOGY, 6895
  - ULCER, PEPTIC
    - IMMUNOLOGY, 6893
  - ULTRASTRUCTURE, 6894

- GASTRODUODENITIS
  - ULCER, PEPTIC
    - DRUG THERAPY, 6930

- GASTROENTERITIS
  - CHOLERA
    - SERUM, 7243
  - ENDOCRINE DISEASES, 6966
  - MAGNESIUM
    - SERUM, 7243
  - NUTRITION DISORDERS
    - DIARRHEA, 7244
    - EPIDEMIOLOGY, 7244
  - VIRUS DISEASES
    - CHILD, 7251
    - EPIDEMIOLOGY, 7251
    - INFANT, 7251

- GASTROENTEROSTOMY
  - STOMACH
    - ULCER, PEPTIC, 6938

- GASTROINTESTINAL DISEASES
  - BILE ACIDS AND SALTS
    - METABOLISM, 6947
  - STOMACH
    - HORMONES, GASTROINTESTINAL, 6685

- GASTROINTESTINAL SYSTEM
  - BLEEDING
    - ENDOSCOPY, 6734, 6899
    - RADIOLOGY, 6899
    - THERAPY, 6734
    - TISSUE ADHESIVES, 6734
  - ENZYMES
    - DIAGNOSIS, 7085
  - GASTRIN
    - CELLS, 6679*
  - HEMORRHAGE
    - DRUG THERAPY, 7186*
    - LIVER CIRRHOSIS, 7186*
    - REVIEW, 7186*
    - VASOPRESSIN, 7186*
  - MOTILITY
    - ELECTROPHYSIOLOGY, 6700
    - NERVOUS CONTROL, 6700
  - RADIONUCLIDES, 6852*

- GENETICS
  - GARDNER'S SYNDROME, 7053
  - LIVER
    - REGENERATION, 6810
  - NEOPLASMS
    - REVIEW, 7239
  - NUTRITION DISORDERS
    - METALS, 7252
    - MINERALS, 7252

- GIARDIASIS
  - TRANSMISSION, 7073

- GLOBULINS
  - ENTERITIS, REGIONAL, 7281
  - HEPATITIS
    - PREVENTION, 7146*
  - HEPATITIS, INFECTIOUS
    - PREVENTION, 7146*

- GLUCAGON
  - GLUCONEOGENESIS
    - ADENOSINE TRIPHOSPHATE, 6804
  - LIVER
    - GLUCONEOGENESIS, 6804

- GLUCONEOGENESIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    - ADENOSINE TRIPHOSPHATE, 6804
  - GLUCAGON
    - ADENOSINE TRIPHOSPHATE, 6804
  - LIVER
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6804
    - GLUCAGON, 6804
    - LEAD, 6770*
    - UREMIA, 6795

- GLUCOSE
  - ABSORPTION
    - DRUG EFFECTS ON, 6825
  - INTESTINAL ABSORPTION
    - MOTILITY, 6694*
  - INTESTINE, SMALL
    - ABSORPTION, 6825
    - TRANSPORT, 6823

- GLUTAMYLTRANSPEPTIDASE
  - CELIAC DISEASE
    - ETIOLOGY, 6978*

- GLYCOGEN
  - ENZYMES
    - DEFICIENCY, 7108*
  - LIVER
    - ENZYMES, 7108*

- GLYCOLIPIDS
  - STOMACH, 6725*

- GLYCOPROTEINS
  - HEPATITIS
    - SERUM, 7263
  - LIVER CIRRHOSIS
    - SERUM, 7263
  - NEOPLASMS
    - SERUM, 7263

GLYCOSIDES
- LIVER
  - NEOPLASMS, 7100*

GRANULOMA
- LIVER
  - ANTI-INFLAMMATORY AGENTS, 7142*
  - DRUG-INDUCED, 7142*

GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
- STOMACH
  - ADRENERGIC RECEPTOR AGONISTS, 6723*
  - ADRENERGIC RECEPTOR BLOCKADERS, 6723*

H1 RECEPTOR ANTAGONISTS
- STOMACH
  - WOUNDS AND INJURIES, 6834*

H2 RECEPTOR ANTAGONISTS
- ACID SECRETION
  - DRUG EFFECTS ON, 6915*
- DRUG THERAPY
  - COMPLICATIONS, 6916*
- DUODENUM
  - ULCER, PEPTIC, 6917*
- STOMACH
  - ACID SECRETION, 6915*
  - ULCER, PEPTIC, 6915*
  - WOUNDS AND INJURIES, 6834*
- ULCER, PEPTIC
  - COMPLICATIONS, 6916*
  - DRUG THERAPY, 6904, 6916*, 6917*

HEMATOBILIA
- ANEURYSM
  - BLEEDING, 7129
- ANGIOGRAPHY
  - DIAGNOSIS, 7120
  - THERAPY, 7120
- LIVER INJURY
  - DIAGNOSIS, 7132
  - THERAPY, 7132

HEMORRHAGE
- SEE ALSO BLEEDING
- COLON, 7045
  - NEOPLASMS, 7040
  - THERAPY, 6874*
- COLONOSCOPY
  - COMPLICATIONS, 7010
- ESOPHAGUS
  - VARICES, 6897
- GALLBLADDER
  - PERFORATION, 7230
- GASTRITIS
  - SURGERY, 6898
  - THERAPY, 6898
- GASTROINTESTINAL SYSTEM
  - DRUG THERAPY, 7186*
  - LIVER CIRRHOSIS, 7186*
  - REVIEW, 7186*
  - VASOPRESSIN, 7186*
- PANCREATITIS
  - SURGERY, 7077*
- PANCREATITIS, CHRONIC
  - ETIOLOGY, 7079*
  - HYPERTENSION, PORTAL, 7079*

HEMORRHAGE (continued)
- RECTUM
  - NEOPLASMS, 7040
  - THERAPY, 6874*
- STOMACH
  - DIAGNOSIS, 6897
  - ENDOSCOPY, 6897
  - ULCER, PEPTIC, 6897
- ULCER
  - THERAPY, 6874*
- VASOPRESSIN
  - ANESTHESIA, 6874*
- WATER, ELECTROLYTE BALANCE
  - THERAPY, 6874*

HEMORRHOIDS
- SURGERY
  - RECURRENCE, 7026
  - SEQUELAE, 7026

HEMOSTASIS
- LIVER DISEASES
  - PROTHROMBIN, 7110*

HEPATIC VEIN THROMBOSIS
- SEE ALSO BUDD-CHIARI SYNDROME

HEPATITIS
- ANEURYSM
  - DISEASES ASSOCIATED WITH, 7138*
- ANGIOGRAPHY
  - CHILD, 7086*
- ANTIBODIES
  - ETHNIC FACTORS, 7157*
- ANTIGENS
  - ETHNIC FACTORS, 7157*
- BILE ACIDS AND SALTS
  - BILE, 7105*
  - INFANT, 7105*
  - SERUM, 7105*
- GLYCOPROTEINS
  - SERUM, 7263
- IMMUNITY, 7146*
- LIPIDS, 7093*
- LIVER
  - ANEURYSM, 7138*
  - LIPASE, 7173*
- LIVER DISEASES, ALCOHOLIC, 7176
- PEROXIDES, 7093*
- PREGNANCY, 7153*
- PREVENTION
  - GLOBULINS, 7146*
- TRANSMISSION
  - FAMILIAL FACTORS, 7149*
- WILSON'S DISEASE
  - DISEASES ASSOCIATED WITH, 7145*

HEPATITIS, CHRONIC
- ANTIBODIES
  - ALBUMINS, 7090*
  - DIAGNOSIS, 7165*
- AUSTRALIA ANTIGEN
  - BIOPSY, 7152*
  - IMMUNITY, 7151*
- BIOCHEMISTRY, 7169
  - REVIEW, 7168
- CHILD
  - HEPATOCYTES, 7166*
  - ULTRASTRUCTURE, 7166*

HEPATITIS, CHRONIC (continued)
    DIAGNOSIS
        REVIEW, 7168, 7170
    DISEASES ASSOCIATED WITH
        HEMOPHILIA, 7167
    DRUG-INDUCED
        SIMULATION, 6781*
    ETIOLOGY
        REVIEW, 7168
    HEPATITIS, INFECTIOUS
        ANTIGENS, 7156*
        AUSTRALIA ANTIGEN, 7156*
    HUMORAL FACTORS
        DIAGNOSIS, 7087*
    IMMUNOLOGY, 7169
        REVIEW, 7168
    PREGNANCY, 7153*
    THERAPY
        REVIEW, 7168, 7170

HEPATITIS, INFECTIOUS
    ALPHA FETOPROTEIN
        RADIOIMMUNOASSAY, 7089*
    ANTIBODIES
        ETHNIC FACTORS, 7157*
    ANTIGENS
        BLOOD, 7150*
        DIAGNOSIS, 7150*
        ETHNIC FACTORS, 7157*
        LIVER, 7150*
        PROGNOSIS, 7150*
    AUSTRALIA ANTIGEN
        BIOPSY, 7152*
        BLOOD, 7150*
        DIAGNOSIS, 7150*
        EPIDEMIOLOGY, 7162, 7163
        IMMUNOLOGY, 7164
        LIVER, 7150*
        REVIEW, 7164
        TRANSMISSION, 7164
    BIOPSY
        ANTIGENS, 7156*
        AUSTRALIA ANTIGEN, 7156*
    CHILD
        AUSTRALIA ANTIGEN, 7161
        EPIDEMIOLOGY, 7161
    DIET
        THERAPY, 7148*
    EPIDEMIOLOGY
        REVIEW, 7160
    HEPATITIS, CHRONIC
        ANTIGENS, 7156*
        AUSTRALIA ANTIGEN, 7156*
    HORMONES
        DIET, 7148*
        THERAPY, 7148*
    IMMUNITY, 7146*
    IMMUNOGLOBULINS
        PREVENTION, 7147*
        REVIEW, 7147*
    IMMUNOLOGY
        PROGNOSIS, 7158
    LIVER
        LIPASE, 7173*
    PREVENTION
        GLOBULINS, 7146*
    PROTEINS
        SYNTHESIS, 6721
    RIBOSOMES, 6721

HEPATITIS, INFECTIOUS (continued)
    TRANSMISSION
        FAMILIAL FACTORS, 7149*
        REVIEW, 7160
        SEX FACTORS, 7159
    VACCINES, 7160

HEPATITIS, NONVIRAL
    CATHARTICS, 7140*

HEPATITIS, TOXIC
    LIVER
        NECROSIS, 6786
    PROTEINS
        SYNTHESIS, 6721
    RIBOSOMES, 6721
    VIRUSES
        NECROSIS, 6786
        SIMULATION, 6786

HEPATOCYTES
    AMINO ACIDS
        TRANSPORT, 6760*
    FERRITIN
        METABOLISM, 6772*
    HEPATITIS, CHRONIC
        CHILD, 7166*
    HORMONES
        BINDING, 6796
    IRON
        METABOLISM, 6772*
    LIVER
        NEOPLASMS, 7101*
    LIVER CIRRHOSIS
        ULTRASTRUCTURE, 7181*
    MEMBRANES
        ANTIGENS, 6846
        LIPIDS, 6846
    MITOCHONDRIA
        DIETARY FACTORS, 6789
        MORPHOLOGY, 6789
    SCLERODERMA
        ULTRASTRUCTURE, 7115*
    TRANQUILIZING AGENTS
        METABOLISM, 6769*

HERNIA
    PANCREATITIS
        DIAGNOSIS, 7081

HIATAL HERNIA
    ESOPHAGEAL REFLUX
        SURGERY, 6863*
    ESOPHAGITIS
        PROGNOSIS, 6867
        REVIEW, 6867
        SURGERY, 6867
        THERAPY, 6867
    SURGERY
        COMPLICATIONS, 6866
        TECHNIQUES, 6866

HIRSCHSPRUNG'S DISEASE
    DIAGNOSIS, 7061
    ENTEROCOLITIS, 7061
    ETIOLOGY, 7061
    INTESTINAL OBSTRUCTION
        NEONATE, 7007
        REVIEW, 7007

HIRSCHSPRUNG'S DISEASE (continued)
- NEONATE
  - REVIEW, 7007
- PATHOLOGY, 7061
- THERAPY, 7061

HISTAMINE
- ABSORPTION
  - DRUG EFFECTS ON, 6825
- STOMACH
  - SECRETION, 6735
  - WOUNDS AND INJURIES, 6834*
- ULCER
  - STRESS, 6736
- ULCER, PEPTIC
  - PROGNOSIS, 6912*

HODGKIN'S DISEASE
- STOMACH, 6889

HORMONE CONTROL
- LIVER
  - ENZYMES, 6715*
- MILK
  - METABOLISM, 6714*
- PROTEINS
  - SYNTHESIS, 6768*

HORMONES
- HEPATITIS, INFECTIOUS
  - DIET, 7148*
  - THERAPY, 7148*
- HEPATOCYTES
  - BINDING, 6796
- INTESTINES
  - FOOD, 6838
- KWASHIORKOR
  - NUTRITION DISORDERS, 7245
- MARASMUS
  - NUTRITION DISORDERS, 7245

HORMONES, ADRENAL CORTEX
- COLITIS, ULCERATIVE, 7066
- PANCREAS
  - PATHOLOGY, 6752
  - SECRETION, 6752
- SALIVARY GLANDS
  - HORMONE EFFECTS ON, 6719

HORMONES, GASTROINTESTINAL
- CHILD
  - REVIEW, 6953
- GASTROINTESTINAL DISEASES
  - STOMACH, 6685
- ILEUM
  - ASSAY, 6820*
  - DIGESTION, 6820*
- JEJUNUM
  - ASSAY, 6820*
  - DIGESTION, 6820*
- MILK
  - METABOLISM, 6714*
- NEONATE
  - MILK, 6714*
- REVIEW, 6837

HYDROCARBONS
- LIVER
  - NEOPLASMS, 7100*
- LIVER INJURY
  - MORPHOLOGY, 6811

HYDROCARBONS, CHLORINATED
- PORPHYRINS
  - ENZYMES, 6785
  - URINE, 6785

HYPERBILIRUBINEMIA
- ANEMIA, SICKLE CELL
  - COMPLICATIONS, 7133*
  - PROGNOSIS, 7133*

HYPERBILIRUBINEMIA, HEREDITARY
- SEE ALSO CRIGLER-NAJJAR SYNDROME

HYPERCHLORHYDRIA
- SEE ALSO ACID SECRETION SECRETION
- STOMACH
  - ULCER, PEPTIC, 6926

HYPERPLASIA
- DUODENUM
  - CELIAC DISEASE, 6979*
  - CELLS, 6979*
- INTESTINE, SMALL
  - CELIAC DISEASE, 6979*
  - CELLS, 6979*

HYPERSENSITIVITY
- LACTOSE INTOLERANCE
  - DIAGNOSIS, 6984
  - MILK, 6984

HYPERTENSION
- GALLBLADDER
  - INFARCTION, 7192
- ULCER, PEPTIC
  - DRUG THERAPY, 6927

HYPERTENSION, PORTAL
- CHILD
  - SCANNING, SCINTILLATION, 7094*
- ETIOLOGY, 7112*
- LIVER
  - MORPHOLOGY, 7112*
  - PATHOLOGY, 7112*
- PANCREATITIS, CHRONIC
  - HEMORRHAGE, 7079*

HYPOCALCEMIA
- ETIOLOGY
  - THYROCALCITONIN, 7076*
- PANCREATITIS
  - COMPLICATIONS, 7076*

HYPOLIPEMIC AGENTS
- FATTY LIVER
  - ACIDS, 6809

HYPOPLASIA
- INTESTINE, SMALL
  - LYMPHANGIECTASIS, 6946

- HYPOTENSION
  - INTESTINE, SMALL
    - NERVOUS SYSTEM, 6832*
    - SHOCK, 6832*
- ILEITIS
  - MALABSORPTION SYNDROMES
    - JEJUNUM, 6940*, 6941*
- ILEUM
  - SEE ALSO DUODENUM, INTESTINE, SMALL, JEJUNUM
  - ANOMALY
    - UROGENITAL SYSTEM, 6970
  - BARIUM
    - ENEMA, 6851*
  - CECUM
    - BARIUM, 7054
  - CONTRAST MEDIA
    - TECHNIQUES, 6851*
  - CROHN'S DISEASE
    - DRUG THERAPY, 7276*
  - HORMONES, GASTROINTESTINAL
    - ASSAY, 6820*
    - DIGESTION, 6820*
  - MOTILITY
    - TRANSPORT, 6710
  - NEOPLASMS
    - CROHN'S DISEASE, 7278
    - INTESTINAL OBSTRUCTION, 6955
  - RADIOLOGY
    - TECHNIQUES, 7054
- IMMUNITY
  - CHOLESTASIS
    - AUSTRALIA ANTIGEN, 7151*
  - HEPATITIS, 7146*
  - HEPATITIS, CHRONIC
    - AUSTRALIA ANTIGEN, 7151*
  - HEPATITIS, INFECTIOUS, 7146*
  - INTESTINES
    - IMMUNOGLOBULINS, 6818*
  - LIVER
    - NEOPLASMS, 7151*
  - LIVER CIRRHOSIS
    - AUSTRALIA ANTIGEN, 7151*
  - SCHISTOSOMIASIS
    - SIMULATION, 6790
- IMMUNOGLOBULINS
  - GASTRIN, 6845
  - HEPATITIS, INFECTIOUS
    - PREVENTION, 7147*
    - REVIEW, 7147*
  - INTESTINE, SMALL
    - DEFICIENCY, 6949
  - INTESTINES
    - CELLS, 6818*
    - IMMUNITY, 6818*
    - NEONATE, 6818*
  - JEJUNUM, 6972
- IMMUNOTHERAPY
  - STOMACH
    - NEOPLASMS, 6877*
- INFANT
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 7105*

- INFANT (continued)
  - DIARRHEA
    - INFECTION, 7261
    - REVIEW, 7258, 7261
    - THERAPY, 7261
  - ENTEROCOLITIS, NECROTIZING, 7255
  - GASTROENTERITIS
    - VIRUS DISEASES, 7251
  - HEPATITIS
    - BILE ACIDS AND SALTS, 7105*
  - INTESTINES
    - BACTERIA, 7253
  - JAUNDICE, OBSTRUCTIVE
    - SCANNING, SCINTILLATION, 7094*
  - LIVER DISEASES
    - SCANNING, SCINTILLATION, 7094*
  - SERUM
    - AMYLASES, 6744*
  - URINE
    - AMYLASES, 6744*
- INFARCTION
  - HYPERTENSION
    - GALLBLADDER, 7192
- INFECTION
  - COLON
    - SURGERY, 7046
  - DIARRHEA
    - CHILD, 7261
    - INFANT, 7261
  - INTESTINE, LARGE
    - PREVENTION, 7056
    - SURGERY, 7056
  - RECTUM
    - SURGERY, 7046
- INFLAMMATION
  - CECUM
    - CHILD, 7044
    - LEUKEMIA, 7044
  - COLITIS, ULCERATIVE
    - HISTOCHEMISTRY, 7067
    - ULTRASTRUCTURE, 7067
  - SALIVARY GLANDS
    - DIAGNOSIS, 7246
    - THERAPY, 7246
    - ULTRASTRUCTURE, 7269
- INFLAMMATORY BOWEL DISEASES
  - ADOLESCENCE
    - ENDOCRINE DISEASES, 7287
  - CHILD
    - ENDOCRINE DISEASES, 7287
    - REVIEW, 6953
- INTEGUMENTARY SYSTEM
  - ANUS
    - NEOPLASMS, 7011
  - SHORT BOWEL SYNDROME
    - KWASHIORKOR, 6951
- INTESTINAL ABSORPTION
  - ALKALOIDS
    - AMINO ACIDS, 6686*
  - CHILD
    - REVIEW, 6953
  - GLUCOSE
    - MOTILITY, 6694*

INTESTINAL ABSORPTION (continued)
- WATER
  - MOTILITY, 6694*

INTESTINAL OBSTRUCTION
- DUODENUM
  - ETIOLOGY, 7113*
  - NEONATE, 7113*
- HIRSCHSPRUNG'S DISEASE
  - REVIEW, 7007
- ILEUM
  - NEOPLASMS, 6955
- INTESTINE, SMALL
  - DIETARY FACTORS, 6967
  - ETHNIC FACTORS, 6967
- NEONATE
  - ETIOLOGY, 7113*
  - HIRSCHSPRUNG'S DISEASE, 7007
  - MILK, 6954

INTESTINE, LARGE
- SEE ALSO CECUM, COLON
- INFECTION
  - SURGERY, 7056
- NEOPLASMS, MALIGNANT, 7038
- POLYPS
  - FAMILIAL FACTORS, 7048, 7058
  - NEOPLASMS, 7048, 7058
- PREVENTION
  - INFECTION, 7056
- SECRETION
  - POTASSIUM, 7271
- SURGERY
  - ANTIBIOTICS, 7056

INTESTINE, SMALL
- SEE ALSO DUODENUM, ILEUM, JEJUNUM
- ABSORPTION
  - AMINO ACIDS, 6686*
  - CELLS, 6690*
  - DRUG EFFECTS ON, 6825
  - GLUCOSE, 6825
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - DRUG EFFECTS ON, 6814*
- AMYLASES, 6823
- CELIAC DISEASE
  - MORPHOLOGY, 6995
- CELLS
  - CHLORIDES, 6690*
  - HYPERPLASIA, 6979*
  - TERPENES, 6827
- CHILD
  - DIGESTION, 6953
- CROHN'S DISEASE
  - NEOPLASMS, 7278
  - SIMULATION, 7278
- DISEASE
  - MORPHOLOGY, 6950
- ELECTROPHYSIOLOGY
  - SOMATOSTATIN, 6711
  - SURGERY, 6697*
- ENZYMES, 6823
  - AMINO ACIDS, 6815*
  - TEMPERATURE, 6824
- GASES, 6973
- HYPERPLASIA
  - CELIAC DISEASE, 6979*

INTESTINE, SMALL
- HYPOTENSION
  - NERVOUS SYSTEM, 6832*
  - SHOCK, 6832*
- IMMUNOGLOBULINS
  - DEFICIENCY, 6949
- INTESTINAL OBSTRUCTION
  - DIETARY FACTORS, 6967
  - ETHNIC FACTORS, 6967
- INTUSSUSCEPTION
  - ULTRASONOGRAPHY, 7025
- ION TRANSPORT
  - BILE ACIDS AND SALTS, 6689*
- ISCHEMIA, 6956
- LYMPHANGIEGTASIS
  - HYPOPLASIA, 6946
  - PROTEIN-LOSING ENTEROPATHIES, 6946
- LYMPHOMA
  - ALPHA-CHAIN DISEASE, 6977*
  - MALABSORPTION SYNDROMES, 6977*
- MEMBRANES
  - ION TRANSPORT, 6688*
- MITOCHONDRIA
  - VITAMIN D, 6839
- NECROSIS
  - ANGIOGRAPHY, 6960
  - EMBOLIZATION, 6960
  - RADIOLOGY, 6952
- NEOPLASMS
  - POLYPS, 6943
- NUCLEIC ACIDS
  - COLON, 6813
  - JEJUNUM, 6813
  - SYNTHESIS, 6813
  - VITAMIN D, 6839
- PERFORATION
  - FETUS, 6962
  - NEONATE, 6962
- PERITONEUM
  - GASES, 6968
- POTASSIUM
  - ULCER, 6939*
- PROTEINS
  - VITAMIN D, 6839
- RADIOLOGY
  - BARIUM, 6829*
- SCANNING, SCINTILLATION
  - BLEEDING, 6959
- SECRETION
  - AMYLASES, 6822
  - CELLS, 6827
  - LIPASE, 6822
  - TERPENES, 6827
- SHOCK
  - NERVOUS SYSTEM, 6832*
- SHUNT, INTESTINAL
  - BIOCHEMISTRY, 6944
  - MORPHOLOGY, 6944
  - OBESITY, 6944
- SURGERY
  - NEONATE, 6961
- TRANSPORT
  - GLUCOSE, 6823
- VILLI
  - DRUG EFFECTS ON, 6833*
  - RADIATION EFFECTS ON, 6833*

INTESTINES
- ABSORPTION
  - FATS, 6695

- INTESTINES (continued)
  - ATRESIA
    - FISSURE, 7015
  - BACTERIA, 6840, 6841
  - DISEASE
    - BILE ACIDS AND SALTS, 7280
    - NERVOUS SYSTEM, 7050
  - ENZYMES
    - LIPIDS, 6817*
  - FOOD
    - HORMONES, 6838
  - IMMUNOGLOBULINS
    - CELLS, 6818*
    - IMMUNITY, 6818*
  - INFANT
    - BACTERIA, 7253
  - NEONATE
    - IMMUNOGLOBULINS, 6818*
  - NEOPLASMS
    - RADIOLOGY, 7024
  - NITROGEN, 6821
  - NUTRITION DISORDERS
    - CHILD, 7262
    - MORPHOLOGY, 7262
  - RADIOLOGY
    - COMPLICATIONS, 6858
    - DISEASE, 6858
  - WOUNDS AND INJURIES
    - RUPTURE, 6903

- INTUSSUSCEPTION
  - CHILD
    - ETIOLOGY, 7042
    - THERAPY, 7042
  - COLON
    - NEOPLASMS, 7035
  - INTESTINE, SMALL
    - ULTRASONOGRAPHY, 7025

- ION TRANSPORT
  - COLON
    - BILE ACIDS AND SALTS, 6816*
  - DIARRHEA
    - ETIOLOGY, 6816*
  - INTESTINE, SMALL
    - BILE ACIDS AND SALTS, 6689*
    - MEMBRANES, 6688*
  - JEJUNUM
    - BILE ACIDS AND SALTS, 6689*
  - SPRUE, TROPICAL, 6982*

- IRON
  - ABSORPTION
    - DIETARY FACTORS, 6691*
  - DEFICIENCY
    - ANEMIA, 6696
  - DIET
    - ABSORPTION, 6692*
    - SIMULATION, 6692*
  - HEPATOCYTES
    - METABOLISM, 6772*
  - METABOLISM
    - ANEMIA, 6696

- IRRITABLE COLON
  - DIAGNOSIS, 7043
  - LACTOSE INTOLERANCE
    - SIMULATION, 6991
  - THERAPY, 7043

- ISCHEMIA
  - INTESTINE, SMALL, 6956

- JAUNDICE
  - IATROGENESIS, 7106*
  - NEONATE
    - DRUG THERAPY, 7134
    - PHOTOTHERAPY, 7134
    - THERAPY, 7134
  - SURGERY
    - DIAGNOSIS, 7106*
    - ETIOLOGY, 7106*

- JAUNDICE, OBSTRUCTIVE
  - BILE DUCTS
    - NEOPLASMS, BENIGN, 7218*
  - CHILD
    - SCANNING, SCINTILLATION, 7094*
  - COMMON BILE DUCT CALCULI
    - ULTRASONOGRAPHY, 7229
  - INFANT
    - SCANNING, SCINTILLATION, 7094*
  - KERNICTERUS
    - NERVOUS SYSTEM, 7107*
  - NEOPLASM METASTASIS
    - SURGERY, 7217*
  - NEOPLASMS, MALIGNANT
    - SURGERY, 7217*
  - PANCREAS
    - CYSTS, 7228

- JEJUNUM
  - SEE ALSO DUODENUM, ILEUM, INTESTINE, SMALL
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    - DRUG EFFECTS ON, 6814*
  - HORMONES, GASTROINTESTINAL
    - ASSAY, 6820*
    - DIGESTION, 6820*
  - IMMUNOGLOBULINS, 6972
  - INTESTINE, SMALL
    - NUCLEIC ACIDS, 6813
  - ION TRANSPORT
    - BILE ACIDS AND SALTS, 6689*
  - MALABSORPTION SYNDROMES
    - ILEITIS, 6940*, 6941*
  - MOTILITY
    - TRANSPORT, 6710

- KERNICTERUS
  - JAUNDICE, OBSTRUCTIVE
    - NERVOUS SYSTEM, 7107*
  - LIVER CIRRHOSIS
    - NERVOUS SYSTEM, 7107*
  - LIVER DISEASES
    - AMMONIA, 7182*
    - DOPAMINE, 7182*

- KIDNEYS
  - AMINO ACIDS
    - SYNTHESIS, 6777*
  - ANOMALY
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*

- KWASHIORKOR
  - EPIDEMIOLOGY, 7245
  - NUTRITION DISORDERS
    - HORMONES, 7245
    - PROTEINS, 7245

KWASHIORKOR (continued)
- SHORT BOWEL SYNDROME
  - INTEGUMENTARY SYSTEM, 6951

LACTOSE
- MALABSORPTION SYNDROMES, 6980*

LACTOSE INTOLERANCE
- BONES
  - CALCIUM, 6988
  - MINERALS, 6988
- DIAGNOSIS, 6990
- EPIDEMIOLOGY, 6983
- HYPERSENSITIVITY
  - DIAGNOSIS, 6984
- IRRITABLE COLON
  - SIMULATION, 6991
- MILK
  - HYPERSENSITIVITY, 6984
- REVIEW, 6990

LAPAROSCOPY
- PANCREATIC DISEASES
  - DIAGNOSIS, 7070

LAPAROTOMY
- CROHN'S DISEASE
  - APPENDICITIS, 7277

LEAD
- LIVER
  - GLUCONEOGENESIS, 6770*

LEUKEMIA
- CECUM
  - INFLAMMATION, 7044

LIPASE
- BLOOD, 6822
- INTESTINE, SMALL
  - SECRETION, 6822
- LIVER
  - HEPATITIS, 7173*
  - HEPATITIS, INFECTIOUS, 7173*
  - LIVER DISEASES, ALCOHOLIC, 7173*

LIPID STORAGE DISEASE
- LIVER, 7124

LIPIDS
- SEE ALSO FATS, TRIGLYCERIDES
- FATTY LIVER
  - TRANSPORT, 6802
- HEPATITIS, 7093*
- HEPATOCYTES
  - MEMBRANES, 6846
- INTESTINES
  - ENZYMES, 6817*
- LIVER CIRRHOSIS, 7093*
- LIVER DISEASES, 7093*
- SALIVARY GLANDS
  - BIOCHEMISTRY, 6720
  - DIETARY FACTORS, 6720

LIPOGENESIS
- LIVER
  - VITAMIN A, 6773*, 6774*

LIPOPROTEINS
- BILE
  - ELECTROPHORESIS, 6775*

LIVER
- ACIDS
  - PHOSPHOLIPIDS, 6808
  - TRIGLYCERIDES, 6808
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - VITAMIN C, 6765*
- ALPHA 1 ANTITRYPSIN
  - DEFICIENCY, 7119
- ALPHA FETOPROTEIN
  - ULTRASTRUCTURE, 6759*
- AMINO ACIDS
  - METABOLISM, 6761*
  - PROTEINS, 6761*
  - SYNTHESIS, 6777*
  - TRANSPORT, 6758*
- ANEURYSM
  - DISEASES ASSOCIATED WITH, 7138*
  - DRUG-INDUCED, 7138*
  - HEPATITIS, 7138*
- ANOMALY
  - NEOPLASMS, BENIGN, 7219*
  - ULTRASONOGRAPHY, 7219*
- ANOMALY, CONGENITAL, 7113*
- AUSTRALIA ANTIGEN
  - HISTOCHEMISTRY, 7154*
- BLEEDING
  - COLLAGEN, 7109*
  - THERAPY, 7109*
- CARBOHYDRATES
  - PROTEINS, 6761*
- CARCINOID TUMOR
  - NEOPLASM METASTASIS, 7102*
- CHOLESTEROL
  - ACIDS, 6808
  - ENZYMES, 6791
  - METABOLISM, 6791
  - SYNTHESIS, 6773*, 6791, 6808
- CIRCULATION
  - CLEARANCE STUDY, 6755*
  - FETUS, 7184*
  - MORPHOLOGY, 7184*
  - NERVOUS CONTROL, 6757*
  - VASOPRESSIN, 6756*
- CLEARANCE STUDY
  - TECHNIQUES, 6755*
- COENZYMES, 6776*
- CYSTS
  - ULTRASONOGRAPHY, 7123
- DRUG-INDUCED
  - FIBROSIS, 7139*
- ENZYMES
  - BIOCHEMISTRY, 6812
  - CIRCADIAN RHYTHM, 6791
  - ENDOTOXINS, 6778*
  - HORMONE CONTROL, 6715*
  - HORMONE EFFECTS ON, 6715*
  - STEROIDS, 6807
- FETUS
  - COPPER, 6805
  - ENZYMES, 6807
  - ZINC, 6805
- FIBROSIS
  - AGE FACTORS, 7139*
  - ALCOHOLS, 7139*

LIVER (continued)
- FISSURE
  - SCANNING, SCINTILLATION, 7130
- GLUCONEOGENESIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6804
  - GLUCAGON, 6804
  - LEAD, 6770*
  - UREMIA, 6795
- GLYCOGEN
  - ENZYMES, 7108*
- GRANULOMA
  - ANTI-INFLAMMATORY AGENTS, 7142*
  - DRUG-INDUCED, 7142*
- HEPATITIS, INFECTIOUS
  - ANTIGENS, 7150*
  - AUSTRALIA ANTIGEN, 7150*
- HEPATITIS, TOXIC
  - NECROSIS, 6786
- HYPERTENSION, PORTAL
  - MORPHOLOGY, 7112*
  - PATHOLOGY, 7112*
- LIPASE
  - HEPATITIS, 7173*
  - HEPATITIS, INFECTIOUS, 7173*
  - LIVER DISEASES, ALCOHOLIC, 7173*
- LIPID STORAGE DISEASE, 7124
- LIPOGENESIS
  - VITAMIN A, 6773*
- METABOLISM
  - ALCOHOLS, 7174*
- MITOCHONDRIA
  - VITAMIN D, 6839
- MORPHOLOGY
  - ALCOHOLS, 7174*
- NECROSIS
  - ANEMIA, APLASTIC, 7111*
  - BILE ACIDS AND SALTS, 7092*
  - CLEARANCE STUDY, 7092*
  - DIAGNOSIS, 7092*
  - DISEASES ASSOCIATED WITH, 7111*
- NEOPLASM METASTASIS
  - RADIONUCLIDES, 6998*
  - SCANNING, SCINTILLATION, 6998*
  - ULTRASONOGRAPHY, 7125, 7227
- NEOPLASMS
  - AFLATOXINS, 7100*
  - ALPHA FETOPROTEIN, 7089*, 7096*, 7104*
  - AUSTRALIA ANTIGEN, 7151*
  - BLEEDING, 7118
  - CARCINOGENS, 6801, 7100*
  - CHILD, 7096*
  - CHOLESTEROL, 7097*
  - DRUG-INDUCED, 6799, 6800
  - DRUG THERAPY, 7099*
  - EPIDEMIOLOGY, 7101*
  - GLYCOSIDES, 7100*
  - HEPATOCYTES, 7101*
  - HYDROCARBONS, 7100*
  - IMMUNITY, 7151*
  - IMMUNOLOGY, 6800, 7097*
  - NITROSAMINES, 7100*
  - PATHOLOGY, 6801
  - RADIOTHERAPY, 7099*
  - RECURRENCE, 7096*
  - TOXINS, 7100*
  - ULTRASONOGRAPHY, 7227

LIVER (continued)
- NEOPLASMS, MALIGNANT
  - CHILD, 7103*
  - CONTRACEPTIVES, ORAL, 7126
  - PROGNOSIS, 7098*, 7103*
  - SURGERY, 7098*
  - SURVIVAL, 7098*
  - THERAPY, 7098*
  - VIRUS DISEASES, 7248
- NUCLEIC ACIDS
  - VITAMIN D, 6839
- OXYGEN
  - NERVOUS CONTROL, 6757*
- PERFUSION
  - AMINO ACIDS, 6761*
- PHOSPHOLIPIDS
  - TECHNIQUES, 6850*
- PROSTAGLANDINS
  - SYNTHESIS, 6794
- PROTEINS
  - VITAMIN D, 6839
- REGENERATION
  - ENZYMES, 6767
  - GENETICS, 6810
  - NUCLEIC ACIDS, 6810
- RIBOSOMES
  - PROTEINS, 6768*
- SCANNING, SCINTILLATION, 6853*
- SHUNT
  - DISEASES ASSOCIATED WITH, 7128
- TOMOGRAPHY, 6853*
- TOXINS
  - POLYSACCHARIDES, 6782*
- TRANSPLANTATION
  - DRAINAGE, 7117*
  - REVIEW, 7116*
  - SURVIVAL, 7116*
  - TECHNIQUES, 7117*

LIVER CIRRHOSIS
- ALCOHOLS, 7191
- ALPHA FETOPROTEIN
  - RADIOIMMUNOASSAY, 7089*
- ANGIOGRAPHY
  - CHILD, 7086*
- ANTIBODIES
  - ALBUMINS, 7090*
  - DIAGNOSIS, 7165*
- ASCITES
  - THERAPY, 7179*
- AUSTRALIA ANTIGEN
  - BIOPSY, 7152*
  - IMMUNITY, 7151*
- CHILD
  - SCANNING, SCINTILLATION, 7094*
- CHOLESTASIS
  - DIAGNOSIS, 7194
- CHOLESTEROL
  - SERUM, 7097*
- CIRCULATION
  - FETUS, 7184*
  - MORPHOLOGY, 7184*, 7187*
- DIAGNOSIS
  - PATHOLOGY, 7193
- DISEASES ASSOCIATED WITH
  - RESPIRATORY SYSTEM, 7183*
- DRUG-INDUCED
  - AGE FACTORS, 7139*
  - ALCOHOLS, 7139*

LIVER CIRRHOSIS (continued)
    ESOPHAGUS
        VARICES, 7185*
    ETIOLOGY, 7191
    GASTRIN
        CIRCADIAN RHYTHM, 7178*
    GASTROINTESTINAL SYSTEM
        HEMORRHAGE, 7186*
    GLYCOPROTEINS
        SERUM, 7263
    HEPATOCYTES
        ULTRASTRUCTURE, 7181*
    HUMORAL FACTORS
        DIAGNOSIS, 7087*
    KERNICTERUS
        NERVOUS SYSTEM, 7107*
        SERUM, 7097*
    LIPIDS, 7093*
    LIVER DISEASES, ALCOHOLIC, 7175
    MITOCHONDRIA
        CYTOCHROMES, 7189*
    NEONATE
        FAMILIAL FACTORS, 7149*
        TRANSMISSION, 7149*
    NEOPLASMS
        DIAGNOSIS, 7097*
    PEROXIDES, 7093*
    THERAPY, 7193
    VARICES
        BLEEDING, 7185*
    VITAMIN B1, 7190

LIVER COMA
    PORTACAVAL SHUNT
        SLEEP, 6779*

LIVER DISEASES
    ANGIOGRAPHY
        CHILD, 7086*
    ANTIBODIES
        ALBUMINS, 7090*
        DIAGNOSIS, 7165*
        MITOCHONDRIA, 7177*
    AUSTRALIA ANTIGEN
        BIOPSY, 7152*
    BILE
        BILE ACIDS AND SALTS, 7280
    BILE ACIDS AND SALTS
        CLEARANCE STUDY, 7092*
    CHILD
        SCANNING, SCINTILLATION, 7094*
    DIAGNOSIS
        BILE ACIDS AND SALTS, 7092*
        CLEARANCE STUDY, 7092*
        PHOSPHOLIPIDS, 6850*
    DIURETICS
        METABOLISM, 7091*
    DRUG METABOLISM
        ANALGESICS AND ANTIPYRETICS, 7084*
    DRUG THERAPY
        COMPLICATIONS, 7122
    HEMOSTASIS
        PROTHROMBIN, 7110*
    IMMUNOLOGY
        DIAGNOSIS, 7087*
    INFANT
        SCANNING, SCINTILLATION, 7094*

LIVER DISEASES (continued)
    KERNICTERUS
        AMMONIA, 7182*
        DOPAMINE, 7182*
    LIPIDS, 7093*
    NEOPLASMS
        ANGIOGRAPHY, 7086*
        CHILD, 7086*
    PEROXIDES, 7093*

LIVER DISEASES, ALCOHOLIC
    ASCITES
        SHUNT, 7180*
    HEPATITIS, 7176
    LIVER
        LIPASE, 7173*
    LIVER CIRRHOSIS, 7175
    VITAMIN B1, 7190

LIVER FUNCTION TESTS
    ENTERECTOMY, 6783*
    LIVER INJURY, 7144
    SHUNT, INTESTINAL, 6783*

LIVER INJURY
    CATHARTICS, 7140*
    COENZYMES, 6798
    DIAGNOSIS
        AMINO ACIDS, 7171*
        PLASMA, 7171*
    DRUG-INDUCED
        ANTI-INFLAMMATORY AGENTS, 7142*
        BIOCHEMISTRY, 7136*
        REVIEW, 7137*, 7141*
        THERAPY, 7141*
        TOXINS, 7137*
    ENZYMES
        STRESS, 6836*
    FUNGI
        TOXICITY, 7143
    HEMATOBILIA
        DIAGNOSIS, 7132
        THERAPY, 7132
    HYDROCARBONS
        MORPHOLOGY, 6811
    LIVER FUNCTION TESTS, 7144
    LYSOSOMES
        STRESS, 6836*
    MICROSOMES
        ENZYMES, 6793
    SHUNT, INTESTINAL
        COMPLICATIONS, 6783*
        ETIOLOGY, 6783*
    TOXINS
        TRIGLYCERIDES, 6792

LYMPHANGIECTASIS
    INTESTINE, SMALL
        HYPOPLASIA, 6946
        PROTEIN-LOSING ENTEROPATHIES, 6946

LYMPHOMA
    ALPHA-CHAIN DISEASE
        DIAGNOSIS, 6977*
    INTESTINE, SMALL
        ALPHA-CHAIN DISEASE, 6977*
        MALABSORPTION SYNDROMES, 6977*

- LYSOSOMES
  - LIVER INJURY
    - STRESS, 6836*
- LYSOZYMES
  - COLITIS, ULCERATIVE, 7062*
  - CROHN'S DISEASE, 7062*
- MAGNESIUM
  - GASTROENTERITIS
    - SERUM, 7243
- MALABSORPTION SYNDROMES
  - ALPHA CHAIN DISEASE, 6977*
    - DIAGNOSIS, 6977*
  - CHILD
    - REVIEW, 6992
  - COENZYMES
    - REVIEW, 6987
  - FOLIC ACID
    - REVIEW, 6987
  - ILEITIS
    - JEJUNUM, 6941*
  - INTESTINE, SMALL
    - LYMPHOMA, 6977*
  - JEJUNUM
    - ILEITIS, 6940*
  - LACTOSE, 6980*
  - MENETRIER'S DISEASE
    - FOLIC ACID, 6902
  - MILK
    - ETIOLOGY, 6981*
  - PROTEINS
    - ETIOLOGY, 6981*
  - VITAMIN B12
    - CHILD, 6985
- MALLORY-WEISS SYNDROME
  - DIAGNOSIS, 6864*
  - ETIOLOGY, 6864*
  - PROGNOSIS, 6864*
  - THERAPY, 6864*
- MANOMETRY
  - BILE DUCTS
    - CHOLANGIOGRAPHY, 7198*
    - SURGERY, 7198*
    - TECHNIQUES, 7198*
  - CALCULI
    - SURGERY, 7198*
  - CHILD
    - REVIEW, 6953
  - COMMON BILE DUCT CALCULI
    - SURGERY, 7198*
  - CYSTS
    - SURGERY, 7198*
  - ESOPHAGUS
    - MOTILITY, 6701, 6702
    - TECHNIQUES, 6701, 6702
  - PANCREATIC DUCT
    - REFLUX, 7199*
  - PANCREATITIS
    - REFLUX, 7075*
  - PANCREATITIS, CHRONIC
    - REFLUX, 7075*
- MARASMUS
  - EPIDEMIOLOGY, 7245
  - NUTRITION DISORDERS
    - HORMONES, 7245
    - PROTEINS, 7245
- MECONIUM
  - CYSTIC FIBROSIS
    - DIAGNOSIS, 7127
- MEDIASTINUM
  - NEOPLASMS, MALIGNANT, 6888
- MEGACOLON
  - SEE ALSO HIRSCHSPRUNG'S DISEASE
- MENETRIER'S DISEASE
  - MALABSORPTION SYNDROMES
    - FOLIC ACID, 6902
- METALS
  - FATTY LIVER
    - ANDROGENS, 6787
    - HORMONE EFFECTS ON, 6787
  - NUTRITION DISORDERS
    - GENETICS, 7252
    - METABOLISM, 7252
- MICROORGANISMS
  - BILE ACIDS AND SALTS
    - ABSORPTION, 6693*
    - TRANSPORT, 6693*
- MICROSOMES
  - LIVER INJURY
    - ENZYMES, 6793
- MILK
  - INTESTINAL OBSTRUCTION
    - NEONATE, 6954
  - LACTOSE INTOLERANCE
    - HYPERSENSITIVITY, 6984
  - MALABSORPTION SYNDROMES
    - ETIOLOGY, 6981*
  - METABOLISM
    - HORMONE CONTROL, 6714*
    - HORMONES, GASTROINTESTINAL, 6714*
  - NEONATE
    - HORMONES, GASTROINTESTINAL, 6714*
    - METABOLISM, 6714*
- MINERALS
  - LACTOSE INTOLERANCE
    - BONES, 6988
  - NUTRITION DISORDERS
    - GENETICS, 7252
    - METABOLISM, 7252
- MITOCHONDRIA
  - HEPATOCYTES
    - DIETARY FACTORS, 6789
    - MORPHOLOGY, 6789
  - INTESTINE, SMALL
    - VITAMIN D, 6839
  - LIVER
    - VITAMIN D, 6839
  - LIVER CIRRHOSIS
    - CYTOCHROMES, 7189*
  - LIVER DISEASES
    - ANTIBODIES, 7177*
- MITOSIS
  - GASTRITIS
    - CELLS, 6722*
  - STOMACH
    - NEOPLASMS, 6876*

MITOSIS (continued)
- STOMACH DISEASES
  - CELLS, 6722*

MOTILIN
- HORMONE EFFECTS ON
  - SECRETIN, 6746*
- PLASMA
  - HORMONE EFFECTS ON, 6746*

MOTILITY
- DUODENUM
  - NERVOUS CONTROL, 6698*
- ESOPHAGUS
  - AMINES, 6707
  - DRUG EFFECTS ON, 6707, 6708
  - ELECTROPHYSIOLOGY, 6703, 6705
  - GASTRIN, 6709
  - HORMONE EFFECTS ON, 6709
  - MANOMETRY, 6701, 6702
  - MUSCLES, 6705, 6706
  - NERVOUS CONTROL, 6706, 6707
  - RADIOLOGY, 6869
  - REFLUX, 6708
  - TEMPERATURE, 6704
- GASTROINTESTINAL SYSTEM
  - ELECTROPHYSIOLOGY, 6700
  - NERVOUS CONTROL, 6700
- ILEUM
  - TRANSPORT, 6710
- INTESTINAL ABSORPTION
  - GLUCOSE, 6694*
  - WATER, 6694*
- JEJUNUM
  - TRANSPORT, 6710
- ODDI'S SPHINCTER
  - ADRENERGIC RECEPTOR AGONISTS, 6848
  - DRUG EFFECTS ON, 6848
  - VAGOTOMY, 6848
- STOMACH
  - GASTRECTOMY, 6908
  - NERVOUS CONTROL, 6698*
  - RADIOLOGY, 6869
  - STRESS, 6835*
  - SURGERY, 6908
  - ULCER, PEPTIC, 6909
  - VAGOTOMY, 6909

MUSCLES
- ESOPHAGUS
  - MOTILITY, 6705, 6706
- RECTUM
  - NEOPLASMS, 7018

NAUSEA
- PYLOROPLASTY
  - COMPLICATIONS, 6936
- VAGOTOMY
  - COMPLICATIONS, 6936

NECROSIS
- HEPATITIS, TOXIC
  - LIVER, 6786
  - VIRUSES, 6786
- INTESTINE, SMALL
  - ANGIOGRAPHY, 6960
  - EMBOLIZATION, 6960
  - RADIOLOGY, 6952

NECROSIS (continued)
- LIVER
  - ANEMIA, APLASTIC, 7111*
  - BILE ACIDS AND SALTS, 7092*
  - CLEARANCE STUDY, 7092*
  - DIAGNOSIS, 7092*
  - DISEASES ASSOCIATED WITH, 7111*

NEONATE
- BILIRUBIN
  - METABOLISM, 7135
- DUODENUM
  - INTESTINAL OBSTRUCTION, 7113*
- HIRSCHSPRUNG'S DISEASE
  - REVIEW, 7007
- INTESTINAL OBSTRUCTION
  - ETIOLOGY, 7113*
  - HIRSCHSPRUNG'S DISEASE, 7007
  - MILK, 6954
- INTESTINE, SMALL
  - PERFORATION, 6962
  - SURGERY, 6961
- INTESTINES
  - IMMUNOGLOBULINS, 6818*
- JAUNDICE
  - DRUG THERAPY, 7134
  - PHOTOTHERAPY, 7134
  - THERAPY, 7134
- LIVER CIRRHOSIS
  - FAMILIAL FACTORS, 7149*
  - TRANSMISSION, 7149*
- MILK
  - HORMONES, GASTROINTESTINAL, 6714*
  - METABOLISM, 6714*
- PANCREAS
  - NERVOUS CONTROL, 6747*
  - SECRETION, 6747*
- PYLORUS
  - OBSTRUCTION, 7113*

NEOPLASM METASTASIS
- BONES
  - RADIONUCLIDES, 6998*
  - SCANNING, SCINTILLATION, 6998*
- CARCINOID TUMOR
  - LIVER, 7102*
- COLON
  - BONES, 7006
  - CHOLANGIOGRAPHY, 6997*
  - DIAGNOSIS, 6997*
  - NEOPLASMS, MALIGNANT, 6997*
  - RADIONUCLIDES, 6998*, 7006
  - SCANNING, SCINTILLATION, 6998*
- DUODENUM
  - POLYPS, 6969
- JAUNDICE, OBSTRUCTIVE
  - SURGERY, 7217*
- LIVER
  - RADIONUCLIDES, 6998*
  - SCANNING, SCINTILLATION, 6998*
  - ULTRASONOGRAPHY, 7125, 7227
- RECTUM
  - BONES, 7006
  - RADIONUCLIDES, 7006
- STOMACH
  - DIAGNOSIS, 6890

- NEOPLASMS
  - ANGIOGRAPHY
    - CIRCULATION, 7267
  - ANUS
    - INTEGUMENTARY SYSTEM, 7011
  - BILIARY TRACT
    - DRUG-INDUCED, 6797
  - COLON
    - AMINES, 6999*
    - ANUS, 7019
    - CARCINOEMBRYONIC ANTIGEN, 7049
    - DIARRHEA, 7040
    - HEMORRHAGE, 7040
    - IMMUNOLOGY, 7003, 7051
    - INTUSSUSCEPTION, 7035
    - MORPHOLOGY, 7052
    - PROGNOSIS, 7051
    - RECTUM, 6999*, 7009, 7040, 7051
    - SURGERY, 7009
    - ULTRASTRUCTURE, 7032
  - CROHN'S DISEASE
    - UROGENITAL SYSTEM, 7285
  - DIET
    - EPIDEMIOLOGY, 7260
    - REVIEW, 7260
  - DRUG THERAPY
    - REVIEW, 7247
    - SURGERY, 7247
  - DUODENUM
    - ENDOSCOPY, 6976
  - ESOPHAGUS
    - EPIDEMIOLOGY, 6870
    - RADIOLOGY, 6870
  - GALLBLADDER
    - CHOLELITHIASIS, 7203*
    - DIAGNOSIS, 7203*
    - SURGERY, 7203*
  - GENETICS
    - REVIEW, 7239
  - GLYCOPROTEINS
    - SERUM, 7263
  - ILEUM
    - CROHN'S DISEASE, 7278
    - INTESTINAL OBSTRUCTION, 6955
  - INTESTINE, LARGE
    - POLYPS, 7058
  - INTESTINE, SMALL
    - CROHN'S DISEASE, 7278
    - POLYPS, 6943
  - INTESTINES
    - RADIOLOGY, 7024
  - LIVER
    - AFLATOXINS, 7100*
    - ALPHA FETOPROTEIN, 7089*, 7096*, 7104*
    - AUSTRALIA ANTIGEN, 7151*
    - BLEEDING, 7118
    - CARCINOGENS, 6801, 7100*
    - CHILD, 7096*
    - CHOLESTEROL, 7097*
    - DRUG-INDUCED, 6799, 6800
    - DRUG THERAPY, 7099*
    - EPIDEMIOLOGY, 7101*
    - GLYCOSIDES, 7100*
    - HEPATOCYTES, 7101*
    - HYDROCARBONS, 7100*
    - IMMUNITY, 7151*
    - IMMUNOLOGY, 6800, 7097*
    - NITROSAMINES, 7100*

- NEOPLASMS (continued)
  - LIVER (continued)
    - PATHOLOGY, 6801
    - RADIOTHERAPY, 7099*
    - RECURRENCE, 7096*
    - TOXINS, 7100*
    - ULTRASONOGRAPHY, 7227
  - LIVER CIRRHOSIS
    - DIAGNOSIS, 7097*
  - LIVER DISEASES
    - ANGIOGRAPHY, 7086*
    - CHILD, 7086*
  - POLYPS
    - INTESTINE, LARGE, 7048
  - RECTUM
    - AMINES, 6999*
    - DIARRHEA, 7040
    - HEMORRHAGE, 7040
    - IMMUNOLOGY, 7003, 7051
    - MUSCLES, 7018
    - OBSTRUCTION, 7021
    - PROGNOSIS, 7051
    - SURGERY, 7009
  - SALIVARY GLANDS
    - ETIOLOGY, 7240
    - REVIEW, 7241
  - STOMACH
    - ALPHA FETOPROTEIN, 7089*
    - DRUG THERAPY, 6877*
    - ETIOLOGY, 6881
    - FOOD, 6881
    - IMMUNOTHERAPY, 6877*
    - KINETICS, 6876*
    - MITOSIS, 6876*
    - NITRITES, 6881
    - SURVIVAL, 6877*
  - SURGERY
    - REVIEW, 7247
  - URINARY SYSTEM
    - ALPHA FETOPROTEIN, 7131

- NEOPLASMS, BENIGN
  - CECUM
    - APPENDICITIS, 7034
  - GALLBLADDER
    - ANOMALY, 7219*
  - JAUNDICE, OBSTRUCTIVE
    - BILE DUCTS, 7218*
  - KIDNEYS
    - ANOMALY, 7219*
  - LIVER
    - ANOMALY, 7219*
  - SALIVARY GLANDS, 7256

- NEOPLASMS, MALIGNANT
  - COLON
    - CHOLANGIOGRAPHY, 6997*
    - NEOPLASM METASTASIS, 6997*
  - DUODENUM
    - DIAGNOSIS, 6975
    - THERAPY, 6975
  - ESOPHAGUS
    - BARRETT'S SYNDROME, 6862*
    - DISEASES ASSOCIATED WITH, 6862*
  - INTESTINE, LARGE, 7038
  - JAUNDICE, OBSTRUCTIVE
    - SURGERY, 7217*

- NEOPLASMS, MALIGNANT (continued)
  - LIVER
    - CHILD, 7103*
    - CONTRACEPTIVES, ORAL, 7126
    - PROGNOSIS, 7098*, 7103*
    - SURGERY, 7098*
    - SURVIVAL, 7098*
    - THERAPY, 7098*
    - VIRUS DISEASES, 7248
  - MEDIASTINUM, 6888
  - NUTRITION DISORDERS
    - THERAPY, 7242
  - PANCREAS
    - DIAGNOSIS, 7073
    - ENDOSCOPY, 7073
    - PANCREATOGRAPHY, 7073
  - SALIVARY GLANDS
    - THERAPY, 7249
  - STOMACH, 6886, 6888
    - CELLS, 6875*
    - DIAGNOSIS, 6887
    - ENDOSCOPY, 6887, 6901
    - PATHOLOGY, 6901
    - PROGNOSIS, 6901
    - ULTRASTRUCTURE, 6875*
  - UROGENITAL SYSTEM
    - DIAGNOSIS, 6890

- NERVOUS CONTROL
  - DUODENUM
    - MOTILITY, 6698*
  - ESOPHAGUS
    - MOTILITY, 6706, 6707
    - SPHINCTER, 6707
  - GASTROINTESTINAL SYSTEM
    - MOTILITY, 6700
  - LIVER
    - CIRCULATION, 6757*
    - OXYGEN, 6757*
  - PANCREAS
    - FETUS, 6747*
    - NEONATE, 6747*
    - SECRETION, 6747*
  - STOMACH
    - MOTILITY, 6698*

- NERVOUS SYSTEM
  - INTESTINE, SMALL
    - HYPOTENSION, 6832*
    - SHOCK, 6832*
  - INTESTINES
    - DISEASE, 7050
  - KERNICTERUS
    - JAUNDICE, OBSTRUCTIVE, 7107*
    - LIVER CIRRHOSIS, 7107*

- ITRITES
  - STOMACH
    - NEOPLASMS, 6881

- ITROGEN
  - FECES
    - DIETARY FACTORS, 6713*
  - GASTRECTOMY
    - METABOLISM, 6910
  - INTESTINES, 6821

- ITROSAMINES
  - LIVER
    - NEOPLASMS, 7100*

- NUCLEIC ACIDS
  - INTESTINE, SMALL
    - COLON, 6813
    - JEJUNUM, 6813
    - SYNTHESIS, 6813
    - VITAMIN D, 6839
  - LIVER
    - REGENERATION, 6810
    - VITAMIN D, 6839

- NUTRITION
  - AMINES
    - SYNTHESIS, 6806

- NUTRITION DISORDERS
  - GASTROENTERITIS
    - DIARRHEA, 7244
    - EPIDEMIOLOGY, 7244
  - GENETICS
    - METALS, 7252
    - MINERALS, 7252
  - INTESTINES
    - CHILD, 7262
    - MORPHOLOGY, 7262
  - KWASHIORKOR
    - HORMONES, 7245
    - PROTEINS, 7245
  - MARASMUS
    - HORMONES, 7245
    - PROTEINS, 7245
  - METABOLISM
    - METALS, 7252
    - MINERALS, 7252
  - NEOPLASMS, MALIGNANT
    - THERAPY, 7242

- OBESITY
  - INTESTINE, SMALL
    - SHUNT, INTESTINAL, 6944
  - SHUNT, INTESTINAL
    - IMMUNOLOGY, 6958
    - SURVIVAL, 6965
    - THERAPY, 6963
  - SURGERY
    - ACIDS, 6942*
    - BILE ACIDS AND SALTS, 6942*
    - CHOLESTEROL, 6942*
    - FATS, 6942*
    - FECES, 6942*
    - PHOSPHOLIPIDS, 6942*
    - STEROLS, 6942*

- OBSTRUCTION
  - BILE DUCTS
    - MORPHOMETRY, 6847
    - SIMULATION, 6847
    - ULTRASTRUCTURE, 6847
  - COLONOSCOPY
    - COMPLICATIONS, 7010
  - PYLORUS
    - ETIOLOGY, 7113*
    - NEONATE, 7113*
  - RECTUM
    - NEOPLASMS, 7021

- ODDI'S SPHINCTER
  - MOTILITY
    - ADRENERGIC RECEPTOR AGONISTS, 6848
    - DRUG EFFECTS ON, 6848
    - VAGOTOMY, 6848

- ORGAN CULTURE
  - CHILD
    - REVIEW, 6953
- OXIDATIVE PHOSPHORYLATION
  - ULCER
    - STRESS, 6730*
- OXYGEN
  - LIVER
    - NERVOUS CONTROL, 6757*
- PAIN
  - PYLOROPLASTY
    - COMPLICATIONS, 6936
  - VAGOTOMY
    - COMPLICATIONS, 6936
- PANCREAS
  - ATROPHY, 6749
  - BICARBONATE SECRETION
    - CHOLAGOGUES AND CHOLERETICS, 6753
    - DRUG EFFECTS ON, 6753
  - BIOPSY
    - TECHNIQUES, 7069
  - CALCULI
    - PANCREATITIS, CHRONIC, 7078*
  - JAUNDICE, OBSTRUCTIVE
    - CYSTS, 7228
  - MORPHOLOGY
    - DRUG EFFECTS ON, 6683*
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 7073
    - ENDOSCOPY, 7073
    - PANCREATOGRAPHY, 7073
  - NERVOUS CONTROL
    - FETUS, 6747*
    - NEONATE, 6747*
  - PATHOLOGY
    - HORMONES, ADRENAL CORTEX, 6752
  - SCANNING, SCINTILLATION, 6853*
  - SECRETION, 6754, 7068
    - AGE FACTORS, 6748
    - CIRCADIAN RHYTHM, 6750
    - DRUG EFFECTS ON, 6683*, 6752
    - ENZYMES, 6751
    - FETUS, 6747*
    - HORMONES, ADRENAL CORTEX, 6752
    - NEONATE, 6747*
    - NERVOUS CONTROL, 6747*
    - PARASYMPATHOMIMETICS, 6747*
    - PROSTAGLANDINS, 6745*
    - ULCER, PEPTIC, 6929
  - TOMOGRAPHY, 6853*
    - ANALYSIS, 6856*
    - DIAGNOSIS, 6855*
    - TECHNIQUES, 6856*
    - ULTRASONOGRAPHY, 6855*
- PANCREAS FUNCTION TESTS
  - DUODENUM
    - ULCER, PEPTIC, 6929
- PANCREATIC DISEASES
  - DIAGNOSIS
    - ANGIOGRAPHY, 7070
    - ENDOSCOPY, 7071
    - LAPAROSCOPY, 7070
    - PANCREATOGRAPHY, 7071
- PANCREATIC DISEASES (continued)
  - DIAGNOSIS (continued)
    - ULTRASONOGRAPHY, 7070
  - TOMOGRAPHY
    - ANGIOGRAPHY, 6854*
    - ULTRASONOGRAPHY, 6854*
- PANCREATIC DUCT
  - REFLUX
    - MANOMETRY, 7199*
- PANCREATITIS
  - CHOLELITHIASIS
    - SURGERY, 7075*
  - COMPLICATIONS
    - HYPOCALCEMIA, 7076*
  - ETIOLOGY
    - DIETARY FACTORS, 7080
  - FATTY ACIDS
    - DEFICIENCY, 7080
  - HEMORRHAGE
    - SURGERY, 7077*
  - HERNIA
    - DIAGNOSIS, 7081
  - REFLUX
    - MANOMETRY, 7075*
- PANCREATITIS, CHRONIC
  - DIAGNOSIS
    - ANGIOGRAPHY, 7083
    - CHOLANGIOGRAPHY, 7083
    - ENDOSCOPY, 7082
    - RADIOLOGY, 7082, 7083
    - SCANNING, SCINTILLATION, 7082
    - ULTRASONOGRAPHY, 7082
  - HEMORRHAGE
    - ETIOLOGY, 7079*
    - HYPERTENSION, PORTAL, 7079*
  - PANCREAS
    - CALCULI, 7078*
  - REFLUX
    - MANOMETRY, 7075*
- PANCREATOGRAPHY
  - ENDOSCOPY
    - COMPLICATIONS, 7071, 7195*
    - TECHNIQUES, 7195*
  - PANCREAS
    - NEOPLASMS, MALIGNANT, 7073
  - PANCREATIC DISEASES
    - DIAGNOSIS, 7071
- PANETH CELL
  - GROWTH FACTORS, 6684
- PARASYMPATHOLYTICS
  - STOMACH
    - ACID SECRETION, 6737
- PARASYMPATHOMIMETICS
  - PANCREAS
    - SECRETION, 6747*
- PENTAGASTRIN
  - STOMACH
    - ACID SECRETION, 6743

- PEPSIN
  - SECRETION
    - ULCER, PEPTIC, 6925
  - STOMACH
    - ATROPINE, 6729*
    - SECRETION, 6925
    - SEROTONIN, 6729*

- PEPSINOGEN
  - STOMACH
    - IMMUNOLOGY, 6741

- PERFORATION
  - BILE DUCTS, 7220*
  - COLON
    - ENDOMETRIOSIS, 7001*
    - PREGNANCY, 7001*
  - COLONOSCOPY
    - COMPLICATIONS, 7010
  - COMMON BILE DUCT CALCULI
    - COMPLICATIONS, 7220*
  - DUODENUM
    - ULCER, PEPTIC, 6920*
  - ENDOMETRIOSIS
    - COMPLICATIONS, 7001*
  - GALLBLADDER
    - HEMORRHAGE, 7230
  - INTESTINE, SMALL
    - FETUS, 6962
    - NEONATE, 6962
  - SIGMOID
    - ENDOMETRIOSIS, 7001*
    - PREGNANCY, 7001*
  - ULCER, PEPTIC
    - SURGERY, 6920*
    - THERAPY, 6920*

- PERFUSION
  - LIVER
    - AMINO ACIDS, 6761*

- PERITONEUM
  - GASES
    - INTESTINE, SMALL, 6968

- PERITONITIS
  - CECUM
    - BARIUM, 7039
  - RECTUM
    - BARIUM, 7039
  - STOMACH
    - BARIUM, 7039

- PEROXIDES
  - HEPATITIS, 7093*
  - LIVER CIRRHOSIS, 7093*
  - LIVER DISEASES, 7093*

- PEUTZ-JEGHER'S SYNDROME
  - DUODENUM
    - POLYPS, 6969
  - POLYPS
    - DUODENUM, 6969

- PHOSPHOLIPIDS
  - LIVER
    - ACIDS, 6808
    - TECHNIQUES, 6850*

- PHOSPHOLIPIDS (continued)
  - LIVER DISEASES
    - DIAGNOSIS, 6850*
  - OBESITY
    - SURGERY, 6942*
  - STOMACH
    - ELECTROPHYSIOLOGY, 6726*
    - MORPHOLOGY, 6726*

- PHOTOTHERAPY
  - JAUNDICE
    - NEONATE, 7134

- PLASMA
  - ALCOHOLISM
    - DIAGNOSIS, 7171*
  - LIVER INJURY
    - DIAGNOSIS, 7171*
  - MOTILIN
    - HORMONE EFFECTS ON, 6746*
  - RADIONUCLIDES
    - DIAGNOSIS, 6828*
  - SECRETIN, 6819*

- PNEUMATOSIS
  - DIAGNOSIS
    - SURGERY, 7047
  - DISEASES ASSOCIATED WITH
    - PATHOLOGY, 6945
    - RADIOLOGY, 6945

- POLYPS
  - BARIUM
    - ENEMA, 7002*, 7008
  - COLON
    - BARIUM, 7002*
    - COLONOSCOPY, 7002*
  - DUODENUM
    - NEOPLASM METASTASIS, 6969
    - PEUTZ-JEGHER'S SYNDROME, 6969
  - GARDNER'S SYNDROME
    - REVIEW, 7013
  - INTESTINE, LARGE
    - FAMILIAL FACTORS, 7048, 7058
    - NEOPLASMS, 7048, 7058
  - INTESTINE, SMALL
    - NEOPLASMS, 6943
  - PEUTZ-JEGHER'S SYNDROME
    - DUODENUM, 6969
  - RECTUM, 7008

- POLYSACCHARIDES
  - LIVER
    - TOXINS, 6782*

- PORPHYRIA
  - BIOCHEMISTRY
    - REVIEW, 7114*
  - PATHOLOGY
    - REVIEW, 7114*

- PORPHYRINS
  - HYDROCARBONS, CHLORINATED
    - ENZYMES, 6785
    - URINE, 6785

- PORTACAVAL SHUNT
  - LIVER COMA
    - SLEEP, 6779*

- POTASSIUM
  - INTESTINE, LARGE
    - SECRETION, 7271
  - INTESTINE, SMALL
    - ULCER, 6939*
  - URINARY SYSTEM
    - DISEASE, 7271

- PREGNANCY
  - AUSTRALIA ANTIGEN
    - TRANSMISSION, 7153*
  - CHOLAGOGUES AND CHOLERETICS, 6849
  - CHOLESTASIS
    - PREMATURITY, 7215*
  - COLON
    - PERFORATION, 7001*
  - HEPATITIS, 7153*
  - HEPATITIS, CHRONIC, 7153*
  - SIGMOID
    - PERFORATION, 7001*

- PREMATURITY
  - CHOLESTASIS
    - PREGNANCY, 7215*

- PROSTAGLANDINS
  - BILE
    - SECRETION, 6745*
  - CHEMICAL PROPERTIES, 6727*
  - LIVER
    - SYNTHESIS, 6794
  - PANCREAS
    - SECRETION, 6745*
  - STOMACH
    - ACID SECRETION, 6727*
  - SYNTHESIS, 6727*

- PROTEIN-LOSING ENTEROPATHIES
  - INTESTINE, SMALL
    - LYMPHANGIEGTASIS, 6946

- PROTEINS
  - DIGESTION, 6826
    - ELECTROPHYSIOLOGY, 6699
  - FATTY LIVER
    - DEFICIENCY, 6802
  - GASTRECTOMY
    - METABOLISM, 6910
  - GASTRIN, 6845
  - HEPATITIS, INFECTIOUS
    - SYNTHESIS, 6721
  - HEPATITIS, TOXIC
    - SYNTHESIS, 6721
  - INTESTINE, SMALL
    - VITAMIN D, 6839
  - KWASHIORKOR
    - NUTRITION DISORDERS, 7245
  - LIVER
    - AMINO ACIDS, 6761*
    - CARBOHYDRATES, 6761*
    - RIBOSOMES, 6768*
    - VITAMIN D, 6839
  - MALABSORPTION SYNDROMES
    - ETIOLOGY, 6981*
  - MARASMUS
    - NUTRITION DISORDERS, 7245
  - RIBOSOMES
    - SYNTHESIS, 6768*

- PROTEINS (continued)
  - SYNTHESIS
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6768*
    - HORMONE CONTROL, 6768*
    - SOMATOSTATIN, 6768*

- PROTHROMBIN
  - LIVER DISEASES
    - HEMOSTASIS, 7110*

- PSEUDO-OBSTRUCTION
  - CHOLANGIOGRAPHY
    - COMMON BILE DUCT, 7234
  - COMMON BILE DUCT
    - SPHINCTER, 7234

- PYLOROPLASTY
  - COMPLICATIONS
    - DIARRHEA, 6936
    - NAUSEA, 6936
    - PAIN, 6936
    - THERAPY, 6936
    - VOMITING, 6936
  - DUODENUM
    - ULCER, PEPTIC, 6918*
  - ULCER, PEPTIC
    - SURGERY, 6918*

- PYLORUS
  - OBSTRUCTION
    - ETIOLOGY, 7113*
    - NEONATE, 7113*

- RADIOIMMUNOASSAY
  - ANTIDIARRHEALS
    - TECHNIQUES, 6830*
  - HEPATITIS, INFECTIOUS
    - ALPHA FETOPROTEIN, 7089*
  - LIVER CIRRHOSIS
    - ALPHA FETOPROTEIN, 7089*

- RADIOLOGY
  - CECUM
    - TECHNIQUES, 7054
  - CHOLECYSTECTOMY, 7233
  - CHOLELITHIASIS
    - CHILD, 7208*
  - COLITIS, ULCERATIVE, 7065
  - ESOPHAGEAL DISEASES
    - EPIDEMIOLOGY, 6870
  - ESOPHAGUS
    - MOTILITY, 6869
    - NEOPLASMS, 6870
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 6899
  - ILEUM
    - TECHNIQUES, 7054
  - INTESTINE, SMALL
    - BARIUM, 6829*
    - NECROSIS, 6952
  - INTESTINES
    - COMPLICATIONS, 6858
    - DISEASE, 6858
    - NEOPLASMS, 7024
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 7082, 7083
  - PNEUMATOSIS
    - DISEASES ASSOCIATED WITH, 6945

- RADIOLOGY (continued)
  - SALIVARY GLANDS
    - REVIEW, 7254
    - TECHNIQUES, 7254
  - STOMACH
    - ANOMALY, 7072
    - BARIUM, 6829*
    - MOTILITY, 6869
  - VAGOTOMY
    - COMPLICATIONS, 6933
  - ZOLLINGER-ELLISON SYNDROME, 7266

- RADIONUCLIDES
  - ANEMIA, PERNICIOUS
    - VITAMIN B12, 6989
  - COLON
    - NEOPLASM METASTASIS, 6998*, 7006
  - GASTROINTESTINAL SYSTEM, 6852*
  - LIVER
    - NEOPLASM METASTASIS, 6998*
  - NEOPLASM METASTASIS
    - BONES, 6998*
  - PLASMA
    - DIAGNOSIS, 6828*
  - RECTUM
    - NEOPLASM METASTASIS, 7006
  - SALIVA
    - DIAGNOSIS, 6828*
  - URINE
    - DIAGNOSIS, 6828*

- RADIOTHERAPY
  - LIVER
    - NEOPLASMS, 7099*

- RECTUM
  - SEE ALSO ANORECTUM, ANUS
  - BARIUM
    - PERITONITIS, 7039
  - COLITIS, ULCERATIVE
    - DRUG EFFECTS ON, 7064*
    - MORPHOLOGY, 7031
  - COLON, 7008
    - GARDNER'S SYNDROME, 6999*
    - NEOPLASMS, 6999*, 7009, 7040, 7051
  - GARDNER'S SYNDROME
    - AMINES, 6999*
  - HEMORRHAGE
    - THERAPY, 6874*
  - MUSCLES
    - NEOPLASMS, 7018
  - NEOPLASM METASTASIS
    - BONES, 7006
    - RADIONUCLIDES, 7006
  - NEOPLASMS
    - AMINES, 6999*
    - COLITIS, ULCERATIVE, 7008
    - DIARRHEA, 7040
    - ETIOLOGY, 7008
    - HEMORRHAGE, 7040
    - IMMUNOLOGY, 7003, 7051
    - OBSTRUCTION, 7021
    - POLYPS, 7008
    - PREVENTION, 7008
    - PROGNOSIS, 7051
    - SURGERY, 7009

- RECTUM (continued)
  - SPHINCTER
    - SURGERY, 7041
  - SURGERY
    - INFECTION, 7046

- REFLUX
  - ESOPHAGUS
    - DRUG EFFECTS ON, 6708
    - MOTILITY, 6708
  - PANCREATIC DUCT
    - MANOMETRY, 7199*
  - PANCREATITIS
    - MANOMETRY, 7075*
  - PANCREATITIS, CHRONIC
    - MANOMETRY, 7075*

- RESPIRATORY SYSTEM
  - CHOLELITHIASIS
    - ADOLESCENCE, 7221
    - CHILD, 7221
  - LIVER CIRRHOSIS
    - DISEASES ASSOCIATED WITH, 7183*
  - SURGERY
    - CHOLELITHIASIS, 7221

- RIBOSOMES
  - HEPATITIS, INFECTIOUS, 6721
  - HEPATITIS, TOXIC, 6721
  - LIVER
    - PROTEINS, 6768*
  - PROTEINS
    - SYNTHESIS, 6768*

- RUPTURE
  - INTESTINES
    - WOUNDS AND INJURIES, 6903
  - STOMACH
    - WOUNDS AND INJURIES, 6903

- SALIVA
  - RADIONUCLIDES
    - DIAGNOSIS, 6828*

- SALIVARY GLANDS
  - AMYLASES
    - DENTISTRY, 6716*
  - CARBOHYDRATES
    - CYTOLOGY, 6717*
    - HISTOCHEMISTRY, 6717*
    - SECRETION, 6717*
    - ULTRASTRUCTURE, 6717*
  - CELLS
    - SECRETION, 6718, 6719
    - ULTRASTRUCTURE, 6719
  - DISEASE
    - CLASSIFICATION, 7259
    - REVIEW, 7241
  - FATTY ACIDS
    - DEFICIENCY, 6720
  - HORMONE EFFECTS ON
    - HORMONES, ADRENAL CORTEX, 6719
  - INFLAMMATION
    - DIAGNOSIS, 7246
    - THERAPY, 7246
    - ULTRASTRUCTURE, 7269
  - LIPIDS
    - BIOCHEMISTRY, 6720
    - DIETARY FACTORS, 6720

- SALIVARY GLANDS (continued)
  - NEOPLASMS
    - ETIOLOGY, 7240
    - REVIEW, 7241
  - NEOPLASMS, BENIGN, 7256
  - NEOPLASMS, MALIGNANT
    - THERAPY, 7249
  - RADIOLOGY
    - REVIEW, 7254
    - TECHNIQUES, 7254
  - SECRETION
    - HORMONE EFFECTS ON, 6719

- SCANNING, SCINTILLATION
  - COLON
    - NEOPLASM METASTASIS, 6998*
  - GALLBLADDER
    - CYSTS, 7235
  - HYPERTENSION, PORTAL
    - CHILD, 7094*
  - INTESTINE, SMALL
    - BLEEDING, 6959
  - JAUNDICE, OBSTRUCTIVE
    - CHILD, 7094*
    - INFANT, 7094*
  - LIVER, 6853*
    - FISSURE, 7130
    - NEOPLASM METASTASIS, 6998*
  - LIVER CIRRHOSIS
    - CHILD, 7094*
  - LIVER DISEASES
    - CHILD, 7094*
    - INFANT, 7094*
  - NEOPLASM METASTASIS
    - BONES, 6998*
  - PANCREAS, 6853*
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 7082

- SCHISTOSOMIASIS
  - IMMUNITY
    - SIMULATION, 6790

- SCLERODERMA
  - HEPATOCYTES
    - ULTRASTRUCTURE, 7115*

- SCLEROSIS
  - CHOLANGITIS
    - DIAGNOSIS, 7204*
    - SURGERY, 7204*

- SECRETIN
  - DUODENUM
    - ACIDITY, 6819*
  - MOTILIN
    - HORMONE EFFECTS ON, 6746*
  - PLASMA, 6819*
  - ULCER, PEPTIC
    - THERAPY, 6929

- SECRETION
  - SEE ALSO ACID SECRETION, BICARBONATE SECRETION, HYPERCHLORHYDRIA
  - BILE
    - PROSTAGLANDINS, 6745*
  - BILE ACIDS AND SALTS
    - REVIEW, 6784

- SECRETION (continued)
  - INTESTINE, LARGE
    - POTASSIUM, 7271
  - INTESTINE, SMALL
    - AMYLASES, 6822
    - CELLS, 6827
    - LIPASE, 6822
    - TERPENES, 6827
  - PANCREAS, 6754, 7068
    - AGE FACTORS, 6748
    - CIRCADIAN RHYTHM, 6750
    - DRUG EFFECTS ON, 6683*, 6752
    - ENZYMES, 6751
    - FETUS, 6747*
    - HORMONES, ADRENAL CORTEX, 6752
    - NEONATE, 6747*
    - NERVOUS CONTROL, 6747*
    - PARASYMPATHOMIMETICS, 6747*
    - PROSTAGLANDINS, 6745*
    - ULCER, PEPTIC, 6929
  - PEPSIN
    - ULCER, PEPTIC, 6925
  - SALIVARY GLANDS
    - CARBOHYDRATES, 6717*
    - CELLS, 6718, 6719
    - HORMONE EFFECTS ON, 6719
  - STOMACH
    - ACID SECRETION, 6739
    - ADENYL CYCLASE, 6735
    - ATROPINE, 6729*
    - HISTAMINE, 6735
    - HORMONE EFFECTS ON, 6727*
    - PEPSIN, 6925
    - SEROTONIN, 6729*
    - VAGOTOMY, 6935

- SEPSIS
  - COLON
    - ANTIBIOTICS, 7017
    - SURGERY, 7017

- SEROTONIN
  - CELIAC DISEASE
    - EXCRETION, 6996
    - URINE, 6996
  - STOMACH
    - ACID SECRETION, 6729*
    - ANESTHESIA, 6728*
    - DIET, 6728*
    - FEEDING, 6728*
    - FISTULA, 6728*
    - PEPSIN, 6729*
    - SECRETION, 6729*

- SERUM
  - AMYLASES
    - AGE FACTORS, 6744*
    - CHILD, 6744*
    - INFANT, 6744*
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 7105*
  - GASTRIN
    - CIRCADIAN RHYTHM, 7178*
  - GASTROENTERITIS
    - CHOLERA, 7243
    - MAGNESIUM, 7243
  - HEPATITIS
    - BILE ACIDS AND SALTS, 7105*
    - GLYCOPROTEINS, 7263

SERUM (continued)
  LIVER CIRRHOSIS
    CHOLESTEROL, 7097*
    GLYCOPROTEINS, 7097*, 7263
  NEOPLASMS
    GLYCOPROTEINS, 7263

SHOCK
  INTESTINE, SMALL
    HYPOTENSION, 6832*
    NERVOUS SYSTEM, 6832*

SHORT BOWEL SYNDROME
  INTEGUMENTARY SYSTEM
    KWASHIORKOR, 6951

SHUNT
  ASCITES
    THERAPY, 7180*
  LIVER
    DISEASES ASSOCIATED WITH, 7128
  LIVER DISEASES, ALCOHOLIC
    ASCITES, 7180*

SHUNT, INTESTINAL
  COMPLICATIONS
    LIVER INJURY, 6783*
    THERAPY, 6964
  INTESTINE, SMALL
    BIOCHEMISTRY, 6944
    MORPHOLOGY, 6944
    OBESITY, 6944
  LIVER FUNCTION TESTS, 6783*
  LIVER INJURY
    ETIOLOGY, 6783*
  OBESITY
    IMMUNOLOGY, 6958
    SURVIVAL, 6965
    THERAPY, 6963
  PSYCHOLOGICAL FACTORS
    THERAPY, 6964

SIGMOID
  PERFORATION
    ENDOMETRIOSIS, 7001*
    PREGNANCY, 7001*

SLEEP
  LIVER COMA
    PORTACAVAL SHUNT, 6779*

SODIUM
  COLON
    ABSORPTION, 6816*
  DIARRHEA
    ABSORPTION, 6816*

SOMATOSTATIN
  INTESTINE, SMALL
    ELECTROPHYSIOLOGY, 6711
  PROTEINS
    SYNTHESIS, 6768*

SPHINCTER
  ANUS
    SURGERY, 7033
  COMMON BILE DUCT
    CONTRACTION, 7234
    PSEUDO-OBSTRUCTION, 7234

SPHINCTER (continued)
  ESOPHAGUS
    AMINES, 6707
    DRUG EFFECTS ON, 6707
    GASTRIN, 6709
    HORMONE EFFECTS ON, 6709
    NERVOUS CONTROL, 6707
  RECTUM
    SURGERY, 7041
  STOMACH
    ELECTROPHYSIOLOGY, 6882
    PATHOLOGY, 6882
    PHYSICAL PROPERTIES, 6882

SPLENECTOMY
  DISEASES ASSOCIATED WITH, 7188

SPRUE, TROPICAL
  ELECTROLYTES
    TRANSPORT, 6982*
  ION TRANSPORT, 6982*
  WATER
    TRANSPORT, 6982*

STASIS
  GASES
    VAGOTOMY, 6933

STEATORRHEA
  THERAPY
    DIET, 7074

STENOSIS
  ENDOSCOPY
    TECHNIQUES, 7201*
    THERAPY, 7201*

STEROIDS
  LIVER
    ENZYMES, 6807

STEROLS
  OBESITY
    SURGERY, 6942*

STOMACH
  ACID SECRETION
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6738
    AMINO ACIDS, 6740
    ATROPINE, 6729*
    BARIUM, 6731
    CELLS, 6738
    DRUG EFFECTS ON, 6737, 6915*
    H2 RECEPTOR ANTAGONISTS, 6915*
    HORMONE EFFECTS ON, 6727*, 6740, 6743
    PARASYMPATHOLYTICS, 6737
    PENTAGASTRIN, 6743
    PROSTAGLANDINS, 6727*
    SECRETION, 6739
    SEROTONIN, 6729*
    VAGOTOMY, 6743
  ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    ADRENERGIC RECEPTOR AGONISTS, 6723*
    ADRENERGIC RECEPTOR BLOCKADERS, 6723*

STOMACH (continued)
    ANOMALY
        ENDOSCOPY, 7072
        RADIOLOGY, 7072
        SURGERY, 7072
    BARIUM
        PERITONITIS, 7039
    BLEEDING
        THERAPY, 6733
        TISSUE ADHESIVES, 6733
    CARCINOEMBRYONIC ANTIGEN, 6883
    DISTENTION
        VAGOTOMY, 6933
    DYSTROPHY, 6843
    ELECTROPHYSIOLOGY
        PHOSPHOLIPIDS, 6726*
        ULCER, PEPTIC, 6909
        VAGOTOMY, 6909
    ENDOSCOPY
        CONTRAST MEDIA, 6859
    EROSIONS
        DUODENUM, 6844
    FISSURE
        ATRESIA, 7015
    GASES
        DISTENTION, 6933
    GASTROINTESTINAL DISEASES
        HORMONES, GASTROINTESTINAL, 6685
    GLYCOLIPIDS, 6725*
    GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
        ADRENERGIC RECEPTOR AGONISTS,
          6723*
        ADRENERGIC RECEPTOR BLOCKADERS,
          6723*
    HEMORRHAGE
        DIAGNOSIS, 6897
        ENDOSCOPY, 6897
    HODGKIN'S DISEASE, 6889
    MORPHOLOGY
        ANALGESICS AND ANTIPYRETICS, 6884
        ANTI-INFLAMMATORY AGENTS, 6724*
        ASPIRIN, 6884
        DRUG EFFECTS ON, 6884
        PHOSPHOLIPIDS, 6726*
    MOTILITY
        GASTRECTOMY, 6908
        NERVOUS CONTROL, 6698*
        RADIOLOGY, 6869
        STRESS, 6835*
        SURGERY, 6908
        ULCER, PEPTIC, 6909
        VAGOTOMY, 6909
    NEOPLASM METASTASIS
        DIAGNOSIS, 6890
    NEOPLASMS
        ALPHA FETOPROTEIN, 7089*
        DRUG THERAPY, 6877*
        ETIOLOGY, 6881
        FOOD, 6881
        IMMUNOTHERAPY, 6877*
        KINETICS, 6876*
        MITOSIS, 6876*
        NITRITES, 6881
        SURVIVAL, 6877*
    NEOPLASMS, MALIGNANT, 6886, 6888
        CELLS, 6875*
        DIAGNOSIS, 6887
        ENDOSCOPY, 6887, 6901
        PATHOLOGY, 6901

STOMACH (continued)
    NEOPLASMS, MALIGNANT (continued)
        PROGNOSIS, 6901
        ULTRASTRUCTURE, 6875*
    PEPSIN
        ATROPINE, 6729*
        SEROTONIN, 6729*
    PEPSINOGEN
        IMMUNOLOGY, 6741
    RADIOLOGY
        BARIUM, 6829*
    SECRETION
        ADENYL CYCLASE, 6735
        ATROPINE, 6729*
        HISTAMINE, 6735
        HORMONE EFFECTS ON, 6727*
        PEPSIN, 6925
        SEROTONIN, 6729*
        VAGOTOMY, 6935
    SEROTONIN
        ANESTHESIA, 6728*
        DIET, 6728*
        FEEDING, 6728*
        FISTULA, 6728*
    SPHINCTER
        ELECTROPHYSIOLOGY, 6882
        PATHOLOGY, 6882
        PHYSICAL PROPERTIES, 6882
    SURGERY
        COMPLICATIONS, 7231
    ULCER
        BLEEDING, 6733
        DRUG THERAPY, 6880
        SIMULATION, 6732
        STRESS, 6730*, 6736, 6835*
        SURGERY, 6880
        THERAPY, 6879*, 6880
    ULCER, PEPTIC
        ACID SECRETION, 6926
        AGE FACTORS, 6913*
        DIAGNOSIS, 6913*
        DRUG THERAPY, 6915*, 6927
        ENDOSCOPY, 6913*
        GASTRECTOMY, 6938
        GASTROENTEROSTOMY, 6938
        H2 RECEPTOR ANTAGONISTS, 6915*
        HEMORRHAGE, 6897
        HYPERCHLORHYDRIA, 6926
        PATHOLOGY, 6921
        SURGERY, 6919*
        THERAPY, 6921
        VAGOTOMY, 6919*, 6938
    VARICES
        BLEEDING, 6900
        DIAGNOSIS, 6900
        SURGERY, 6900
        THERAPY, 6900
    WOUNDS AND INJURIES
        H1 RECEPTOR ANTAGONISTS, 6834*
        H2 RECEPTOR ANTAGONISTS, 6834*
        HISTAMINE, 6834*
        RUPTURE, 6903

STOMACH DISEASES
    ACID SECRETION, 6722*
    CELLS
        MITOSIS, 6722*

- STRESS
  - LIVER INJURY
    - ENZYMES, 6836*
    - LYSOSOMES, 6836*
  - STOMACH
    - MOTILITY, 6835*
    - ULCER, 6736, 6835*
  - ULCER
    - ADENOSINE TRIPHOSPHATASE, 6730*
    - HISTAMINE, 6736
    - METABOLISM, 6730*
    - OXIDATIVE PHOSPHORYLATION, 6730*
    - PREVENTION, 6736
    - STOMACH, 6730*

- STRICTURE
  - ESOPHAGUS
    - ESOPHAGEAL REFLUX, 6865
    - REVIEW, 6865

- TEMPERATURE
  - ESOPHAGUS
    - MOTILITY, 6704
  - INTESTINE, SMALL
    - ENZYMES, 6824

- TERPENES
  - INTESTINE, SMALL
    - CELLS, 6827
    - SECRETION, 6827

- THYROCALCITONIN
  - HYPOCALCEMIA
    - ETIOLOGY, 7076*

- TISSUE ADHESIVES
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 6734
  - STOMACH
    - BLEEDING, 6733
  - ULCER
    - BLEEDING, 6733

- TOMOGRAPHY
  - LIVER, 6853*
  - PANCREAS, 6853*
    - ANALYSIS, 6856*
    - DIAGNOSIS, 6855*
    - TECHNIQUES, 6856*
  - PANCREATIC DISEASES
    - ANGIOGRAPHY, 6854*
    - ULTRASONOGRAPHY, 6854*
  - ULTRASONOGRAPHY
    - PANCREAS, 6855*

- TOXICITY
  - ANTI-INFLAMMATORY AGENTS
    - PREVENTION, 7250
  - CHENODEOXYCHOLIC ACID, 6771*
  - LIVER INJURY
    - FUNGI, 7143

- TOXINS
  - LIVER
    - NEOPLASMS, 7100*
    - POLYSACCHARIDES, 6782*
  - LIVER INJURY
    - DRUG-INDUCED, 7137*
    - TRIGLYCERIDES, 6792

- TRANQUILIZING AGENTS
  - HEPATOCYTES
    - METABOLISM, 6769*

- TRANSPLANTATION
  - LIVER
    - DRAINAGE, 7117*
    - REVIEW, 7116*
    - SURVIVAL, 7116*
    - TECHNIQUES, 7117*

- TRANSPORT
  - AMINO ACIDS
    - AMINO TRANSFERASES, 6758*
    - LIVER, 6758*
  - BILE ACIDS AND SALTS
    - DIET, 6693*
    - MICROORGANISMS, 6693*
  - FATTY LIVER
    - LIPIDS, 6802
  - HEPATOCYTES
    - AMINO ACIDS, 6760*
  - ILEUM
    - MOTILITY, 6710
  - INTESTINE, SMALL
    - GLUCOSE, 6823
  - JEJUNUM
    - MOTILITY, 6710
  - SPRUE, TROPICAL
    - ELECTROLYTES, 6982*
    - WATER, 6982*

- TRIGLYCERIDES
  - SEE ALSO FATS, LIPIDS
  - LIVER
    - ACIDS, 6808
  - LIVER INJURY
    - TOXINS, 6792

- ULCER
  - ACID SECRETION
    - BACTERIA, 6732
  - BLEEDING
    - THERAPY, 6733
    - TISSUE ADHESIVES, 6733
  - DUODENUM
    - AMINES, 6742
    - DRUG-INDUCED, 6742
    - PATHOLOGY, 6957
  - HEMORRHAGE
    - THERAPY, 6874*
  - INTESTINE, SMALL
    - POTASSIUM, 6939*
  - STOMACH
    - BLEEDING, 6733
    - DRUG THERAPY, 6880
    - SIMULATION, 6732
    - STRESS, 6736, 6835*
    - SURGERY, 6880
    - THERAPY, 6879*, 6880
  - STRESS
    - ADENOSINE TRIPHOSPHATASE, 6730*
    - HISTAMINE, 6736
    - METABOLISM, 6730*
    - OXIDATIVE PHOSPHORYLATION, 6730*
    - PREVENTION, 6736
    - STOMACH, 6730*
  - THERAPY
    - PROGNOSIS, 6879*

- ULCER, PEPTIC
  - CHILD
    - FAMILIAL FACTORS, 6924
  - DIAGNOSIS
    - ENDOSCOPY, 6913*
    - PROGNOSIS, 6912*
  - DRUG THERAPY
    - ANTACIDS, 6914*
    - CHEMICAL PROPERTIES, 6928
    - COMPLICATIONS, 6927
    - EDEMA, 6927
    - H2 RECEPTOR ANTAGONISTS, 6904, 6916*, 6917*
    - HYPERTENSION, 6927
  - DUODENUM, 6925
    - ACID SECRETION, 6926
    - AGE FACTORS, 6913*
    - ANTIGENS, 6911*
    - DIAGNOSIS, 6913*
    - DRUG THERAPY, 6914*, 6917*
    - ENDOSCOPY, 6913*
    - ETIOLOGY, 6911*
    - FAMILIAL FACTORS, 6923
    - GASTRECTOMY, 6934
    - GENETIC FACTORS, 6911*
    - H2 RECEPTOR ANTAGONISTS, 6917*
    - PANCREAS FUNCTION TESTS, 6929
    - PATHOLOGY, 6921
    - PERFORATION, 6920*
    - PYLOROPLASTY, 6918*
    - SURGERY, 6905, 6918*, 6919*, 6931
    - THERAPY, 6905, 6921, 6931
    - VAGOTOMY, 6905, 6918*, 6919*, 6934
  - DYSPEPSIA, 6919*
  - ENDOSCOPY
    - AGE FACTORS, 6913*
  - ETIOLOGY, 6922
    - ANTIGENS, 6911*
    - GENETIC FACTORS, 6911*
  - GASTRECTOMY
    - COMPLICATIONS, 6934
  - GASTRITIS
    - DISEASES ASSOCIATED WITH, 6878*, 6893
    - IMMUNOLOGY, 6893
  - GASTRODUODENITIS
    - DRUG THERAPY, 6930
  - GENETIC FACTORS
    - ANTIGENS, 6911*
  - H2 RECEPTOR ANTAGONISTS
    - COMPLICATIONS, 6916*
  - PANCREAS
    - SECRETION, 6929
  - PATHOLOGY, 6922
  - PERFORATION
    - SURGERY, 6920*
    - THERAPY, 6920*
  - PROGNOSIS
    - HISTAMINE, 6912*
  - PYLOROPLASTY
    - COMPLICATIONS, 6918*
  - SECRETION
    - PEPSIN, 6925
  - STOMACH
    - ACID SECRETION, 6926
    - AGE FACTORS, 6913*
    - DIAGNOSIS, 6913*
    - DRUG THERAPY, 6915*, 6927
    - ELECTROPHYSIOLOGY, 6909

- ULCER, PEPTIC (continued)
  - STOMACH (continued)
    - ENDOSCOPY, 6913*
    - GASTRECTOMY, 6938
    - GASTROENTEROSTOMY, 6938
    - H2 RECEPTOR ANTAGONISTS, 6915*
    - HEMORRHAGE, 6897
    - HYPERCHLORHYDRIA, 6926
    - MOTILITY, 6909
    - PATHOLOGY, 6921
    - SURGERY, 6919*
    - THERAPY, 6921
    - VAGOTOMY, 6919*, 6938
  - SURGERY
    - COMPLICATIONS, 6918*
    - DUMPING SYNDROME, 6918*
    - PYLOROPLASTY, 6918*
    - VAGOTOMY, 6918*, 6932
  - THERAPY
    - SECRETIN, 6929
    - VAGOTOMY, 6905
  - VAGOTOMY
    - COMPLICATIONS, 6918*, 6934
    - DUMPING SYNDROME, 6918*, 6934
    - TECHNIQUES, 6905

- ULTRASONOGRAPHY
  - ABDOMEN, 7270
  - COMMON BILE DUCT
    - DILATATION, 7222
  - GALLBLADDER
    - ANOMALY, 7219*
  - INTESTINE, SMALL
    - INTUSSUSCEPTION, 7025
  - JAUNDICE, OBSTRUCTIVE
    - COMMON BILE DUCT CALCULI, 7229
  - KIDNEYS
    - ANOMALY, 7219*
  - LIVER
    - ANOMALY, 7219*
    - CYSTS, 7123
    - NEOPLASM METASTASIS, 7125, 7227
    - NEOPLASMS, 7227
  - PANCREATIC DISEASES
    - DIAGNOSIS, 7070
    - TOMOGRAPHY, 6854*
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 7082
  - TOMOGRAPHY
    - PANCREAS, 6855*

- ULTRASOUND
  - BILE DUCTS
    - CALCULI, 7224
  - COMMON BILE DUCT CALCULI, 7224

- UREMIA
  - LIVER
    - GLUCONEOGENESIS, 6795

- URINARY SYSTEM
  - DISEASE
    - POTASSIUM, 7271
  - NEOPLASMS
    - ALPHA FETOPROTEIN, 7131

- URINE
  - AMYLASES
    - AGE FACTORS, 6744*

URINE (continued)
    AMYLASES (continued)
        CHILD, 6744*
        INFANT, 6744*
    CELIAC DISEASE
        SEROTONIN, 6995
    HYDROCARBONS, CHLORINATED
        PORPHYRINS, 6785
    RADIONUCLIDES
        DIAGNOSIS, 6828*

UROGENITAL SYSTEM
    CROHN'S DISEASE
        NEOPLASMS, 7285
    ILEUM
        ANOMALY, 6970
    NEOPLASMS, MALIGNANT
        DIAGNOSIS, 6890

VACCINES
    HEPATITIS, INFECTIOUS, 7160

VAGOTOMY
    COMPLICATIONS
        DIARRHEA, 6936
        NAUSEA, 6936
        PAIN, 6936
        RADIOLOGY, 6933
        THERAPY, 6936
        VOMITING, 6936
    DUODENUM
        ULCER, PEPTIC, 6905, 6918*, 6919*, 6934
    GASES
        STASIS, 6933
    ODDI'S SPHINCTER
        MOTILITY, 6848
    STOMACH
        ACID SECRETION, 6743
        DISTENTION, 6933
        ELECTROPHYSIOLOGY, 6909
        MOTILITY, 6909
        SECRETION, 6935
        ULCER, PEPTIC, 6919*, 6938
    ULCER, PEPTIC
        COMPLICATIONS, 6918*, 6934
        DUMPING SYNDROME, 6918*, 6934
        SURGERY, 6918*, 6932
        TECHNIQUES, 6905
        THERAPY, 6905

ARICES
    DUODENUM
        BLEEDING, 6900
        DIAGNOSIS, 6900
        SURGERY, 6900
        THERAPY, 6900
    ESOPHAGUS
        HEMORRHAGE, 6897
    LIVER CIRRHOSIS
        BLEEDING, 7185*
        ESOPHAGUS, 7185*
    STOMACH
        BLEEDING, 6900
        DIAGNOSIS, 6900
        SURGERY, 6900
        THERAPY, 6900

VASOPRESSIN
    GASTROINTESTINAL SYSTEM
        HEMORRHAGE, 7186*
    HEMORRHAGE
        ANESTHESIA, 6874*
    LIVER
        CIRCULATION, 6756*
    REVIEW, 7186*

VATER'S PAPILLA
    ENDOSCOPY
        DIAGNOSIS, 6857
        DISEASE, 6857
        SURGERY, 6857

VILLI
    INTESTINE, SMALL
        DRUG EFFECTS ON, 6833*
        RADIATION EFFECTS ON, 6833*

VIRUS DISEASES
    COLITIS, ULCERATIVE, 7279
    CROHN'S DISEASE, 7279
    GASTROENTERITIS
        CHILD, 7251
        EPIDEMIOLOGY, 7251
        INFANT, 7251
    LIVER
        NEOPLASMS, MALIGNANT, 7248

VIRUSES
    HEPATITIS, TOXIC
        NECROSIS, 6786
        SIMULATION, 6786

VITAMIN A
    LIPOGENESIS, 6774*
    LIVER
        LIPOGENESIS, 6773*

VITAMIN B1
    LIVER CIRRHOSIS, 7190
    LIVER DISEASES, ALCOHOLIC, 7190

VITAMIN B12
    ANEMIA, PERNICIOUS
        ABSORPTION, 6989
        RADIONUCLIDES, 6989
    MALABSORPTION SYNDROMES
        CHILD, 6985

VITAMIN C
    CHOLELITHIASIS
        PREVENTION, 6780*
    LIVER
        ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6765*

VITAMIN D

    INTESTINE, SMALL
        MITOCHONDRIA, 6839
        NUCLEIC ACIDS, 6839
        PROTEINS, 6839
    LIVER
        MITOCHONDRIA, 6839
        NUCLEIC ACIDS, 6839
        PROTEINS, 6839

VOMITING
    PYLOROPLASTY
        COMPLICATIONS, 6936
    VAGOTOMY
        COMPLICATIONS, 6936

WATER
    INTESTINAL ABSORPTION
        MOTILITY, 6694*
    SPRUE, TROPICAL
        TRANSPORT, 6982*

WATER, ELECTROLYTE BALANCE
    HEMORRHAGE
        THERAPY, 6874*

WILSON'S DISEASE
    DIAGNOSIS, 7145*
    DISEASES ASSOCIATED WITH
        HEPATITIS, 7145*

WOUNDS AND INJURIES
    COLON
        COMPLICATIONS, 7005
        REVIEW, 7029
        SURGERY, 7027
        SURVIVAL, 7005
        THERAPY, 7028
    INTESTINES
        RUPTURE, 6903
    STOMACH
        H1 RECEPTOR ANTAGONISTS, 6834*
        H2 RECEPTOR ANTAGONISTS, 6834*
        HISTAMINE, 6834*
        RUPTURE, 6903

ZINC
    ACRODERMATITIS
        DRUG THERAPY, 6974
    LIVER
        FETUS, 6805

ZOLLINGER-ELLISON SYNDROME
    RADIOLOGY, 7266

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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CONTENTS

	Abstracts, Citations	Page
PRE-CLINICAL SCIENCES		
Morphology, Cellular Structure and Histochemistry	7288-7296	931
Absorption--Excretion--Transport	7297-7319	932
Motility	7320-7335	936
Secretion and Metabolism	7336-7341	938
Stomach	7342-7365	940
Pancreas	7366-7381	943
Hepatobiliary Tract	7382-7482	947
Intestine	7483-7507	967
General	7508-7524	974
DIAGNOSTIC PROCEDURES	7525-7553	977
GASTROINTESTINAL DISEASES		
Esophagus	7554-7566	980
Stomach	7567-7571	981
Peptic Ulcers	7572-7605	982
Small Intestine	7606-7632	985
Malabsorption	7633-7656	987
Large Intestine	7657-7716	990
Ulcerative Colitis	7717-7721	995
Pancreas	7722-7733	995
Pancreatitis	7734-7740	997
Liver and Biliary Tract	7741-7770	999
Hyperbilirubinemic States	7771-7776	1004
Nonviral Hepatitis and Hepatic Injury	7777-7780	1005
Acute Viral Hepatitis	7781-7797	1006
Chronic Hepatitis	7798-7801	1009
Alcoholic Liver Disease	7802-7810	1010
Cirrhosis	7811-7822	1012
Gallbladder and Biliary Tract Diseases	7823-7852	1014
General	7853-7891	1017
Parasitology	7892-7895	1020
Regional Enteritis	7896-7900	1020

AUTHOR INDEX

SUBJECT INDEX

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NOTE

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

7288 GOBLET CELLS IN EMBRYONIC INTESTINE: ACCELERATED DIFFERENTIATION IN CULTURE.

(Eng.) Black, B. L.; Moog, F. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *Science* 197(4301):368-370; 1977.

The course of goblet cell differentiation was studied in duodena of chick embryos. If duodenal tissue from 14-day embryos was cultured in chemically defined medium, more than twice as many goblet cells appeared within 48 hr as in intact embryos during the same time. The increase in goblet cell number was accelerated by 10^{-9} M thyroxine but was prevented by 10^{-6} M hydrocortisone. The results suggest that differentiation of intestinal epithelium is regulated in part by a circulating inhibitor.

7289 PURIFICATION OF HISTAMINE RECEPTOR (IV): SPECIFICITY OF BINDING OF VARIOUS DRUGS TO THE HISTAMINE RECEPTOR-RICH FRACTION AND TO SOLUBILIZED BINDING SITES.

(Eng.) Uchida, M.; Takagi, K. (Dept. Molecular Pharmacology, Meiji Coll. Pharmacy, Setagaya-ku, Tokyo 154, Japan). *Jpn. J. Pharmacol.* 27(1):9-15; 1977.

The binding affinities and specificities of ^{3}H-histamine to the receptor-rich membrane fraction and solubilized sites and its displacement by various agonistic and antagonistic drugs were investigated in the feline small intestine. Scatchard plots of histamine binding to plasma membrane fragments demonstrated two orders of binding sites with binding constants of $K_1=2.1 \times 10^5$ M^{-1} and $K_2=1.3 \times 10^4$ M^{-1} and binding capacities of about 2 and 17 nmol/mg protein, resp. Binding was not only rapid but also reversible. Membrane fragments pretreated with dibenamine exhibited only the lower affinity binding sites in contrast to a preparation protected with diphenhydramine, which exhibited both sites. However, the solubilized receptors exhibited only high affinity, low capacity ($K=1.1 \times 10^5$ M^{-1}, 4 nmol/mg binding sites. Histamine, diphenhydramine, chlorpheniramine, 2-methyl-histamine, and betazole, all H_1-receptor agonists and antagonists, were the most effective competitors of histamine binding. Atropine, 4-methyl-histamine, phetolamine, and propranolol, all H_2 receptor agonists and antagonists, were less effective competitors of histamine binding. Imidazole acetic acid, phytostigmine, phenylephrine, isoproterenol, and carbachol were not effective competitors. The specificities and quantities of binding observed were similar in both the membrane fractions and in the solubilized preparations, indicating that the receptors could be adequately measured both *in vivo* and *in vitro*. However, the calculated number of sites bound to these drugs was higher than expected in some cases, and it is concluded that further work in improving the specificity of binding is required.

7290 MORPHOLOGICAL CHANGES OF THE ADAPTING SMALL INTESTINE DEPRIVED OF GASTRIC, DUODENAL, BILIARY AND PANCREATIC SECRETIONS IN THE RAT.

(Eng.) Fenyo, G. (Dept. Surgery and Surgical Res. Lab., Karolinska sjukhuset, Stockholm, Sweden). *Eur. Surg. Res.* 9(2):122-130; 1977.

The influence of gastrointestinal secretions on adaptive morphological changes in rat small intestine with diminished absorptive surface was investigated. Four groups of Sprague-Dawley rats were operated upon. In group 1 (controls), laparotomy and suture-marking of the small intestine were performed. In group 2, a jejuno-ileostomy was established, resulting in a bypass of about 85% of the small intestine. In group 3, a similar bypass was performed along with diversion of secretions from the duodenum, pancreas, and bile to the transverse colon. In group 4 animals, gastric secretion was diverted to the colon in addition to the operations performed in group 3 animals. No visible macroscopic changes were detectable in group 1 rats. However, in groups 2-4, there was a noticeable hypertrophy of the jejunum and ileum in circuit and also of the first part of the blind loop. The blind loop gradually became narrower towards its top, and its last 20-25 cm was visibly atrophic. In groups 3 and 4, some rats had a grossly dilated colon descendens distal to the jejuno-transversostomy. Increases of wet and dry weight and villus height (% of control values) for group 2 rats amounted to 103, 100, and 29%, resp., for the jejunum, and 141, 123, and 71%, resp., for the ileum. In group 3 animals, the corresponding increases for the jejunum were 11, 96, and 55%, resp.; for the ileum, they were 106, 81, and 40%, resp. Wet weight, dry weight, and villus height increased in group 4 rats by 42, 35, and 9%, resp., for the jejunum, and 23, 16, and 26%, resp., for the ileum. The above experiments demonstrate that the presence of duodeno-pancreatico-biliary secretions is not indispensable for the development of compensatory hypertrophic changes in the small intestine. The importance of gastric secretions in this respect cannot be evaluated because of the serious malabsorption that occurred in group 4 rats as a result of the operations.

7291 RECEPTORS FOR POLYMERIZED ALBUMIN ON LIVER CELLS.

(Eng.) Lenkei, R.; Onica, D.; Ghetie, V. (Dept. Immunology, Victor Babes Inst., Spl. Independentei 99, R-76201 Bucharest 35, Rumania). *Experientia* 33(8):1046-1047; 1977.

The hypothesis that the removal of albumin polymers from the circulation may be performed by specific receptors on liver cells was tested. Using rabbit polymerized albumin either labeled with fluorescein isothiocyanate (FITC-RSAP) or coated on sheep RBC, specific receptors on rabbit liver cells were demonstrated. FITC-RSAP stained more than 90% of the hepatocytes. The majority of fluorescent hepatocytes presented ring and patchy staining. If the cell suspension was incubated for 2 hr at 37 C, many cells exhibited progressive pinocytosis. The intensity of fluorescence was considerably enhanced if the cells had been incubated for 2 hr at 37 C before staining, which may indicate that the *in vivo* cells have loosely attached albumin on their surface that is lost during the incubation at 37 C. No staining was observed with fluorescein isothiocyanate-labeled rabbit albumin. The staining with FITC-RSAP was not reduced by preliminary incubation of cells with nonfluorescent rabbit albumin. No significant staining of rabbit alveolar macrophages or blood lymphocytes was recorded either with FITC-RSA or with FITC-RSAP. These results show that the binding of FITC-RSAP to hepatocytes is specific. The results suggest that there are receptors specific for the fixation and further manipulation of the polymerized albumin on the rabbit hepatocyte membrane.

7292 THE MORPHOGENESIS OF THE LIVER IN THE CHICK EMBRYO--DEVELOPMENT OF THE HEPATIC ENDODERM, THE HEPATIC MESENCHYME, THE ENDOTHELIUM AND MACROPHAGES. (Eng.) Fukuta, S. (Zoological Inst., Univ. Tokyo, Tokyo, Japan). *J. Fac. Sci. Univ. Tokyo Sect. 4* 13(4):341-351; 1976.

7293 THE FUNCTION OF THE HEPATIC ARTERY. (Eng.) Rappaport, A. M.; Schneiderman, J. H. (No affiliation given). *Rev. Physiol. Biochem. Pharmacol.* 76:130-175; 1976.

7294 A SCANNING ELECTRON MICROSCOPY OF SUBCELLULAR STRUCTURES OF THE HUMAN HEPATIC CELL. (Eng.) Itoshima, T.; Shimada, Y.; Hayashi, N.; Murakami, T. (Okayama Univ. Medical Sch., Okayama 700, Japan). *Arch. Histol. Jpn.* 39(1):15-21; 1976.

7295 DEVELOPMENT OF ACINAR CELLS IN THE RAT SUBMANDIBULAR GLAND. (Eng.) Srivastava, H. C. (Medical Coll., Baroda, India). *J. Anat.* 123(2):459-465; 1977.

7296 ULTRASTRUCTURE OF THE PAROTID DUCT. CYTOCHEMICAL STUDIES OF THE STRIATED DUCT AND PAPILLARY CYSTADENOMA LYMPHOMATOSUM OF THE HUMAN PAROTID GLAND. (Eng.) Cutler, L. S.; Chaudhry, A.; Innes, D. J., Jr. (Univ. Connecticut Health Center, Farmington, CT 06032). *Arch. Pathol. Lab. Med.* 101 (8):420-424; 1977.

See also, 7309, 7318, 7345, 7396, 7436, 7453, 7484, 7494, 7500, 7517, 7599, 7653, 7693, 7836.

ABSORPTION - EXCRETION - TRANSPORT

7297 MOTILITY- AND BLOOD FLOW-DEPENDENT ABSORPTION OF AMINO ACIDS IN CANINE SMALL INTESTINE. (Eng.) Pytkowski, B.; Michalowski, J. (Medical Center Postgraduate Education, Marymoncka 99, 01-813 Warsaw, Poland). *Eur. J. Clin. Invest.* 7(2): 79-86; 1977.

The relation between L-phenylalanine and L-serine absorption, intestinal motility, and blood flow was studied with a canine *in situ* isolated jejunal loop in acute experiments and in chronic preparations in conscious dogs. During spontaneous rhythmic contractions, as well as after mechanical and pharmacological (i.e., pilocarpine or acetylcholine) stimuli, rhythmic changes in blood flow, related to intestinal contractions, were observed. They had no bearing on mean blood flow or absorption as long as they did not occur together with tonic contractions. The tonic contractions resulted in a prolonged decrease in jejunal blood flow and diminished amino acid absorption rate. Absorption and motility index, as well as blood flow and motility were negatively correlated. There was a positive rectilinear correlation between intestinal blood flow and absorption, regardless of whether changes in blood flow resulted from the increase in motility or were induced by intestinal artery occlusion. These correlations suggest that changes in amino acid absorption during increased motility depend on changes in blood flow. This relationship may be important in clinical syndromes with hypermotility.

7298 MECHANISM OF INTESTINAL ABSORPTION AND BRAIN UPTAKE OF L-5-HYDROXYTRYPTOPHAN IN RATS, AS COMPARED TO THOSE OF L-3,4-DIHYDROXYPHENYLALANINE. (Eng.) Shindo, H.; Komai, T.; Kawai, K. (Central Res. Lab., Sankyo Co., Ltd., Hiromachi 1-chome, Shinagawa-ku, Tokyo, Japan). *Chem. Pharm. Bull.* 25(6):1417-1425; 1977.

L-5-hydroxytryptophan (5-HTP) and L-3,4-dihydroxyphenylalanine (dopa) were compared with respect to their mechanisms of intestinal absorption, metabolism in the intestine and liver, and mechanisms of passage through the blood-brain barriers *in vitro* or *in situ* in the rat. The corresponding D-isomers were also investigated for comparison. L-5-HTP, but not the D-isomer, was absorbed from the intestine by an active transport mechanism in the same way as L-dopa. *In vitro* studies using rat brain cortex slices showed that both L-5-HTP and L-dopa, but not their D-isomers, are taken up by the brain tissues by an active transport mechanism that is saturable, energy-dependent, and competitive. There was no substantial difference between L-5-HTP and L-dopa in the rate of intestinal absorption and that of brain uptake. L-5-HTP was decarboxylated in the intestine to a much lesser extent than L-dopa during absorption, and the decarboxylation activity of rat intestine and liver homogenates was found to be about four and seven times higher for L-dopa than for L-5-HTP, resp. The latter results suggest that a p.o. dose of L-5-HTP can be much more easily transferred into the circulating blood, without undergoing significant decarboxylation in the peripheral organs, than can L-dopa, resulting in a more efficient penetration of L-5-HTP into the brain as a serotonin precursor.

7299 INTESTINAL ABSORPTION AND RETENTION OF CADMIUM IN NEONATAL RAT. (Eng.) Sasser, L. B.; Jarboe, G. E. (Comparative Animal Res. Lab., Oak Ridge, TN 37830). *Toxicol. Appl. Pharmacol.* 41(2):423-431; 1977.

To quantitate systemic cadmium absorption and to determine the pattern of intestinal uptake and retention of cadmium, newborn Sprague-Dawley rats were dosed p.o. at 2 or 24 hr of age with 1 µCi of ^{115m}Cd and killed at intervals between 1 and 21 days after dosing. Systemic cadmium absorption was about six times greater in 2-hr-old pups as compared with 1-day-old pups, but the rate of absorption after day 1 was similar in both age groups. Post-weaning rats dosed at 6 weeks of age absorbed 0.5% of the Cd dose, resp. Cadmium was tenaciously retained in the gastrointestinal tract of newborn rats, with over 60% of the Cd dose remaining in the gastrointestinal tract 15 days after dosing. Autoradiographs showed considerable amounts of radioactivity not only in the intestinal surface epithelium and brush borders, but also in the crypts, lamina propria, and muscular layer. Because of the greater absorption and the prolonged intestinal retention of Cd in the newborn rat and the long biological half-life of Cd in the body, Cd exposure in infancy could result in greater lifetime Cd accumulation. The prolonged intestinal retention of Cd may have significant implications for the interpretation of short-term balance studies of metals.

7300 STEADY-STATE METABOLISM AND TRANSPORT OF D-GLUCOSE BY RAT SMALL INTESTINE IN VITRO. (Eng.) Pritchard, P. J.; Porteous, J. W. (Dept. Biochemistry, Univ. Aberdeen, Marischal Coll., Aberdeen AB9 1AS, Scotland). *Biochem. J.* 164(1):1-14; 1977.

The translocational and metabolic fate of D-glucose was studied in the *in vitro* rat small intestine under defined conditions. Conditions of incubation of the everted sacs were selected to ensure that absorption of D-glucose by the mucosal tissue, intracellular metabolism of the absorbed glucose, and transport of glucose through the intact intestinal tissue proceeded linearly with respect to time of incubation within stated intervals. Under these conditions, steady intracellular concentrations of glucose and lactate were demonstrated. About 25% of the glucose absorbed from the external mucosal solution was temporarily accumulated within the mucosal tissue and about 25% was transported through the intact tissue into the external serosal solution; the remainder of the absorbed glucose was metabolized, 90% to lactate and 10% to CO_2. Concomitant respiration rates were comparable with those reported for several other preparations of intestine and were stoichiometrically in excess of the O_2 metabolism required to account for the production of CO_2 from the absorbed glucose. Water transport through the everted sacs proceeded at an optimum rate under the experimental conditions selected. Other factors that influenced the design of the experiments and the interpretation of results included the initial physiological state of the animal, the anesthetic used, and the ionic composition of the incubation medium.

7301 EFFECT OF SODIUM TAUROCHOLATE AND ETHANOL ON HYDROGEN ION ABSORPTION IN RABBIT ESOPHAGUS. (Eng.) Chung, R. S. K.; Johnson, G. M.; Denbesten, L. (Veterans Admin. Hosp., Iowa City, IA 52240). *Am. J. Dig. Dis.* 22(7):582-588; 1977.

H^+ absorption by the rabbit esophagus was studied during *in vivo* perfusion of the esophagus with a solution of 0-140 mM H^+ containing 5 mM sodium taurocholate (NaTC) or 5% ethanol (E). Net ion and volume fluxes, changes in osmolality and potential difference (PD), histological alterations, and absorption of NaTC or E were correlated with concentration of H^+ in the perfusate. Both agents markedly increased the rate of removal of H^+ from the esophageal lumen; this removal was accompanied by a fall in PD and a net increase in the transport of Na^+, K^+, and Cl^- ions in the direction of their chemical gradients as well as by a decrease in osmolality in the recovered perfusate. Neutral solutions of E depressed PD and increased net ion fluxes to a lesser extent than did acid solutions, and acidity did not affect absorption of E. NaTC in neutral solution did not induce changes in PD or in net ion fluxes, nor was it absorbed; absorption of NaTC increased with acidity. Damage to the esophageal mucosa (extensive thrombosis, necrosis, spontaneous rupture) was more severe after perfusion with an acid solution of NaTC than with E. For both agents, histological changes were proportional to H^+ concentration. The data suggest that increased permeability of the esophageal mucosa is the basic mechanism underlying esophagitis.

7302 IMPORTANCE OF LUMINAL LECITHIN IN INTESTINAL ABSORPTION AND TRANSPORT OF LIPID IN THE RAT. (Eng.) Tso, P.; Simmonds, W. J. (Dept. Physiology, Univ. Western Australia, Nedlands, 6009

Western Australia). *Aust. J. Exp. Biol. Med. Sci.* 55(3):355-357; 1977.

The importance of luminal lecithin in the intestinal absorption and transport of lipid was studied in rats, and the stomach emptying and uptake from the lumen were measured. Control and bile fistula male Wistar rats received 5 ml of a test meal made up of lipid (labeled with ^{14}C-oleic acid) and bile salts via a gastric tube; the test meal in some cases also contained about 65 µmol of egg lecithin (50 mg). There was no significant differences in stomach emptying or absorption in the two subgroups of bile fistula rats. At 2 hr after the test meal administration, the percentage of administered radioactive dose recovered from the mucosa was the same for control and the two bile fistula groups. However, at 4 hr, there was a significant ($p<0.01$) increase in mucosal recovery in controls as compared to the other two groups. The control rats transported significantly more lipid than the bile fistula groups at 4 hr ($p<0.05$) but not at 2 hr. If the amount of radioactive lipid transported was expressed as percent dose absorbed, the percentage stayed constant (83%) in all three groups at 2 and 4 hr. This finding implies that transport is related to absorption. The results do not support the previous suggestion that chylomicron formation and release are impaired in bile fistula rats. No evidence was found that luminal lecithin plays an important role in the transport of absorbed fat as chylomicrons.

7303 EFFECTS OF PROTEIN SYNTHESIS INHIBITORS ON ANGIOTENSIN-STIMULATED AND ANGIOTENSIN-INHIBITED FLUID TRANSPORT BY RAT JEJUNUM IN VIVO. (Eng.) Bolton, J. E.; Munday, K. A.; Parsons, B. J. (Dept. Physiology and Biochemistry, Univ. Southampton, Southampton SO9 3TU, England). *J. Endocrinol.* 74(2): 213-221; 1977.

The effects of protein synthesis inhibitors on the *in vivo* jejunal responses to i.v. infusions of angiotensin were studied in Wistar rats. Actinomycin D (600 µg/kg, i.v.) had no effect on the stimulation of fluid transport, which followed the infusion of low doses of angiotensin (0.59 ng/kg/min). Cycloheximide (0.1 or 2 mg/kg), blocked the stimulatory response to angiotensin, but was without effect on the inhibitory response to high doses of the hormone (590 ng/kg/min). It is concluded that low (physiological) doses of angiotensin stimulate fluid transport by a mechanism involving protein synthesis at a stage later than transcription, whereas high doses of the hormone inhibit fluid transport by a process that does not require protein synthesis.

7304 THE SELECTIVE UPTAKE AND TRANSMISSION OF PROTEINS TO THE CIRCULATION FROM THE SMALL INTESTINE OF THE SUCKLING RAT. (Eng.) Jones, R. E. (Dept. Zoology, Univ. Coll. North Wales, Bangor, Gwynedd, North Wales, United Kingdom). *Biochim. Biophys. Acta* 451(1):151-160; 1977.

The uptake of various ^{131}I- or ^{125}I-labeled protein mixtures from the small intestine of 14-day-old Wistar rats was measured after oral or intraluminal administration of the proteins. Mixtures were administered orally by a polythene stomach tube. Intraluminal injection of mixtures was performed after laparotomy and ligation of intestine at the ileocecal junction and at the pyloric sphincter. The mixtures containing various combinations of labeled bovine, rat, and sheep IgG and bovine albumin were given in doses of 0.2 ml NaCl, with a total dose of 300 µg of protein. Concentrations in sera 4 hr after oral administration were lower than after intestinal injection, possibly as a result of gastric hydrolysis. The concentration in the sera 4 hr after intraluminal administration was higher when proteins were injected into the isolated proximal small intestine than when they were injected into the distal small intestine. Sera concentrations also indicated greater selectivity in protein uptake by the proximal intestine. When the distribution of proteins was measured in small intestinal walls 1 hr after administration, the proximal intestine demonstrated selective uptake of the homologous IgG, while paired homologous and heterologous IgG was observed in equal concentrations in the wall of the distal small intestine. Measurement of proteins in the gut washings and sera indicate that the specific uptake of proteins by the cells of the proximal intestine is insufficient to account wholly for the process of selective transport to the circulation. Specific uptake may be a first step in this process.

7305 WATER ABSORPTION AND SWELLING IN THE RAT SMALL INTESTINE IN VITRO. (Eng.) Esposito, G.; Csaky, T. Z. (Istituto di Fisiologia Generale e di Chimica Biologica, Universita degli Studi di Milano, via Mangiagelli 32, I-20133, Milano, Italy). *Pfluegers Arch.* 369(1):75-78; 1977.

Net mucosal-to-serosal water transport and water retention as functions of time were simultaneously measured in the isolated, everted rat jejunum and ileum. The swelling of the epithelium preceded the absorption of fluid, and then it remained constant throughout the experiment. The water uptake, determined as a weight increase, and the net water transport, determined as a serosal volume increase, were higher in Krebs-Ringer-bicarbonate medium than in a Krebs-Ringer-phosphate medium. In the jejunum, glucose markedly stimulated both the tissue retention and the net transport of water, but these effects were not seen in the ileum. The replacement of chloride with sulfate in the medium diminished both water transport and retention, but both were markedly stimulated by the addition of glucose. The results show that during water transport the epithelial layer swells, and the swelling increases when the amount of water transported is increased.

7306 STUDIES ON THE INTESTINAL ABSORPTION OF BOVINE XANTHINE OXIDASE. (Eng.) Volp, R. F.; Lage, G. L. (Sch. Pharmacy, Univ. Wisconsin, Madison, WI 53706). *Proc. Soc. Exp. Biol. Med.* 154 (4):488-492; 1977.

The fate of xanthine oxidase at the pH of the stomach was investigated using a low pH buffer, and the absorption of this enzyme was studied in the everted rat intestine. Xanthine oxidase activity was determined by liquid scintillation counting of ^{14}C-uric acid formed by the action of the enzyme on ^{14}C-xanthine. Treatment of milk with a low pH buffer resulted in irreversible loss of xanthine oxidase activity. There was no significant difference between enzyme activities in serosal fluid or intestinal homogenates from everted gut strips incubated in Krebs buffer alone and those incubated in Krebs buffer plus milk, nor was there a difference between either of these and the control. The results show that the proposal that xanthine oxidase passes through the stomach and is absorbed intact by the small intestine is implausible.

7307 DETERMINATION OF EXTRACELLULAR SPACE IN SMALL INTESTINE.

(Eng.) Hajjar, J. J.; Bitar, K. (Sch. Medicine, American Univ. Beirut, Beirut, Lebanon). *Comp. Biochem. Physiol.* [*A*] 56A(4):615-619; 1977.

The extracellular space (ECS) of the turtle small intestine was characterized in the mucosal and submucosal layers (using ^{14}C-D sorbitol, ^{14}C-inulin, ^{22}Na, ^{14}C-D-mannitol, and 131-radioiodinated serum albumin [RISA] as probing solutes) by exposing only one surface at a time of the intestinal strip to each solute. The effects of changes in cell volume on the ECS were studied by changing the osmolarity or temperature of the incubation solution. The ECS values differed widely with the different probing solutes. Inulin uptake achieved an equilibrium value (1.6 µl/mg dry weight) in the first 30 min and maintained this value for 2.5 hr. Regardless of the method of exposure to the probing solute, the mucosal space (0.08 ± 0.002 ml/g wet weight) remained smaller than the submucosal space (0.16 ± 0.02 ml/g wet weight), suggesting that inulin could not penetrate between the two layers. RISA, of similar molecular weight, produced similar results. Sorbitol, which has a smaller molecular weight than inulin or RISA, did not differentiate between the two layers and occupied a much larger ECS (2.8 µl/mg dry weight at 30 min) than did inulin. Furthermore, sorbitol uptake never reached equilibrium, although the greatest increase occurred within the first 60 min. Mannitol and ^{22}Na, also of small molecular weight compared to inulin or RISA, produced results similar to those with sorbitol. Using inulin as a probe, the ECS varied inversely with changes in cell volume. The mucosal inulin space was shown to account for most of the change. It is concluded that, for experiments involving more than 30-40 min incubation times, inulin is the most useful probe due to its ability to differentiate between the mucosal and submucosal layers and to the fact that it rapidly achieves equilibrium. However, since inulin occupied approximately 60% of the sorbitol and mannitol space in the submucosa and muscularis and about 32% of the mannitol space in the mucosa, a correction factor must be employed.

7308 ELECTRICAL CHANGES IN ISOLATED RAT JEJUNUM INDUCED BY HYPERTONICITY.

(Eng.) Garcia-Diaz, J. F.; Corcia, A. (Seccion de Biofisica, Facultad de Medicina, Universidad de Malaga, Spain). *Biochem. Biophys. Acta* 468(2):177-187; 1977.

The electrical response of isolated jejunum from Wistar rats to changes in the osmolarity of the mucosal and serosal bathing media was investigated. When the bathing solution contained 20 mM of D-glucose, the transepithelial potential difference (PD, serosal solution positive) at 30 min averaged 8.6 ± 0.3 mV. Mannitol-induced mucosal hypertonicity produced a drop in the PD with a half-time of about 15 sec; the change in PD was -7.4 ± 0.4 mW when 170 mM mannitol was added and -4.4 ± 0.4 mV following the addition of 85 mM mannitol. When both the mucosal and serosal solutions were made hypertonic simultaneously by mannitol addition, the PD changed in the same way as when only the mucosal solution was made hypertonic. When 170 mM mannitol was added to the serosal solution only, the PD fell slowly during the first 15 sec and then rose to a stable value at 35 min, with the difference in PD values before and after mannitol addition being 0.5 ± 0.1 mV; this difference was significantly different from zero ($p<0.01$). There was no significant difference between the relative changes in PD and short-circuit current, suggesting that there was no change in the transmural electric resistance values due to osmotic effects. When the PD was varied by adding different concentrations of glucose to the bathing media (using mannitol to maintain the isotonicity of the initial bathing solution), the PD value at 30 min after the addition of 20 mM glucose averaged 8.6 ± 0.5 mV; with 5 mM glucose plus 15 mM mannitol, the PD averaged 4.0 ± 0.3 mV; and when glucose was completely replaced by mannitol (20 mM), the PD was 1.0 ± 0.1 mV. The potential drop induced by mucosal hypertonicity was linearly related to the magnitude of the PD just before the increase in osmolarity. The drop in potential can be explained by a decrease in the electrical resistance of the extracellular shunt pathway due to an opening of the tight junctions. The results can be accounted for in terms of an equivalent electrical circuit for the small intestine, which makes it possible to obtain estimates of the values of the diffusion potential and the salt gradient across the tight junction.

7309 CORRELATIVE STUDIES OF FUNCTION AND MORPHOLOGY.

(Eng.) Lev, R. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 24-29; 1977.

ABSORPTION - EXCRETION - TRANSPORT

7310 MACROMOLECULAR TRANSPORT IN THE DEVELOPING SMALL INTESTINE. (Eng.) Walker, W. A. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Nck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 44-54; 1977.

7311 EFFECT OF MATERNAL DIET ON INTESTINAL TRANSPORT IN VITRO IN DEVELOPING NEONATAL RATS. (Eng.) Fitzgerald, J. F. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 75-79; 1977.

7312 DEVELOPMENTAL ASPECTS OF FAT ABSORPTION. (Eng.) Watkins, J. B. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 86-91; 1977.

7313 EFFECTS OF ALDOSTERONE ON H_2O AND ELECTROLYTE FLUXES IN DOG JEJUNUM AND ILEUM [Abstract]. (Eng.) Moore, E. W.; Dowla, M. U. (Medical Coll. Virginia, Richmond, VA). *Gastroenterology* 72(5, Part 2):1104; 1977.

7314 VITAMIN K-2 COLONIC AND ILEAL IN VIVO ABSORPTION. BILE, FATTY ACIDS, AND pH EFFECTS ON TRANSPORT [Abstract]. (Eng.) Hollander, D.; Rim, E.; Ruble, P. E. (Dept. Medicine, Wayne State Univ., Detroit, MI). *Gastroenterology* 72(5, Part 2):1071; 1977.

7315 EFFECT OF INTRAPERITONEAL NEMBUTAL ON GASTRIC ELECTRICAL POTENTIAL [Abstract]. (Eng.) Mann, N. S.; Narenderan, K.; Borkar, B.; Kadian, R. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1097; 1977.

7316 LONG-CHAIN FATTY ACID (LCFA) IS TRANSPORTED PRIMARILY VIA THE PORTAL VEIN AT LOW RATES OF INTESTINAL LCEA ABSORPTION [Abstract]. (Eng.) McDonald, G. B.; Saunders, D. R.; Rubin, C. E.; Weidman, M. (Dept. Medicine, Univ. Washington, Seattle, WA). *Gastroenterology* 72(5, Part 2):1099; 1977.

7317 INFLUENCE OF NET WATER MOVEMENT ON ABSORPTION OF OLEIC ACID IN THE HUMAN JEJUNUM [Abstract]. (Eng.) Brown, B. D.; Broor, S. L.; Ammon, H. V. (Veterans Admin. Center, Wood, WI). *Gastroenterology* 72(5, Part 2):1032; 1977.

7318 FURTHER STUDIES ON Fc RECEPTORS FOR IgG MONOMER (FcR) IN NEONATAL RAT INTESTINE [Abstract]. (Eng.) Borthistle, B. K.; Brown, W. R.; Kubo, R.; Grey, H. (Veterans Admin. Hosp., Portland, OR). *Gastroenterology* 72(5, Part 2):1031; 1977.

7319 EVIDENCE FOR BINDING OF IgA AND IgM TO SECRETORY COMPONENT (SC) IN INTESTINAL EPITHELIUM [Abstract]. (Eng.) Brown, W. R.; Isobe, K.; Nakane, P. K. (Veterans Admin. Hosp., Denver, CO). *Gastroenterology* 72(5, Part 2):1034; 1977.

See also, 7352, 7436, 7459, 7483, 7486, 7487, 7493, 7508, 7609, 7636, 7749.

MOTILITY

7320 AUTOMATED HIGH-SPEED ANALYSIS OF GASTROINTESTINAL MYOELECTRIC ACTIVITY. (Eng.) Wingate, D.; Barnett, T.; Green, R.; Armstrong-James, M. (London Hosp. Medical Coll., Turner St., London E.1, England). *Am. J. Dig. Dis.* 22(3): 243-251; 1977.

An automated system for the high-speed analysis of gastrointestinal myoelectric activity using high-speed tape replay is described. Replay speed (120 mm/sec) is 60 times the recording speed, so that 1 sec of replay time is equal to 1 min of recording (real) time. Data analysis is performed using digital counting and an averaging computer. Rapid replay not only reduces the time required for data retrieval, but also increases the frequency of the recorded signals to allow for electronic separation of fast and slow wave activity for on-line conversion into digital pulses suitable for computer analysis. The technique is illustrated by the analysis of a single prolonged multichannel recording of myoelectric activity in two mongrel dogs fitted with eight monopolar electrodes on the serosa of the gastrointestinal tract. Recording was undertaken continuously from the conscious fasted animal for 570 min. Similar numbers of spikes were counted in duodenal and jejunal recordings (2,772 and 2,444, resp.), but activity was apparently greater in the ileum and antrum (9,653 and 21,324 spikes, resp.). The pure exponential nature of the antral recording suggested that the spikes were artifacts, and at autopsy, it was found that the conducting lead to the gastric antrum had fractured. On the basis of the interval histogram, the antral recording was discarded, and the ileum recording was regarded with some suspicion. Pulse density histograms of the complete duodenal and jejunal recordings were constructed with the averaging computer and clearly showed bursts of interdigestive myoelectric activity separated by intervals of quiescence. An examination of the distribution of spikes from two leads in 12 consecutive 10-min recording periods for duodenal and jejunal activity reveals not only peaks of activity, but also their aboral migratory nature, as they occur later in the jejunum than in the duodenum. Digital counting quantifies myoelectric events, and this may prove to be important in assessing the myoelectric response to exogenous stimuli.

7321 SITE OF ACTION OF CATECHOLAMINES ON THE PERISTALTIC REFLEX. (Eng.) Perucca, E.; Teggia, M.; Tonini, M. (Inst. Medical Pharmacology, Univ. Pavia, Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(9):581-586; 1976.

To clarify the site of peristaltic reflex regulation, the efficiency of sympathetic stimulation in inhibiting peristalsis and the contractile response to several drugs were investigated in the cat and guinea pig distal colon. Peristalsis was induced by insertion of an intraluminal balloon, and the periarterial plexus of the inferior mesenteric artery was stimulated at low frequencies. The drugs tested were acetylcholine chloride (0.2 µg injected intraarterially) and piperoxan HCl and propranolol HCl (each, 1×10^{-7} g/ml added to the organ bath). In the cat, stimulation of the periarterial nerves blocked peristalsis by abolishing the mechanical response of the longitudinal and circular muscle layers. A few seconds after the end of stimulation, however, peristalsis resumed. Sympathetic stimulation did not influence the contractile response of the longitudinal and circular muscles to acetylcholine, which produced a contraction of similar amplitude to the one produced by the balloon. The peristaltic reflex and its inhibition by sympathetic stimulation were the same in the guinea pig. Piperoxan, but not propranolol, abolished the block of peristalsis due to sympathetic stimulation. It is suggested that the adrenergic system inhibits peristalsis through a depression of cholinergic neuron activity. Although the catecholamines have a direct effect on the muscle cells, the main mechanism regulating the peristaltic reflex is inhibition of the intrinsic nervous structures.

7322 GASTRIC MOTILITY AND EMPTYING FOLLOWING PARIETAL CELL VAGOTOMY AND SELECTIVE GASTRIC VAGOTOMY. EXPERIMENTAL INVESTIGATION. (Eng.) Mikkelsen, K.; Eriksen, P. O.; Bone, J. (Kommunehospitalet, Univ. Aarhus, Aarhus, DK-8000, Denmark). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 17(5B): 714-722; 1976.

In adult mongrel dogs, the effect of the following three surgical procedures on gastric motility and the hormonal phase of gastric secretion was studied: (1) parietal cell vagotomy without drainage, (2) parietal cell vagotomy plus gastroduodenal anastomosis, (3) selective gastric vagotomy (cutting the antral nerves) plus parietal cell vagotomy, and (4) gastric and parietal cell vagotomies plus gastroduodenal anastomosis. In all dogs, a Heidenhain pouch (HP, a denervated fornix pouch) was constructed prior to the other procedure. Gastric motility and emptying of a meal of 200 g of standard dog food in dogs with HP alone was the baseline for comparison of the experimental results. Antral motility and gastric emptying time were unaffected by parietal cell vagotomy. Addition of anastomosis to the parietal cell vagotomy decreased motility but did not have a significant effect on mean emptying time. When the antral nerves were cut, complete atony of the stomach occurred. Emptying rate was unaltered in animals who had vagotomies plus gastroduodenal anastomosis because the standard meal passed passively through the anastomosis. Selective gastric vagotomy plus parietal cell vagotomy without anastomosis caused atony and significantly ($p<0.005$) prolonged emptying time. It is suggested that the "dumping" effect observed in duodenal ulcer patients who have undergone a combined parietal cell vagotomy and anastomosis may be the result of a decrease in the rate of emptying of the stomach. Parietal cell vagotomy without anastomosis is recommended as the procedure of choice for treatment of duodenal ulcer.

7323 THE INTERDIGESTIVE MYOELECTRIC COMPLEX IN NORMAL SUBJECTS AND PATIENTS WITH BACTERIAL OVERGROWTH IN THE JEJUNUM [Abstract]. (Eng.) Vantrappen, G.; Janssens, J.; Hellemans, J.; Ghoos, Y. (Dept. Medical Res., Univ. Leuven, Leuven, Belgium). *Gastroenterology* 72(5, Part 2):1167; 1977.

7324 INFLUENCE OF GASTRIN ON THE MIXING PROPERTIES OF THE SMALL BOWEL IN THE RAT [Abstract]. (Eng.) Gustavsson, S.; Jung, B.; Lundqvist, G.; Nilsson, F. (Univ. Hosp., 751 14 Uppsala, Sweden). *Eur. Surg. Res.* 9(Suppl. 1):143; 1977.

7325 DIRECT INHIBITORY EFFECTS OF ENKEPHALINS ON CONTRACTILE RESPONSES IN THE GUINEA PIG ILEUM [Abstract]. (Eng.) Sprugel, W.; Mitznegg, P.; Domschke, W.; Domschke, S.; Wunsch, E.; Moroder, L.; *et al.* (Dept. Pharmacology, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Gastroenterology* 72(5, Part 2):1135; 1977.

7326 A NON-INVASIVE METHODOLOGY FOR MOUTH-TO-COLON TRANSIT TIME DETERMINATION IN PRESCHOOL CHILDREN USING HYDROGEN (H_2) BREATH ANALYSIS [Abstract]. (Eng.) Solomons, N.; Vasquez, L.; Torun, B.; Viteri, F. (Inst. Nutrition of Central America and Panama, Guatemala City, Guatemala). *Gastroenterology* 72(5, Part 2):1135; 1977.

MOTILITY

7327 A COMPARISON OF THE REACTIVITY OF NON-VASCULAR SMOOTH MUSCLE FROM NORMOTENSIVE AND SPONTANEOUSLY HYPERTENSIVE RATS [Abstract]. (Eng.) Moore, A. F.; Khairallah, P. A. (Cleveland Clinic Foundation, Cleveland, OH 44106). *Fed. Proc.* 36(3):1021; 1977.

7328 ELECTRICAL ACTIVITY OF HUMAN TAENIA COLI IN VITRO [Abstract]. (Eng.) Kirk, D.; Duthie, H. L. (Royal Infirmary, Sheffield, England). *Gastroenterology* 72(5, Part 2):1080; 1977.

7329 ACUTE EFFECT OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS ON PYLORIC SPHINCTER PRESSURE (PSP) AND DUODENO-GASTRIC REFLUX (DGS) [Abstract]. (Eng.) Pantoja, J. L.; Defilippi, C.; Valenzuela, J. E. (Univ. Chile Sch. Medicine, Santiago, Chile). *Gastroenterology* 72(5, Part 2):1111; 1977.

7330 DISPERSION OF SOLID FOOD BY THE CANINE STOMACH [Abstract]. (Eng.) Meyer, J. H.; Mandiola, S.; Shadchehr, A.; Cohen, M. (Veterans Admin. Hosp., Sepulveda, CA). *Gastroenterology* 72(5, Part 2)1102; 1977.

7331 GASTRIC EMPTYING DURING CONTROLLED INTRAGASTRIC PRESSURE [Abstract]. (Eng.) Strunz, U. T.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1137; 1977.

7332 GASTRIC EMPTYING OF "INERT" VISCOUS MEALS IN RESPONSE TO VAGAL STIMULATION [Abstract]. (Eng.) Silverman, L.; Bauer, R. F.; Brooks, F. P. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1131; 1977.

7333 COMPARATIVE EFFECT OF ASPIRIN, KETOPROFEN, IBUPROFEN, NAPROXEN AND TOLECTIN ON GASTRIC ELECTRIC POTENTIAL IN RAT [Abstract]. (Eng.) Mann, N. S.; Borkar, B.; Narenderan, K.; Kadian, R. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1096; 1977.

7334 EFFECT OF METIAMIDE AND CIMETIDINE ON ASPIRIN INDUCED REDUCTION OF GASTRIC ELECTRICAL POTENTIAL IN RAT [Abstract]. (Eng.) Mann, N. S.; Borkar, B.; Kadian, R. S.; Narenderan, K. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1096; 1977.

7335 SPHINCTER OF ODDI MOTOR ACTIVITY: DEMONSTRATION OF UNIQUE HIGH-PRESSURE PHASIC CONTRACTIONS [Abstract]. (Eng.) Shaffer, R. D.; Hogan, W. J.; Geenen, J. E.; Dodds, W. J.; Stewart, E. T.; Arndorfer, R. C. (Medical Coll. Wisconsin, Milwaukee, WI). *Gastroenterology* 72(5, Part 2): 1130; 1977.

See also, 7308, 7358, 7516, 7574, 7601, 7698.

SECRETION AND METABOLISM

7336 α-ADRENERGIC RECEPTORS IN RAT PAROTID CELLS. I. CORRELATION OF [^{3}H]DIHYDROERGOCRYPTINE BINDING AND CATECHOLAMINE-STIMULATED POTASSIUM EFFLUX. (Eng.) Strittmatter, W. J.; Davis, J. N.; Lefkowitz, R. J. (Durham Veterans Admin. Hosp., Durham, NC 27705). *J. Biol. Chem.* 252(15):5472-5477; 1977.

The binding of [^{3}H]dihydroergocryptine was used to characterize the α-adrenergic receptor binding sites in both parotid membranes and dissociated parotid acinar cells of Sprague-Dawley rats. [^{3}H]dihydroergocryptine bound rapidly to both the membranes and dissociated cells. The association rate constant in membranes was 1.7×10^7 l/mol/min at 20 C. In cells [^{3}H]dihydroergocryptine binding reached equilibrium within 10 min. [^{3}H]dihydroergocryptine binding was saturable in membranes with 29.7 fmol bound/mg of protein and a dissociation constant of 10.5 nM. [^{3}H]dihydroergocryptine binding to cells rendered hypoxic or frozen and thawed was saturable with approximately 15,000 sites/cell. By contrast, binding to incubated, oxygenated cells did not saturate at concentrations of [^{3}H]dihydroergocryptine up to 20 nM. [^{3}H]dihydroergocryptine binding closely correlated with measurements of K^+ release. The ability of eight adrenergic agents to displace [^{3}H]dihydroergocryptine correlated (r=0.98) with their ability to stimulate or block K^+ release and had the typical potency series expected for an α-adrenergic receptor (epinephrine>norepinephrine>>isoproterenol; [-]-epinephrine>[+]-epinephrine; [-]-norepinephrine>[+]-norepinephrine). K^+ efflux generated by α-adrenergic stimulation reached a maximum at 30-60 sec. K^+ was then taken up by the cells with a half-time of 4 min. This uptake was blocked by ouabain. The maximum release of K^+ by 10^{-3} M epinephrine in the presence of 10^{-3} M ouabain was 2.3 μg of $K^+/10^6$ cells. Since each cell possesses 15,000 binding sites, 2.3×10^6 molecules of K^+ are released per binding site. If 60 sec are required for release, 4×10^4 molecules of K^+/binding site/sec are released.

7337 α-ADRENERGIC RECEPTORS IN RAT PAROTID CELLS. II. DESENSITIZATION OF RECEPTOR BINDING SITES AND POTASSIUM RELEASE. (Eng.) Strittmatter, W. J.; Davis, J. N.; Lefkowitz, R. J. (Durham Veterans Admin. Hosp., Durham, NC 27705). *J. Biol. Chem.* 252(15):5478-5482; 1977.

The attenuation by epinephrine of K$^+$ release from dissociated rat parotid acinar cells and the factors that influence its development (desensitization) and reversal (resensitization) were characterized. Preincubation of dissociated rat parotid acinar cells with 10^{-3} M epinephrine produced a time- and concentration-dependent decrement in the α-adrenergic response of the cells, K$^+$ release. This receptor desensitization by epinephrine was specific for the α-adrenergic receptor of the acinar cells, since K$^+$ release by the muscarinic cholinergic agonist, carbachol, remained unchanged. The half-time for desensitization was 2 min at 38 C. Chelation of Ca^{2+} with 10^{-3} ethylene glycol bis(β-aminoethyl ether)*N,N'*-tetraacetic acid prevented epinephrine-induced K$^+$ release, but did not prevent desensitization. The α-adrenergic antagonist, phentolamine (10^{-4} M), did not produce desensitization, but blocked the desensitization caused by epinephrine. Desensitized cells slowly resensitized when incubated in the absence of agonist. Depolarization of the acinar cell membrane potential by elevating external K$^+$ concentration or incubating in ouabain markedly accelerated resensitization. Desensitization and resensitization of the α-adrenergic biological response were accompanied by parallel changes in the α-adrenergic receptor binding sites assessed by [^{3}H]dihydroergocryptine binding. These data are the first demonstration of α-adrenergic receptor desensitization. In rat parotid acinar cells, rapid alterations in membrane binding sites contribute to desensitization and resensitization of the α-adrenergic response and, as in the cholinergic receptor of muscle, the membrane voltage appears to regulate the rate of receptor resensitization.

7338 ETHANOL-INDUCED INHIBITION OF GUANYLATE CYCLASE IN LIVER, PANCREAS, STOMACH, AND INTESTINE. (Eng.) Vesely, D. L.; Levey, G. S. (Univ. Miami Sch. Medicine, Miami, FL 33152). *Res. Commun. Chem. Pathol. Pharmacol.* 17(2):215-224; 1977.

Ethanol-induced inhibition of soluble preparations of guanylate cyclase from the liver, pancreas, stomach, and ileum of male Sprague-Dawley rats is reported. At a concentration of 5%, ethanol inhibited liver, pancreas, ileum, and stomach guanylate cyclase by 100, 85, 96, and 98%, resp. ($p<0.001$). Before ethanol addition, the levels of cyclic guanosine 3',5'-monophosphate (cyclic GMP, pmol accumulated/mg protein/10 min incubation) in liver, pancreas, ileum, and stomach tissues were 279 ± 6, 224 ± 6, 592 ± 6, and 453 ± 6, resp., whereas, after ethanol addition, the corresponding values were 0, 34 ± 4, 25 ± 3, and 8 ± 2, resp. Studies on the effects of different doses of ethanol on hepatic guanylate cyclase revealed that ethanol concentrations of 2.5 and 5.0% resulted in maximal inhibition (100%) of hepatic guanylate cyclase, whereas ethanol concentrations of 1.0% or less had no significant inhibiting effect on guanylate cyclase. The inhibitory effects of ethanol on the guanylate cyclase-cyclic GMP system of the above tissues provide a possible explanation for some of the diverse effects of ethanol on these tissues.

7339 IN VIVO STUDIES OF PRODUCTION AND UTILIZATION OF LACTIC ACID IN THE RAT. ROLE OF THE DIGESTIVE TRACT. (Fre.) Remesy, C.; Demigne, C.; Aufrere, J. (Station de Physiopathologie de la Nutrition, I.N.R.A., Theix, Saint Genes Champanelle, 63110 Beaumont, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):607-613; 1977.

Lactic acid levels were measured and related to pH in the stomach (secretory and nonsecretory zones), duodenum, jejunum, ileum, and cecum of male Sherman rats fed cereal-based or synthetic diets for 10 days. Diet 1 had a wheat and corn base supplemented with soya cakes and molasses. Diet 2 was semisynthetic and consisted of 13% casein, 79% wheat starch, corn oil, vitamins, and minerals. Diet 3 was similar to diet 2 except that potato starch replaced the wheat starch in proportions varying from 20-79%. Rats fed diet 1 had a pH of 5 and high levels of D-lactic acid in the nonsecretory zone of the stomach, which indicated that the lactic acid was produced by microbial fermentation. In the small intestine, L-lactic acid, which is produced by endogenous glycolysis, increased and D-lactic acid decreased. In the cecum, D- and L-lactic acid levels increased above 8 mM only when the pH fell below 5; volatile fatty acids predominated. Rats fed diets 2 and 3 had very low levels of lactic acid, principally L-lactic acid, in the stomach and small intestine. In the cecum, only rats fed diet 3 had considerable amounts of both D- and L-lactic acid and a pH below 5. Arteriovenous differences in lactate concentration in the liver, stomach, small intestine, and cecum showed that the jejunum was the site of highest glucose uptake and lactate production. However, lactate production by the jejunum was markedly lower in fasting rats than in rats fed diet 2. Glucose consumption accounted for most of the lactate excreted by the rats.

7340 CALCIUM ION UPTAKE INDUCED BY CHOLINERGIC AND α-ADRENERGIC STIMULATION IN ISOLATED CELLS OF RAT SALIVARY GLANDS. (Eng.) Koelz, H. R.; Kondo, S.; Blum, A. L.; Schulz, I. (Stadtspital Triemli, Birmensdorfer-Strasse 497, CH-8063 Zurich, Switzerland). *Pfluegers Arch.* 370(1): 37-44; 1977.

7341 RETENTION OF AMYLASE IN THE SECRETORY GRANULES OF PAROTID GLAND AFTER EXTENSIVE RELEASE OF Ca^{++} BY IONOPHORE A-23187. (Eng.) Flashner, Y.; Schramm, M. (Dept. Biological Chemistry, Hebrew Univ. Jerusalem, Jerusalem, Israel). *J. Cell Biol.* 74(3):789-793; 1977.

See also, 7290, 7295, 7358, 7651, 7874.

Stomach

7342 CENTRAL NORADRENERGIC INHIBITION OF GASTRIC MUCOSAL BLOOD FLOW AND ACID SECRETION IN RATS. (Eng.) Osumi, Y.; Aibara, S.; Sakae, K.; Fujiwara, M. (Dept. Pharmacology, Kyoto Univ., Sakyo-ku, Kyoto 606, Japan). *Life Sci.* 20(8):1407-1416; 1977.

To investigate the role of central noradrenalin (NA) in gastric functions, changes in mucosal blood flow (MBF) and acid secretion following electrical stimulation of the lateral hypothalamic area (LHA) and the effects of NA on these parameters were examined in anesthetized Wistar rats. NA (10 μg) injected into the lateral ventricle decreased the basal value of both the gastric MBF and acid output, while the same dose of acetylcholine or dopamine was without effect. Repetitive electrical stimulation of LHA at 10 cycles/sec, 0.5 mA, 2 msec for 10 min elicited a significant, reproducible increase in both gastric MBF and acid output. NA (10 μg) injected into the lateral ventricle completely blocked these increases induced by the electrical stimulation. These data suggest that a central noradrenergic inhibitory mechanism is involved in the regulation of the gastric MBF and acid secretion.

7343 REDOX INVOLVEMENT IN ACID SECRETION IN THE AMPHIBIAN GASTRIC MUCOSA. (Eng.) Rabon, E. C.; Sarau, H. M.; Rehm, W. S.; Sachs, G. (Lab. Membrane Biology, Univ. Alabama Birmingham, Birmingham, AL 34294). *J. Membr. Biol.* 35(3):189-204; 1977.

Gastric fundic metabolism was studied spectroscopically in frog mucosa during transitions of secretory status *in vitro* and by direct measurement of pyridine nucleotides and associated metabolites in biopsies of dog fundic mucosa also during secretory transition. In the frog, inhibition of spontaneous secretion by burimamide resulted in oxidation of the redox components from flavin adenine dinucleotide (FAD) to cytochrome a_3. Addition of histamine resulted in reduction of these components with onset of secretion by about 50%. In contrast, the effect of burimamide, and subsequently histamine, on the NAD^+:NADH ratio was relatively slight. The presence of burimamide substantially reduced the effect of amytal on the pyridine nucleotide spectrum and abolished the effect of amytal on FAD and the cytochromes. Measurement of lactate, pyruvate, α-ketoglutarate, NH_3, and glutamate in the dog showed that, whereas the calculated NAD^+:NADH ratio in the cytoplasm declined with onset of secretion, the calculated mitochondrial ratio rose. No change was noted in the $NADP^+$:NADPH ratio. It is concluded that (1) H_2 antagonists act by blocking substrate flow into the mitochondrial respiratory chain, (2) conversely, histamine stimulation acts at the level of substrate mobilization, and (3) there may be a cross-over in the mitochondrial chain between NAD^+ and FAD.

7344 EFFECT OF DUODENAL ACIDIFICATION ON GASTRIC MUCUS AND ACID SECRETION IN CONSCIOUS CATS. (Eng.) Vagne, M.; Perret, G. (INSERM U 45, Pavillon Hbis, Hopital E.-Herriot, F-69374 Lyon Cedex 2, France *Digestion* 14(4):332-341; 1976.

Cats, previously prepared with a Heidenhain pouch (HP) and a gastric fistula (GF), were used to determine the effect on mucus, acid, and pepsin secretion of endogenously released duodenal hormones. The hormones were released by closing the GF, during gastric acid secretion induced by the i.v. infusion of pentagastrin (32 μg/kg/hr) or histamine (0.32 μg/kg/hr), for 15-min periods. Acid entering the duodenum caused release mostly of secretin, but also of cholecystokinin (CCK), and previous studies with exogenously administered secretin and CCK have resulted in stimulation of pepsin and mucus in cats. The release of endogenous duodenal hormones produced by closing the GF also induced a stimulation of pepsin and mucus secretions in the HP, and, in addition, there was an increase in acid. Since the gastrointestinal hormones secretin and CCK were not considered to be responsible for this effect, it is suggested that another factor released by the duodenum stimulates the production of gastric acid secretions.

7345 THE EFFECT OF ACID-STIMULATING AND INHIBITING DRUGS ON THE ULTRASTRUCTURE OF GASTRIC PARIETAL CELLS IN MAN. (Eng.) Pillay, C. V.; Somers, S.; Booyens, J.; Moshal, M. G.; Bryer, J. V. (Dept. Physiology, Univ. Durban-Westville, Durban, South Africa). *S. Afr. Med. J.* 51(25):915-919; 1977.

The ultrastructure of human parietal cells at rest was studied after stimulation of gastric acid secretion by pentagastrin and after inhibition with the anticholinergic drug propantheline or with the histamine H_2-receptor antagonist cimetidine. Biopsy specimens of the fundus of the stomach from patients referred for upper gastrointestinal endoscopy were taken 1 hr after the i.m. administration of 6 μg pentagastrin and 1 hr after the i.v. administration of either 100 mg cimetidine or 30 mg propantheline. The ultrastructure of parietal cells 1 hr after pentagastrin stimulation showed a decrease in the number of vesicles and tubules and an increase in the number of microvilli in the canaliculus and gastric gland. The opposite occurred 1 hr after inhibition of gastric acid secretion by either cimetidine or propantheline, with an increase in the number of vesicles and tubules and a decrease in the number of microvilli in the canaliculi being observed. These observations support the hypothesis that, during secretion of acid, the tubulovesicular system increases the secretory surface of the lumen of the gastric gland and the canaliculus by a process of eversion or fusion of the vesicles and tubules with the plasmalemma. On inhibition of acid secretion, there is thought to be a reformation of the tubulovesicular system by pinocytosis. An observed increase in lysosomal activity after the administration of the two inhibiting drugs may possibly be involved in reducing the quantity of membrane following the membrane flow that occurs on gastric acid inhibition.

7346 ANTACIDS AND GASTRIC MUCOSA: PROTECTIVE EFFECT OF AN ANTACID ON ACETYLSALICYLIC ACID-INDUCED FUNCTIONAL CHANGES IN HUMAN GASTRIC MUCOSA. (Ger.) Caspary, W. F.; Kausch, H. (Med. Univ.-Klinik und Poliklinik, Humboldtallee 1, 34 Gottingen, W. Germany). *Fortschr. Med.* 95(31):1931-1939; 1977.

The effect of a liquid antacid (Gastropulgit gel: attapulgit + aluminum hydroxide and magnesium carbonate) on the transmural electrical potential difference (TEPD) of the gastric mucosa (potential difference between serosa and mucosa) was studied in healthy young adults following intragastric administration of 640 mg acetylsalicylic acid (ASA) in 50 ml of a 0.9% common salt solution. ASA alone decreased the TEPD from 44.27 ± 5.38 mV to 28.27 ± 8.14 mV ($p<0.001$), and this value did not return to normal during the first 30 min after ASA administration. When the same dose of ASA was administered with 20 ml of Gastropulgit gel, the ensuing drop in the TEPD was not statistically significant (from 39.85 ± 4.87 mV to 34.14 ± 4.85 mV; $p>0.05$). Since the TEPD is correlated with several functional parameters of the gastric mucosal barrier, Gastropulgit gel appears to exert a protective effect against the acute damage to the gastric mucosa caused by salicylates.

7347 EFFECT OF 13-NLE-MOTILIN ON GASTRIC SECRETION, SERUM GASTRIN LEVEL AND MUCOSAL BLOOD FLOW IN DOGS. (Eng.) Konturek, S. J.; Dembinski, A.; Krol, R.; Wunsch, E. (Medical Acad., Krakow, Poland). *J. Physiol. (Lond.)* 264(3):665-672; 1977.

The effects of 13-norleucine-motilin (13-nle-motilin) on basal gastric acid and pepsin secretion, serum gastrin level, pentagastrin-induced gastric secretion, histamine-induced gastric secretion, and mucosal blood flow were investigated in dogs prepared with chronic gastric fistulas and denervated fundic and antral pouches. 13-Nle-motilin infused i.v. in graded doses (1.5-100 ng/kg/hr) produced a dose-dependent increase in gastric acid and pepsin outputs, corresponding at their peaks to about 25% and 3% of the maximal response to pentagastrin (8 μg/kg/hr), resp.; these peaks occurred at the 50 μg/kg/hr dose of 13-nle-motilin. The motilin-induced stimulation of gastric secretion occurred independently of antral pH and was not accompanied by any alteration in the serum gastrin level, suggesting that motilin did not affect the release of gastrin. When infused i.v. in a constant dose against a constant background stimulation with pentagastrin or histamine, 13-nle-motilin inhibited both acid and pepsin secretion from the main stomach and fundic pouch. The inhibitory effect of 13-nle-motilin was always associated with a marked reduction in mucosal blood flow but without any change in the ratio of aminopyrine concentration in the gastric juice and blood plasma, indicating that this peptide primarily affects gastric secretion but does not limit the gastric mucosal microcirculation.

7348 EFFECT OF NICOTINE ON GASTRIC ACID SECRETION: EVIDENCE OF ELECTROGENIC PUMP THEORY. (Eng.) Dinno, M. A.; Ando, M.; Dinno, F. H.; Huang, K. C.; Rehm, W. S. (Dept. Pharmacology, Univ. Louisville, Louisville, KY 40201). *Am. J. Physiol.* 232(3):E251-E257; 1977.

The effect of nicotine on H^+ and Cl^- in the frog stomach was studied to determine the mechanism (unitary or electrogenic) involved. Nicotine (5 mM serosal bathing solution) reduced gastric acid secretion 90% and increased the transmucosal potential difference (PD) and short-circuit current (Isc) without changing the transmucosal resistance. A dose-response correlation was shown. During the first 8 min, the changes in the measured parameters, namely, PD versus H^+ secretory rate (I_H) and Isc versus I_H, were linear. After 8 min, there was a deviation from linearity. Isotopic ^{36}Cl flux measurement across the gastric mucosa under the short-circuit condition showed that the serosal-to-mucosal flux of Cl^- was greater than the mucosal-to-serosal flux, resulting in a net Cl^- secretion. Thus, 5 mM nicotine caused only a 41% reduction in net Cl^- secretion. The linear relationships between PD versus I_H and Isc versus I_H lend support to the electrogenic theory of HCl secretion.

7349 OCCURRENCE OF GASTRIN IN GASTRIC JUICE, IN ANTRAL SECRETION, AND IN ANTRAL PERFUSATES OF CATS. (Eng.) Uvnas-Wallensten, K. (Dept. Pharmacology, Karolinska institutet, S-104 01 Stockholm 60, Sweden). *Gastroenterology* 73(3):487-491; 1977.

To determine whether the gastrin found in the gastric juice of cats reaches the gastric lumen via the corporeal or via the antral mucosa, cats underwent insertion of a cannula into the corporeal wall halfway between the cardia and the antrum-corpus boundary. Gastric juice secretion was induced by electrical vagal stimulation. For gastrin determinations, gastric juice samples were collected every 7.5 or 15 min and neutralized immediately, and the acidity was determined by titration with 0.01 M NaOH. When an acute antral pouch was created by ligation of the gastric lumen, most of the gastrin was found in the antral secretion. When the antral pouch was perfused with a warm phosphate buffer solution, the amount of gastrin appearing in the antral perfusate was significantly greater than that in the gastric venous effluent (the antrum: blood release ratio ranged from 2 to 23, average 10.5). Electrical stimulation of the vagi increased gastrin output into the antrum and the circulation.

7350 CYCLIC AMP AND THE RELEASE OF ANTRAL GASTRIN. (Eng.) Gabrys-Pomykala, B. F.; Alavi, S. M.; Nyhus, L. M.; Bombeck, C. T. (Univ. Illinois Medical Center, Chicago, IL). *Scand. J. Gastroenterol.* 12(4):507-511; 1977.

To investigate the possible role of cyclic AMP in the release of antral gastrin, the cyclic AMP content in the canine antral mucosa and the antral venous immunoassayable gastrin levels were determined. The isolated, vagally innervated antral pouches in anesthetized dogs were irrigated with 0.5% acetylcholine chloride (Ach) or a 0.4 M mixture of nonessential amino acids (AA), or distended at 30 cm H_2O. In addition, 2-deoxy-D-glucose (2-DG, 100 mg/kg) was administered i.v. Significant increases in antral venous gastrin, caused by gastrin releasers, were associated with a significant rise in cyclic AMP content in the antral mucosa. Acidification of the antrum with simultaneous administration of 2-DG and acidified AA abolished gastrin release, and significantly reduced mucosal cyclic AMP. Acidified Ach and distention of the antrum with 0.1 N HCl suppressed gastrin levels without significantly changing the mucosal cyclic AMP content. Since the augmented gastrin release was accompanied by an increased mucosal cyclic AMP, the results suggest that cyclic AMP participates in the action of gastrin secretagogues.

7351 GLYCOLIPIDS OF THE HUMAN GASTRIC CONTENT: STRUCTURE OF THE SULFATED GLYCEROGLUCOLIPID. (Eng.) Slomiany, B. L.; Slomiany, A.; Glass, G. B. J. (New York Medical Coll., 5th Ave at 106th St., New York, NY 10029). *Eur. J. Biochem.* 78(1):33-39; 1977.

The characterization of a new sulfated glycolipid isolated from the lipid extract of human gastric content is described. The isolation procedure involved column fractionation on silicic acid and thin-layer chromatography. Degradation studies revealed the presence of glucose, sulfate, fatty acids, and glyceryl monoethers. The structure of this glycolipid was identified by partial acid hydrolysis, oxidation with periodate and chromium trioxide, and permethylation studies as: SO_3H-6Glcα1→6Glcα1→6Glcα1→3-diglyceride. The diglyceride portion of this glycolipid consists mostly of 1-*O*-alkyl-2-*O*-acyl-glycerol.

7352 GLYCOPROTEIN TRANSPORT IN THE SURFACE MUCOUS CELLS OF THE RAT STOMACH. (Eng.) Kramer, M. F.; Geuze, J. J. (Sch. Medicine, Univ. Utrecht, Utrecht-2501, Netherlands). *J. Cell. Biol.* 73(3):533-547; 1977.

The intracellular transport of glycoproteins pulse-labeled *in vitro* with tritiated leucine and galactose was studied in the surface mucous lining cells (SMC) of the rat fundic stomach by electron microscope autoradiography. The SMC survived for several hours in pieces of the fundus incubated in a bicarbonate-buffered medium. The SMC had a normal ultrastructure for at least 4 hr of incubation. Kinetic activity was normal for at least 5 hr as demonstrated by the normal nuclear incorporation of tritiated thymidine. The SMC incorporated labeled leucine and galactose at normal rates up to 4 hr and 6 hr, resp. In contrast to the SMC, the cells of the gastric glands showed signs of degeneration within 1 hr after the start of incubation. In the SMC, the secretory protein formed a smaller part of the total protein synthesized than in other secretory cells studied. The intracellular transport of the leucine-labeled moiety of the glycoproteins followed the normal pathway. The RER lost 35% of its transportable labeled protein within 30 min. The Golgi complex was maximally labeled at 40 min and the mucous granules after 120 min. Galactose was attached to the glycoproteins mainly in the Golgi complex. Glycoproteins were not secreted within 2 hr after synthesis of their protein moiety.

7353 COMPARISON BETWEEN TRUNCAL AND SELECTIVE GASTRIC VAGOTOMY IN RATS. (Ger.) Schwamberger, K.; Geir, W. (Geriatrisch-chirurgische Univ.-Klinik Innsbruck, Anichstrasse 35, A-6020 Innsbruck, Austria). *Langenbecks Arch. Chir.* 344(1):53-60; 1977.

The effects of truncal and selective vagotomy were studied in adult Sprague-Dawley rats after pyloric ligation according to Shay for 9 hr. There were no significant differences between the two procedures with respect to gastric tonicity, gastric acid secretion (ml/100 g body weight), gastric juice pH, and total acidity (in mEq HCl per 100 g). Both forms of vagotomy protected the animals from stress ulcer, but truncal vagotomy was more efficient. The size of the stress ulcers was 0-1 mm^2 following truncal vagotomy, 1-2 mm^2 following selective vagotomy, 0-1 mm^2 following truncal vagotomy with ligation of the left gastric artery, and 1-2 mm^2 following simultaneous truncal and selective vagotomy. The difference between selective and truncal vagotomy in terms of the size of the stress ulcer is statistically significant ($p=0.05$). This difference is due to devascularization of the lesser curvature of the stomach.

7354 RECONSTITUTION OF A PROTON PUMP FROM GASTRIC MUCOSA. (Eng.) Goodall, M. C.; Sachs, G. (Lab. Membrane Biology, Univ. Alabama in Birmingham, Birmingham, AL 35294). *J. Membrane Biol.* 35(4):285-301; 1977.

7355 A PRECURSOR OF KININS IN THE GASTRIC MUCUS. (Eng.) Geiger, R.; Feifel, G.; Haberland, G. L. (Chirurgischen Klinik der Universitat Munchen, Nussbaumstrasse 20, D-8000 Munchen 2, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(7):931-933; 1977.

7356 FORSSMAN GLYCOLIPID HAPTEN VARIANTS OF DOG GASTRIC MUCOSA. (Eng.) Slomiany, A.; Slomiany, B. L.; Annese, C. (New York Medical Coll., New York, NY 10029). *FEBS Lett.* 81(1): 157-160; 1977.

7357 EVALUATION OF CIMETIDINE (TAGAMET): AN ANTAGONIST OF HYDROCHLORIC ACID SECRETION. Clayman, C. B. (American Medical Assoc., 535 N. Dearborn St., Chicago, IL 60610). *JAMA* 238(12): 1289-1290; 1977.

7358 RELATIONSHIP BETWEEN GASTRO-OESOPHAGEAL ACID REFLUX, BASAL GASTRO-OESOPHAGEAL SPHINCTER PRESSURE, AND GASTRIC ACID SECRETION. (Eng.) Boesby, S. (Odense Sygehus, DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12(5):547-551; 1977.

7359 ANTACID THERAPY AND DRUG KINETICS. (Eng.) Hurwitz, A. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Clin. Pharmacokinet.* 2(4): 269-280; 1977.

7360 ACTIVE ALKALINIZATION BY AMPHIBIAN GASTRIC FUNDIC MUCOSA IN VITRO. (Eng.) Flemstrom, G. (Dept. Physiology, Univ. Uppsala, Uppsala, Sweden). *Am. J. Physiol.* 233(1):E1-E12; 1977.

7361 ACTION OF PARENTERAL INFUSED AMINO ACIDS ON THE FUNCTIONS OF THE GASTROINTESTINAL TRACT. (Eng.) Shlygin, G. K.; Golinko, O. N. (USSR Acad. Medical Sciences, Moscow, USSR). *Nutr. Metab.* 21(Suppl. 1):129-131; 1977.

7362 THE SECRETION OF PEPSIN. (Eng.) Kondo, T.; Magee, D. F. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *J. Physiol. (Lond.)* 270(1):29-36; 1977.

7363 INHIBITION OF RAT GASTRIC ACID SECRETION IN VIVO AND IN VITRO BY ARACHIDONIC ACID AND ITS REVERSAL BY INDOMETHACIN. (Eng.) Frame, M. H.; Main, I. H. M.; Melarange, R. A. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *J. Physiol. (Lond.)* 270(1):79P-80P; 1977.

7364 THE EFFECT OF SELECTIVE PROXIMAL VAGOTOMY WITH AND WITHOUT PYLOROPLASTY ON SERUM GASTRIN LEVELS AND ACID SECRETION AFTER FEEDING AND SHAM FEEDING IN DOGS. (Eng.) Bauer, H.; Holle, F.; Okukubo, F.; Andersson, S.; Arnold, R.; Creutzfeldt, W. (Chirurgische Poliklinik der Universitat Munchen, Pettenkoferstrasse 8a, D-8000 Munchen 2, W. Germany). *World J. Surg.* 1(2):223-229; 1977.

7365 STAGES OF LYMPH DRAINAGE OF THE HUMAN STOMACH. (Eng.) Durovicova, J.; Munka, V.; Kocisova, M. (Faculty Medicine, Safarik Univ., Kosice, Czechoslovakia). *Fol. Morphol. (Praha)* 25(2):167-170; 1977.

See also, 7315, 7329, 7330, 7338, 7495, 7514, 7516, 7517, 7519, 7559, 7574, 7575, 7585, 7594, 7605, 7873.

SECRETION AND METABOLISM

Pancreas

7366 PHOTOAFFINITY LABELING OF A PEPTIDE SECRETAGOGUE RECEPTOR IN THE EXOCRINE PANCREAS. (Eng.) Galardy, R. E.; Jamieson, J. D. (Yale Univ. Sch. Medicine, New Haven, CT 06150). *Mol. Pharmacol.* 13(5):852-863; 1977.

The feasibility of photoaffinity labeling receptors for 2-nitro-5-azidobenzoyl-Gly-Trp-Met-Asp-Phe-NH_2 (NAB-CCK-5) in lobules (small clusters of acini) of guinea pig pancreas was studied. NAB-CCK-5 mimics cholecystokinin and the more potent secretagogue cerulein in stimulating the discharge of exportable proteins from acinar cells of the guinea pig pancreas *in vitro*. Photolysis of this affinity label (5 μM) causes irreversible stimulation of a protein discharge that is indistinguishable in rate, magnitude, and morphological aspects from that observed with the most potent doses of cerulein (0.1 mM). The irreversible agonist activity cannot be removed by extensive washing of the lobules, and it is blocked only by metabolic inhibition (by performing the 3-hr assay at 0 C or under 95% nitrogen-5% carbon dioxide atmosphere, or in the presence of an uncoupler of oxidative phosphorylation). Irreversible agonist activity is not observed without photolysis, and it is not observed after photolysis of lobules in the presence of 2-nitro-5-azidobenzoic acid, 2-nitro-5-azidobenzoyl-angiotensin II, 2-nitro-5-azidobenzoyl-Gly-Gly-Met-Asp-Phe-NH_2, cerulein, or with previously photolyzed NAB-CCK-5. However, protection by native peptide secretagogues against irreversible labeling by NAB-CCK-5 was not shown. The labeled biologically active sites appear to be those responsible for peptide secretagogue-mediated release of exportable proteins. The mechanism of labeling NAB-CCK-5 is not clear, since native secretagogues show no competition for labeling.

7367 HISTOCHEMICAL STUDY OF CHOLINERGIC ACTIVITIES IN EXOCRINE PANCREAS OF DOGS: MODIFICATIONS RELATED TO CHRONIC ALCOHOLISM.

(Eng.) Celener, D.; de la Porte, P. L.; Tiscornia, O.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM U 31, 46, Chemin de la Gaye, 13009 Marseille, France). *Biomedicine* 27(4):161-165; 1977.

The effect of alcoholism on cholinergic activity in the canine exocrine pancreas was histochemically examined from pancreatic biopsies obtained from five adult mongrel dogs provided with duodenal and gastric cannulae that received a standard diet enriched in fat and protein. Three of the dogs received 2.0 g/kg/day of ethanol diluted in isotonic saline through the gastric cannula over periods of 3, 4, and 48 months, resp. The other two dogs served as controls. In the two nonalcoholic dogs, the localization of acetylcholinesterase (AChE) activity in the exocrine pancreas fit the classical description. Nerve fibers entered along the connective septa as discrete bundles of perivascular plexuses and passed to the glandular tissue. Fine fibrils ran to acinar zones and formed a periacinar nerve network. In dogs receiving ethanol for 3 and 4 months, resp., there were many interlobular and perivascular fibers, but the branching was less conspicuous and the number of fine periacinar fibrils, as well as their enzyme activity, was decreased compared with controls. Decreased AChE activity in dogs receiving ethanol for 48 months was more pronounced and was limited to the fine fibrils. Choline acetyl transferase (CAT) activity was low in nonalcoholic dogs and was localized on the periacinar fibrils that formed a delicate framework. In dogs receiving ethanol for 3 and 4 months, resp., CAT activity was increased compared with that of control dogs. Although the CAT distribution was similar to that of controls, the fibrils appeared darker and enlarged. Sometimes the fibrils appeared to be reduplicated, and many had a perivascular location. In dogs receiving ethanol for 48 months, a striking increase in CAT activity was seen in spite of some nonspecific metal deposit on the secretory granules of the acinar cells. Although the histochemical observations were only semiquantitative, the results suggest that the cholinergic tone of the exocrine pancreas is increased in chronic alcoholic dogs.

7368 CANINE EXOCRINE PANCREATIC SECRETORY CHANGES INDUCED BY AN INTRAGASTRIC ETHANOL TEST MEAL.

(Eng.) Tiscornia, O. M.; Levesque, D.; Sarles, H.; Bretholz, A.; Voirol, M.; De Oliveira, J. P. M.; *et al.* (Sch. Medicine of Buenos Aires, Buenos Aires, Argentina). *Am. J. Gastroenterol.* 67(2):121-130; 1977.

Exocrine pancreatic secretory changes induced by an intragastric ethanol test meal were studied in five dogs with chronic gastric fistulas (Thomas cannula) and a new type of chronic pancreatic fistula that permits the collection of pure nonactivated pancreatic juice after the ingestion of a test meal. In the first series of experiments, a test meal (400 g canned dog meat) was given with 200 ml saline simultaneously infused through the gastric cannula. In response to this stimulus, the 20-min peak pancreatic flow rate and bicarbonate output were 33% and 34%, resp., of the maximal secretion of the pancreatic gland obtained with secretin in six control dogs provided with gastric and the classical Thomas duodenal fistula. The 20-min peak protein output represented 84% of the maximal secretory capacity attained with dose-response curves to cholecystokinin in the same group of control animals. In the second series, either 1.5 or 2.0 g/kg ethanol were given instead of saline. Intragastric ethanol induced a dissociation of pancreatic secretion. Ethanol also induced a significant inhibition of flow rate, of bicarbonate concentration, and of bicarbonate output, and it caused a significant rise in protein concentration. The protein output remained unchanged. It is postulated that ethanol, acting on the stomach, duodenum, and jejunum, evokes, independently of its gastrin-releasing capacity, an unknown humoral or nervous mechanism that counteracts the ethanol-elicited cholinergic-mediated inhibition of pancreatic protein secretion.

7369 THE EFFECT OF SYMPATHOMIMETIC DRUGS ON EXOCRINE PANCREAS FUNCTION. STUDIES IN THE ISOLATED CAT PANCREAS.

(Ger.) Heidbreder, E.; Sieber, P.; Heidland, A. (Medizinische Universitatsklinik Wurzburg, Josef-Schneider-Strasse 2, D-8700 Wurzburg, W. Germany). *Res. Exp. Med.* 171(1):79-92; 1977.

The effects of perfusion of various sympathomimetic drugs on α-amylase, lipase, protein, and Ca secretion into the pancreatic juice and on the rate of volume output were studied in the isolated pancreas of adult cats. Pancreatic juice flow was stimulated by secretin, and enzyme secretion was stimulated by acetylcholine (AC, 100 ng) or cholecystokinin-pancreozymin (0.1-0.2 U). Isoproterenol, metaproterenol, salbutamol, fenoterol, and terbutaline stimulated protein and enzyme secretion and caused a transient, slight reduction of the volume output of pancreatic juice. Phentolamine and phenoxybenzamine did not influence basal pancreatic secretion, but they inhibited AC-stimulated protein secretion. β-Adrenolytic drugs did not affect volume output or Ca, chloride, nonstimulated protein, and enzyme secretion. AC-stimulated protein secretion was inhibited by D-propranolol, prindolol, oxprenolol, practolol, and butoxamine. β-Sympathomimetics reduced protein and enzyme secretion that had been stimulated by β-adrenolytics, but D- and L-propranolol did not inhibit the effect of isoproterenol. Protein and enzyme secretion was stimulated by isoproterenol and salbutamol in cats pretreated with reserpine (1-1.5 mg/kg i.v.) before perfusion and by AC and β-sympathomimetics in cats pretreated with 6-hydroxydopamine (60 mg/kg i.v.). Tetracaine inhibited enzyme secretion following administration of β-sympathomimetics. Ca-free perfusion did not reduce the enzyme secretion induced by isoproterenol, salbutamol, and terbutaline, but pancreatic Ca secretion ceased after a 60-min perfusion. Nifedipine inhibited the AC effect during Ca-free perfusion. Hemicholinium markedly inhibited isoproterenol-stimulated protein and enzyme secretion without influencing volume output. Atropine caused reversible inhibition of the pancreatic output following the application of β-sympathomimetics without influencing volume output. The findings show that β-sympathomimetics have a cholinergic effect on pancreatic protein and enzyme secretion.

7370 EFFECTS OF MEMBRANE STABILIZERS ON PANCREATIC AMYLASE RELEASE. (Eng.) Williams, J. A.; Poulsen, J. H.; Lee, M. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *J. Membr. Biol.* 33(1/2):185-195; 1977.

The ability of compounds with membrane stabilizing activity to affect pancreatic amylase release was studied in male mice, and the steps in the stimulus-secretion coupling process were examined. Chlorpromazine, propranolol, and thymol (10^{-5}-10^{-4}, 10^{-4}-10^{-3}, and 10^{-4}-10^{-3} M, resp.) were all found to inhibit bethanechol-stimulated amylase release and, at slightly higher concentrations (3 x 10^{-4}, 3 x 10^{-3}, and 3 x 10^{-3} M, resp.), to induce release regardless of the presence of the secretagogue. This biphasic effect was similar to that found previously for the local anesthetic tetracaine. Release by high concentrations of propranolol and tetracaine was accompanied by ultrastructural evidence of cell damage. Membrane stabilizers at concentrations that inhibited amylase release were shown to block bethanechol-induced depolarization and stimulation of $^{45}Ca^{++}$ efflux, although the drugs alone partially depolarized pancreatic cells. The release of amylase induced by Ca^{++} (introduced by the ionophore A23187) was also abolished. There findings indicate that membrane stabilizers independently inhibit the steps leading to a rise in intracellular Ca^{++} and the subsequent Ca^{++}-activated amylase release.

7371 BIOCHEMICAL REACTIONS INVOLVED IN PANCREATIC ENZYME SECRETION. 4. EFFECTS OF CYTOCHALASIN B ON FUNCTIONS OF THE EXOCRINE PANCREAS. (Eng.) Morisset, J.; Beaudoin, A. R. (Departement de biologie, Universite de Sherbrooke, Sherbrooke, Quebec, Canada J1K 2R1). *Can. J. Physiol. Pharmacol.* 55(3):644-651; 1977.

The effects of cytochalasin B on pancreatic enzyme secretion were studied in an attempt to establish a role for microfilaments in the exocytosis process. Cytochalasin B (1 μg/ml) inhibited amylase secretion induced by urecholine or cholecystokinin-pancreozymin (CCK-PZ) but did not modify that induced by dibutyryl cyclic AMP. The inhibitory effect of the drug was reversible after a 30-min washing out period. It did not affect O_2 consumption, basal calcium efflux, or efflux caused by CCK-PZ. Amino acid accumulation in the tissue and their incorporation into proteins were not modified. It is suggested that cytochalasin B inhibits pancreatic enzyme secretion, probably through an effect on the microfilament system.

7372 EFFECTS OF Na PENTOBARBITAL ANESTHESIA ON SERUM SECRETIN AND EXOCRINE PANCREATIC SECRETIONS. (Eng.) Boden, G.; Shore, L. S.; Wilson, R. M.; Essa-Koumar, N.; Landor, J. H. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Horm. Metab. Res.* 9(2):123-127; 1977.

The effect of sodium pentobarbital anesthesia on serum secretin concentration and exocrine pancreatic secretion was investigated in dogs with chronic gastric and pancreatic fistulas. Sodium pentobarbital anesthesia (30 mg/kg, i.v.) reduced basal pancreatic flow rate by 74%, bicarbonate by 70% and protein secretions by 81% without affecting basal immunoreactive secretin (IRS) concentration. The anesthesia had no effect on HCl (9.6 mEq/30 min, intraduodenally)-mediated IRS release, but it reduced HCl-mediated bicarbonate output by about 50%. It had no effect on pancreatic responsiveness to stimulation by exogenous secretin (0.5 IU/kg/30 min), and it did not affect serum concentrations of IRS following secretin infusion. These data suggest that basal pancreatic secretory functions are under control of tonic neural influences, that Na pentobarbital anesthesia has no effect on IRS release but inhibits stimulated pancreatic bicarbonate secretion through suppression of an unidentified agent, and that Na pentobarbital does not affect the metabolism of secretin. The intraduodenal administration of 9.6 mEq of HCl and the i.v. infusion of 0.5 IU/kg of secretin for 30 min both resulted in similar IRS concentrations of approximately 600 μU/ml (equivalent to 150 pg/ml).

7373 DIFFERENT ACTION OF HORMONAL STIMULATION ON THE BIOSYNTHESIS OF THREE PANCREATIC ENZYMES. (Eng.) Dagorn, J. C.; Mongeau, R. (Unite de Recherches de Pathologie Digestive, INSERM U 31, 46 chemin de la Gaye, 13009 Marseille, France). *Biochim. Biophys. Acta* 498(1):76-82; 1977.

The effect of hormonal stimulation on the synthesis of pancreatic protein and enzymes in Sprague-Dawley rats was investigated. The animals received an i.v. injection of either saline (controls) or cholecystokinin-pancreozymin (8 Ivy dog U/kg) together with secretin (5 clinical U/kg). Hormonal stimulation led to an immediate decrease in protein synthesis, followed by a sustained increase. Overall, the quantity of proteins synthesized by the pancreas within 60 min of stimulation was increased by 50% compared with controls. Pancreatic stimulation also resulted in nonparallel variations in the rates of biosynthesis of the pancreatic enzymes chymotrypsinogen, amylase, and lipase, suggesting independent regulation of these syntheses. When the result of one stimulation was calculated in terms of quantities of enzymes synthesized by the pancreas in comparison with controls, it was found that the quantities of chymotrypsinogen, amylase, and lipase were increased by 63, 26, and

10%, resp., in comparison with controls during the 60 min following hormonal injection. This result indicates that repeated cholecystokinin-pancreozymin plus secretin stimulations can induce adaptation-like modifications of the pancreatic enzyme content.

7374 PLASMA SECRETIN CONCENTRATION AND PANCREATIC EXOCRINE SECRETION AFTER INTRAVENOUS SECRETIN OR INTRADUODENAL HCl IN ANAESTHETIZED PIGS. (Eng.) Schaffalitzky de Muckadell, O. B.; Fahrenkrug, J.; Holst, J. J. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400 Copenhagen NV, Denmark). *Scand. J. Gastroenterol.* 12(3):267-272; 1977.

The concentration of immunoreactive secretin in arterial blood and in the exocrine pancreatic secretion were measured in female pigs (Danis Landrace breed) during the intraportal infusion of porcine secretin in doses of 0.03, 0.06, 0.1, 0.3, 1.0, and 3.0 clinical U (CU)/kg/hr and during the intraduodenal instillation of 50 ml 0.1 M HCl. The lowest dose of exogenous secretin to significantly increase secretin concentration in the blood was 0.03 CU/kg/hr, which was a subthreshold dose of exocrine pancreatic secretion. The infusion of 0.03 CU/kg/hr of exogenous secretin increased the plasma secretin concentration from 0.2 ± 0.2 pM to 3.1 ± 0.4 pM, which was more than twice the detection limit of the radioimmunoassay used. A linear relation was found between the secretin dose infused and the plasma secretin level, with the steady state plasma secretin concentration (in pM) being equal to 104 times the secretin dose (in CU/kg/hr) + 0.1. After the instillation of HCl, plasma secretin concentration reached a plateau slightly lower but not significantly different from the plateau reached during the infusion of 0.3 CU/kg/hr secretin, with the calculated release of secretin during HCl instillation being an estimated 0.22 CU/kg/hr. The lowest secretin dose giving a significant increase in pancreatic flow rate was 0.1 CU/kg/hr. Bicarbonate concentration in pancreatic juice, pancreatic flow rate, and bicarbonate output after stimulation with HCl were equal to values found during a 15-min period in which a secretin dose of 0.3 CU/kg/hr was infused and averaged 114 mM, 12 ml/hr, and 1.67 mmol/hr, resp. Maximum pancreatic flow rate and bicarbonate output required a secretin dose of 1.0 CU/kg/hr, whereas maximum bicarbonate concentration (141 mM) was reached at a secretin dose of 0.3 CU/kg/hr. It was not possible to demonstrate a significant effect of exogenous secretin infused into the portal vein at doses below 0.1 CU/kg/hr; thus, in the present model, measurement of secretin concentrations in plasma was a more sensitive and accurate method to demonstrate secretin release than determination of pancreatic bicarbonate output or flow rate.

7375 COMPARISON OF THE EFFECT OF SOMATOSTATIN ON GASTROINTESTINAL FUNCTION IN THE CONSCIOUS AND ANAESTHETIZED CAT AND ON THE ISOLATED CAT PANCREAS. (Eng.) Albinus, M.; Blair, E. L.; Case, R. M.; Coy, D. H.; Gomez-Pan, A.; Hirst, B. H.; *et al.* (Dept. Pharmacology, Univ. Tubingen, W. Germany). *J. Physiol. (Lond.)* 269(1):77-91; 1977.

The effects of somatostatin on pentagastrin-stimulated gastric secretion, on pancreatic electrolyte and enzyme secretion, on gallbladder function, and on gastric mucosal blood flow were studied in cats. Somatostatin (10 μg/kg/hr) inhibited gastric acid and pepsin secretion stimulated by pentagastrin (8 μg/kg/hr) in conscious and anesthetized cats with chronically implanted gastric fistulas. In the acutely surgically prepared anesthetized cat, somatostatin inhibited pepsin secretion but produced little inhibition of gastric acid secretion or mucosal blood flow. Secretin-stimulated pancreatic juice volume was not significantly reduced in acutely prepared anesthetized cats, but there was a limited reduction of cholecystokinin-pancreozymin stimulated pancreatic amylase secretion and gallbladder contraction. Somatostatin had neither stimulatory nor inhibitory effects on electrolyte and amylase secretion in the isolated saline-perfused cat pancreas. The results suggest that some of the effects of somatostatin may depend on the interaction of other factors (nervous or humoral) on the target cell and that these may vary in different experimental preparations.

7376 BLOCKING OF PROTEIN PANCREATIC SECRETION BY MAXIMAL SECRETIN INFUSION IN THE DOG. (Eng.) Tiscornia, O. M.; Lechene De La Porte, P.; Sarles, H. (Pozos 1916, 1245 Buenos Aires, C.F., Argentina). *Am. J. Gastroenterol.* 67(5):468-472; 1977.

7377 NUTRITIONAL AND CIRCADIAN VARIATIONS IN LIPASE ACTIVITY AND COLIPASE SATURATION IN RAT PANCREAS. (Eng.) Girard-Globa, A.; Simond-Cote, E. (Centre de Recherches sur la Nutrition, C.N.R.S., 92190 Meudon Bellevue, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):539-542; 1977.

7378 ELEVATED FECAL LEVELS OF ENDOGENOUS PANCREATIC ENDOPEPTIDASES AFTER ANTIBIOTIC TREATMENT. (Eng.) Borgstrom, A.; Genell, S.; Ohlsson, K. (Dept. Surg., Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 12(5):525-529; 1977.

7379 DECREASE OF NON-SUPPRESSIBLE INSULIN-LIKE ACTIVITY AFTER PANCREATECTOMY AND NORMALIZATION BY INSULIN THERAPY. (Eng.) Eigenmann, J. E.; Becker, M.; Kammermann, B.; Leemann, W.; Heimann, R.; Zapf, J.; Froesch, E. R. (Dept. Medicine, Univ. Zurich, Zurich, Switzerland). *Acta Endocrinol.* 85(4):818-822; 1977.

7380 THE EFFECT OF ACUTE HYPERGLYCAEMIA ON HORMONALLY STIMULATED PANCREATIC EXOCRINE SECRETION IN MAN. (Eng.) Clain, J.; Barbezat, G.

O.; Bank, S. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 52(9):358-361; 1977.

7381 RADIOIODINATION AND DISTRIBUTION OF 6-TYROSYL SECRETIN IN NORMAL RATS. (Eng.) Robbins, P. J.; Silberstein, E. B.; Fortman, D. L. (Cincinnati General Hosp., Cincinnati, OH 45267). *Int. J. Nucl. Med. Biol.* 4(2):118-122; 1977.

See also, 7338, 7361, 7570, 7602, 7722, 7723, 7731, 7736, 7740.

SECRETION AND METABOLISM

Hepatobiliary Tract

7382 AGE-RELATED CHANGES IN THE HEPATIC ENDOPLASMIC RETICULUM: A QUANTITATIVE ANALYSIS. (Eng.) Schmucker, D. L.; Mooney, J. S.; Jones, A. L. (Veterans Admin. Hosp., San Francisco, CA 94121). *Science* 197(4307):1005-1008; 1977.

A quantitative electron microscopic study of age-related changes in the hepatic endoplasmic reticulum of Fischer 344 rats was performed. The total endoplasmic reticulum in the centrilobular cells more than doubled in surface area in rats between 1 and 10 months of age ($p<.001$) from about 40 μm^2/average hepatocyte at 1 month to >80 μm^2/average hepatocyte at 10 months. The increase was less marked in the portal zone hepatocytes (65%, $p<.001$). At 20 months of age, the surface area of the total endoplasmic reticulum in both the centrilobular and portal zone hepatocytes was still increased over that observed in 1-month-old rats, but it was slightly less than that seen at 10 months of age. In 30-month-old rats, the specific surface area of the total endoplasmic reticulum had decreased for both zones of the liver lobule to values similar to those observed in 1-month-old rats. These changes were attributed to the smooth-surfaced endoplasmic reticulum, since neither the rough-surfaced endoplasmic reticulum nor the Golgi membranes underwent any significant change in surface area as a function of age.

7383 PREPARATION AND CHARACTERIZATION OF ISOLATED PARENCHYMAL CELLS FROM GUINEA PIG LIVER. (Eng.) Elliott, K. R.; Pogson, C. I. (Biological Lab., Univ. Kent, Canterbury, Kent CT2 NJ, England). *Mol. Cell. Biochem.* 16(1):23-29; 1977.

A method is described for the isolation and characterization of parenchymal cells from guinea pig liver. Dunkin-Hartley guinea pigs were anesthetized with i.p. nembutal (80 mg/kg) after fasting for 48 hr. Heparin (600 IU/kg) and bretylium tosylate (12.5 mg/kg) were added to the anesthetic solution to prevent vasoconstriction. The portal vein was clamped and cut on the hepatic side to permit liver perfusion through the inferior vena cava. After 20 min of perfusion with 200 ml of Ca^{2+}-free Krebs-Henseleit saline gassed with $O_2 + CO_2$ (95:5), the last 120 ml of which contained 0.03% collagenase, the liver was carefully removed. The liver cell suspension that resulted from washing with 0.9% NaCl and dispersion in 75 ml of medium containing Ca^{2+32} and 2% bovine serum albumin was filtered and centrifuged at 30 x *g* for 2 min. Washing and centrifugation were repeated, and a final suspension was prepared of 20 mg cells (dry weight)/ml Krebs-Henseleit medium containing 2% serum albumin. This preparation gave a cell yield of 20-30%. There was negligible loss of cytoplasmic enzymes as the gluconeogenesis and ureoneogenesis rates were within the physiological range.

7384 ISOLATED RAT LIVER NEEDS CALCIUM TO MAKE BILE. (Eng.) Owen, C. A., Jr. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Proc. Soc. Exp. Biol. Med.* 155(3):314-317; 1977.

The role of calcium in hepatic bile synthesis was studied in isolated Sprague Dawley rat livers. When normal livers were perfused with heparinized normal rat whole blood, 10-15 µl of bile were excreted per minute. This amount was reduced to one-tenth of its normal rate by the addition of 0.13 M sodium citrate to the blood. When 0.1 M calcium chloride was subsequently added, bile flow returned to normal if the interval between the additions of citrate and calcium did not exceed 1 hr. Magnesium chloride (0.1 M) had no such corrective effect. Two tests of liver function, generation of factor VII and conversion of [^{14}C]alanine to TCA-precipitable ^{14}C, were unaffected by the addition of citrate to plasma-free perfusions. Calcium is normally present in bile and might well be a necessary ingredient for the generation of bile.

7385 TIME-DEPENDENT ELIMINATION OF SUBSTRATES FLOWING THROUGH THE LIVER OR KIDNEY. (Eng.) Bass, L.; Bracken, A. J. (Dept. Mathematics, Univ. Queensland, Brisbane, Australia). *J. Theor. Biol.* 67(4):637-652; 1977.

Established steady-state models of elimination of flowing substrates by Michaelis-Menten kinetics in the intact liver and kidney are extended to time-dependent situations. The common features and differences of these models are presented. Time-dependent distributions of substrate concentration can be calculated with the use of steady-state results and a knowledge of the motion of fluid through the organs. The result is simplest when time-dependence is due to changes in substrate concentrations at the inlet, i.e., following injection or infusion. Flow through the liver is dealt in greater detail, and the instantaneous overall elimination rate, with special reference to galactose elimination, is evaluated for this organ.

7386 THE TRANSPORT, HEPATOBILIARY DISTRIBUTION AND CLEARANCE OF ^{99m}Tc-Sn-LIDOCAINE IMINODIACETIC ACID, ^{99m}Tc-Sn-LIDA. (Eng.) Noronha, O. P. D.; Sewatkar, A. B.; Ganatra, R. D.; Subramanian, G. (Tata Memorial Hosp., Parel, Bombay 400 012, India). *Int. J. Nucl. Med. Biol.* 4(2):122-128; 1977.

The method of preparation, transport, hepatobiliary distribution, and clearance of ^{99m}Tc-Sn-lidocaine iminodiacetic acid (^{99m}Tc-Sn-*lida*) was studied. Paper chromatography in citric acid-*n*-butanol showed that the radiopharmaceutical had a R_f=0.0 and any free ^{99m}Tc-O_4^- migrated with a R_f=0.30-0.35. Electrophoretic mobilities showed that it moves to about 3.0 cm towards the anode, whereas free $^{99m}TcO_4^-$ travels about 6-7 cm in veronal buffer system under the same conditions. These patterns of behavior were found to be stable for at least 4 months. Toxicity and survival studies in mice indicated that there were no untoward effects, even at a dose as high as 210 mg/kg. Tissue distribution studies in mice injected i.v. with 20 μCi of ^{99m}Tc-Sn-LIDA indicated that the liver activity decreased from about 28% at the end of 6 min to about 9% in about 20 min, followed by a concomitant increase in the gut activity from 40% to 75% in the corresponding time interval. There was negligible activity in other organs (spleen, lungs, thyroid). A similar behavior pattern was seen when the radiopharmaceutical was administered in rats. Scintiscans obtained in rabbits injected i.v. with 2.0 mCi of ^{99m}Tc-Sn-LIDA showed extremely rapid excretion into the gut. At 7 min, the liver was visualized, and clearance had already started at this time. At 30 min, the gallbladder was seen distinctly with a considerable portion of the activity cleared into the gut. In humans, liver uptake was also rapid, and gallbladder localization took place in about 20 min. ^{99m}Tc-Sn-LIDA behaves as an excellent hepatobiliary agent. It is rapidly cleared from the blood, preferentially localized in the hepatocytes, and cleared through the bile en route to the bowel. The ease of its preparation, its stability, and its low toxicity enhances its usefulness in nuclear medicine procedures.

7387 UNIDIRECTIONAL INFLUX OF GLUTAMINE AND OTHER NEUTRAL AMINO ACIDS INTO LIVER OF FED AND FASTED RAT IN VIVO. (Eng.) Pardridge, W. M. (Univ. California at Los Angeles Center for the Health Sciences, Los Angeles, CA 90024). *Am. J. Physiol.* 232(5):E492-E496; 1977.

The fractional extraction of the unidirectional influx of several neutral amino acids (glutamine, leucine, alanine, tryptophan, and cycloleucine) into rat liver *in vivo* was studied with a tissue-sampling, single-injection technique. Liver uptake of ^{14}C-amino acid was expressed as an index relative to the hepatic clearance of a ^{3}H-labeled water (^{3}HOH) internal reference. The maximal fractional extraction of ^{3}HOH influx into liver (0.85) and the rate constant of ^{3}HOH efflux back to blood (0.87/min) provided an estimate of portal blood flow, 0.93 ml/min/g, in the barbiturate-anesthetized, laparotomized rat. Given the extraction data for the ^{3}HOH reference, liver uptake indices for the five amino acids studied were converted into maximal fractional extractions of amino acid influx into liver: glutamine, 0.72 ± 0.03; leucine, 0.56 ± 0.02; alanine, 0.43 ± 0.04; tryptophan, 0.40 ± 0.03; cycloleucine, 0.25 ± 0.01; and sucrose, 0.09 ± 0.02. The influx of glutamine and cycloleucine was shown to be increased 35% with 48 hr of fasting. These data indicate that glutamine penetrates the liver cell membrane faster than any of the 19 amino acids studied thus far. The rate of unidirectional influx of glutamine and other amino acids into liver reveals that the capacity of liver cells to transport amino acids is several fold greater than that of other organs such as brain or muscle.

7388 GALLBLADDER BILE COMPOSITION IN DIFFERENT ETHNIC GROUPS. (Eng.) Oviedo, M. A.; Ho, K. J.; Biss, K.; Soong, S. J.; Mikkelson, B.; Taylor, C. B. (Cancer Center, Northwestern Univ., Chicago, IL). *Arch. Pathol. Lab. Med.* 101(4):208-212; 1977.

One hundred and ninety-four gallbladder biles from various ethnic groups were analyzed for their composition. The subjects included 64 white patients without gallstones, 93 white patients with gallstones, and 37 black patients without gallstones. The solubility of cholesterol in bile was determined mainly by the relative amounts of phospholipid and bile salt present. Bile from patients with gallstones was usually supersaturated with cholesterol above the boundary of the metastable state. Biles from normal white subjects of Finland, New Zealand, and the United States were already in the metastable state of supersaturation with cholesterol. The Masai of East Africa and black subjects of the United States had a bile level below the limit of maximum cholesterol solubility. This study indicates that the difference in the prevalence of cholesterol cholelithiasis in various ethnic groups is related to the difference in their bile composition, which might, in turn, be controlled by some genetic and other as yet unidentified factors.

7389 PROLONGED INDUCTION OF GERMFREE BILE ACID PATTERN IN CONVENTIONAL RATS BY ANTI-

BIOTICS. (Eng.) Gustafsson, B. E.; Gustafsson, J. A.; Carlstedt-Duke, B. (Dept. Germfree Res., Karolinska Institutet Stockholm, Sweden). *Acta Med. Scand.* 201(4):155-160; 1977.

To determine the effects of antibiotics on the bile acid pattern in the intestinal contents of conventional rats, male AGUS rats reared under germfree conditions were given benzylpenicillin (360,000 IU/kg/day), neomycin (180 mg/kg/day), kanamycin (35 mg/kg/day), erythromycin (360 mg/kg/day), bacitracin + neomycin (27,000 IU/kg/day and 550 mg/kg/day, resp.), succinylsulfathiazole (360 mg/kg/day), and metronidazole (20 or 100 mg/kg/day). The animals received the drugs through a stomach tube for 5 days. Feces were collected daily for 3 days, followed by a 4-day interval between each collection period, and the total fecal bile acids in each sample were assessed by gas chromatography. Eight weeks after the initiation of treatment, rats were given an enema with 1 ml of a 10^{-1} dilution of cecum contents from six intact syngeneic rats. The characteristic features of the pretreatment bile acid pattern were the presence of allodeoxycholic acid, deoxycholic acid, β-muricholic acid, hyodeoxycholic acid, and allohyodeoxycholic acid. Treatment with antibiotics resulted in a germfree pattern (disappearance of allo-, hyo-, and deoxycholic acids and appearance of α-muri-, chenodeoxy-, and cholic acids) that was not normalized until the normal intestinal flora was reestablished by the intestinal bacteria-containing enema.

7390 BILE-FAT RELATIONSHIPS IN GASTRIC SECRETORY INHIBITION AND BILE FLOW STIMULATION. (Eng.) Kihl, B. O.; Boden, G.; Landor, J. H. (CMDNJ-Rutgers Medical Sch., Piscataway, NJ 08854). *Surgery* 81(4):386-391; 1977.

To clarify the possible role of bile in fat-induced gastric secretory inhibition, the effect of intraduodenal infusion of mineral oil, olive oil, bile, or a mixture of olive oil and bile on pentagastrin-stimulated gastric secretion, bile flow, and serum immunoreactive secretin levels was studied in dogs. Mineral oil alone or bile alone had no effect on gastric secretion; olive oil alone caused an insignificant diminution of gastric secretion, but the mixture of bile and olive oil induced prompt, statistically significant gastric secretory inhibition ($p<0.001$). Bile had the early choleretic effect that would be expected to result from the absorption of bile salts; olive oil alone caused a delayed (by 45-60 min) increase in bile flow, whereas the bile-olive oil mixture brought about a delayed and much greater increase in bile flow rates; the mean bile secretion was 2.3 cm^3/15 min after olive oil and 3.3 cm^3/15 min after olive oil plus bile. None of the agents given intraduodenally produced a significant change in the serum secretin level. Intravenous pentagastrin infusion caused a significant increase in rate of bile flow ($p<0.001$). The results offer further evidence that fat, in the presence of bile, acts as a potent inhibitor of gastric acid secretion.

7391 GAS-LIQUID CHROMATOGRAPHIC ASSAY OF SERUM BILE ACIDS. (Eng.) Ross, P. E.; Pennington, C. R.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee DD1 9SY, Scotland). *Anal. Biochem.* 80(2):458-465; 1977.

The analysis of serum bile acids by gas-liquid chromatography is described. Bile acids are extracted from 0.5-2 ml of serum and analyzed as methyl ester trifluoroacetates following enzymatic hydrolysis of the taurine and glycine conjugates. The method does not detect bile acid sulfates, although inclusion of a solvolysis procedure before enzymatic hydrolysis would allow for their measurement. The method was used to establish normal values for serum bile acids in normal subjects after an overnight fast and 2 hr postprandially (p.p.). After the overnight fast, mean levels of lithocholic acid, deoxycholic acid, chenodeoxycholic acid (CDCA), ursodeoxycholic acid, and cholic acid were 0.09, 0.47, 0.88, 0.05, and 0.60 μM, resp.; mean levels 2 hr p.p. were 0.18, 0.59, 1.39, 0.13, and 0.98 μM, resp. Thus, in normal subjects, the main serum bile acid was CDCA. The increase in total serum bile acids 2 hr p.o. (3.34 versus 2.07 μM after fasting) was mainly due to an increase in primary bile acids, since the other bile acids did not rise consistently. In two normal subjects, serum was collected during fasting and at 15-min intervals for 2 hr p.p. The bile acids, again mainly CDCA, increased after only 15 min. Peak levels were observed at 75 min p.p., after which they gradually fell; however, they were still elevated 2 hr p.p. Sera from liver disease patients contained substantially elevated levels of bile acids (both fasting and p.p.) with respect to healthy controls, indicating that the method can differentiate between normal and liver disease subjects.

7392 EFFECTS OF DIFFERENT BILE SALTS UPON THE COMPOSITION AND MORPHOLOGY OF A LIVER PLASMA MEMBRANE PREPARATION, DEOXYCHOLATE IS MORE MEMBRANE DAMAGING THAN CHOLATE AND ITS CONJUGATES. (Eng.) Vyvoda, O. S.; Coleman, R.; Holdsworth, G. (Dept. Biochemistry, Univ. Birmingham, P.O. Box 363, Birmingham B15 2TT, England). *Biochim. Biophys. Acta* 465(1):68-76; 1977.

The effects of various bile salts on rat liver plasma membrane preparations were studied. Plasma membrane preparations were incubated with various bile salts at 0 or 37 C. The bile salts caused the removal of various amounts of proteins, membrane enzymes, and phospholipids. Cholate, taurocholate, and glycocholate removed appreciable amounts of protein from the saline-washed membranes, and considerable amounts of both phospholipids and the membrane enzymes, 5-nucleotidase, alkaline phosphatase, alkaline phosphodiesterase 1, and L-leucyl-β-naphthylamidase. These losses were greater at 37 than at 0 C. The material remaining contained membrane-like profiles, many of vesicular form, even when the preparation was almost completely devoid of phospholipids. Deoxycholate, both at 0 and 37 C, removed more protein, membrane enzymes, and phospholipids than did cholate and its conjugates. The material remaining was mainly granular and unorganized, and the only remaining features were structures resembling the nexus, and occasional desmosomes. Deoxycholate appears to cause greater perturbation of membrane structure than the trihydroxy bile salt, cholate, and its conjugates. The results may have implications for the effects of bile salts upon the membranes of liver cells during bile salt secretion and the production of bile.

7393 QUANTITATIVE DETERMINATION OF SERUM BILE ACIDS USING A 7α-HYDROXYSTEROID DEHYDROGENASE. (Eng.) Fausa, O.; Skalhegg, B. A. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(4):441-447; 1977.

Primary bile acids in serum from healthy volunteers and from patients with parenchymatous liver disease or cholestatic hepatobiliary disorders were measured by an enzymatic-fluorimetric method that utilizes a crude 7α-hydroxysteroid dehydrogenase isolated from *P. testosteroni*. The mean recovery of cholic and chenodeoxycholic acids averaged 85.5 ± 5.7% from normal sera and 84.5 ± 6.3% from jaundiced sera. The mean concentration of serum 7α-hydroxy bile acids (primary bile acids) in fasting, healthy subjects was 2.5 ± 1.45 µM (range, 1.2-6.3 µM); this comprised 73 ± 11.5% of the total bile acid concentration (measured as the 3α-hydroxy bile acid concentration). In the cholestatic hepatobiliary disease and parenchymatous liver disease patients, the proportion of 7α-hydroxy bile acids (with respect to total bile acids) was significantly ($p < 0.001$) increased, with mean values of 91.5 ± 8.0% and 93.5 ± 9.6%, resp., being observed. The enzymatic-fluorimetric procedure was reliable and sensitive; when used in conjunction with 3α-hydroxysteroid dehydrogenase, it enabled the concentration of primary and secondary bile acids to be determined directly.

7394 COMPARATIVE STUDIES OF THE EFFECTS OF FASTING ON BILE SALT POOL SIZES OF HAMSTERS AND RATS. (Eng.) Beher, W. T.; Stradnieks, S.; Lin, G. J.; Konde, W. L. (Henry B. Ford Hosp., 2799 W. Grand Blvd., Detroit, MI 48202). *Steroids* 29(5):695-700; 1977.

The effect of fasting on total bile salt pool size was measured and compared in cholecystectomized and intact Syrian hamsters and in a species of rat that lacks a gallbladder. Bile salts were measured in the liver and bile ducts, cecum, small intestine, and, when present, gallbladder of animals that had been fed normally or fasted for 24, 48, or 72 hr. The rats maintained the size of their total bile salt pool during the fast periods possibly due to the continuation of enterohepatic circulation during fasting. Consequently, the bile salt concentration in the rat liver would not increase and bile acid biosynthesis would continue, thereby maintaining the bile salt pool size. Intact hamsters maintained and even increased their bile salts during fasts by storing the salts in the gallbladder and, to some extent, the small intestine When the hamsters were cholecystectomized, the total bile salt pool of animals fasted for 48 hr decreased to about one-third the level of animals on a normal diet (7.37 ± 2.33 µM/100 g versus 21.6 ± 2.20 µM/100 g; $p<0.01$).

7395 DIFFUSION COEFFICIENTS OF SINGLE BILE SALT AND BILE SALT-MIXED LIPID MICELLES IN AQUEOUS SOLUTION MEASURED BY QUASIELASTIC LASER LIGHT SCATTERING. (Eng.) Oh, S. Y.; McDonnell, M. E.; Holzbach, R. T.; Jamieson, A. M. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Biochim. Biophys. Acta* 488(1):25-35; 1977.

Diffusion coefficients of single bile salt micelles and bile salt-mixed lipid micelles in aqueous solution were measured by quasielastic laser light scattering. There was a negligible change in the micellar translational diffusion coefficient (D_t) with bile salt concentration in most bile salt systems except in taurodeoxycholate systems with and without added phosphatidylcholine (PTC) and in ternary systems (bile salt-PTC-cholesterol) that were saturated or metastably supersaturated with respect to cholesterol. D_t values extrapolated to zero micelle concentration D_t^0 for the pure bile salt conjugates sodium glycocholate, sodium glycodeoxycholate, sodium taurochenodeoxycholate and mixed bile salt micelles of the Neiderheiser-Roth composition were (x 10^6 cm^2/sec): 1.75, 1.50, 1.46, 1.57, 1.22, 1.02, and 1.67, resp. The Stokes radii for these pure bile salt conjugates were 18.8, 21.9, 22.5, 20.9, 26.9, 32.2, and 19.7 A, resp. Micellar size correlated with bile salt molecular structure. For binary systems containing the above single bile salts plus PCT (molar ratio=3:1), the corresponding D_t^0 values (given in the same order as above) were 1.60, 1.38, 1.07, 1.54, 1.23, and 0.93, resp. The Stokes radii for these binary micelles were 20.5, 23.8, 30.7, 21.3, 26.7, and 35.3 A, resp. In most systems, PTC produced a small increase in micellar size that is interpreted as simple swelling of the single-species micelles. The Stokes radii for ternary systems (bile salt-PTC-cholesterol) that were saturated or metastably supersaturated with respect to cholesterol were the same within experimental error, being 34.9 and 34.2 A, resp. The corresponding values of D_t^0 in these two ternary systems were 0.94 and 0.94, resp. It is concluded that intermicellar interactions significantly contributed to the measured diffusion coefficients in the ternary systems as well as in the single sodium taurodeoxycholate and the binary taurodeoxycholate-PTC systems over the bile salt concentration range (0-20% weight/volume) studied.

7396 STEROL AND BILE ACID METABOLISM DURING DEVELOPMENT. 1. STUDIES ON THE GALLBLADDER AND INTESTINAL BILE ACIDS OF NEWBORN AND FETAL RABBITS. (Eng.) Subbiah, M. T. R.; Marai, L.; Dinh, D. M.; Penner, J. W. (Mayo Clinic, Rochester, MN 55901). *Steroids* 29(1):83-92; 1977.

The content and distribution of bile acids in 26-day-old rabbit fetuses and 1-day-old newborn rabbits were studied. The intestinal tract and gallbladder were removed, and the extracted bile acids were subjected to gas-liquid chromatography. The bile acids of adult rabbits are predominantly conjugated with glycine; in contrast, both the fetal and newborn rabbits had a significant amount of taurine conjugates, and they did not have the band corresponding to glycodeoxycholic acid. Samples from the fetal and newborn rabbits contained essentially the same three bile acids, deoxycholic (DCA), chenodeoxycholic (CDCA), and cholic acid (CA), but in different proportion. CA comprised 44.6% of the total content of bile acids in the fetal rabbit gallbladder fraction and 63.5% in the intestinal fraction (compared to 80.2% and 76.5%, resp., in these fractions from newborn rabbits). The fetus samples contained a significant amount of CDCA, 31.7%, compared to 12.3% in newborn rabbits. In the newborn rabbits, 64.4% of the bile acids were located in the intestine, but in the fetuses, 60.9% of the total bile acids were associated with the gallbladder.

7397 EFFECT OF LIPOPROTEIN-X ON HEPATIC CHOLESTEROL SYNTHESIS. (Eng.) Liersch, M.; Baggio, G.; Heuck, C. C.; Seidel, D. (Medical Univ. Hosp., Univ. Heidelberg, Bergheimerstrasse 58, D-6900 Heidelberg, W. Germany). *Atherosclerosis* 26(4):505-514; 1977.

To determine the mechanism of hypercholesterolemia following bile duct obstruction, male Sprague-Dawley rats underwent i.v. infusions of lipoproteins X and B (LP-X and LP-B) isolated from the serum of patients with extrahepatic biliary obstruction and from the serum of bile duct-ligated rats. Infusion lasted for 16 hr, and each rat received 24 mg cholesterol/100 g body weight. The livers of the animals were perfused, and hepatic cholesterol synthesis was subsequently studied *in vitro*. After LP-B infusion, cholesterol synthesis (μatom ^{3}H/hr/g dry weight) was reduced to about half of its control value (7.6 ± 2, compared to 17.9 ± 1.6 in controls), but infusion with LP-X resulted in an insignificant reduction to 82% of control values. These results were confirmed with bile fistula rats, whose cholesterol synthesis is enhanced following the diversion of bile salts. After 48 hr of diversion, cholesterol synthesis increased twofold (31 ± 4, compared to 17.9 ± 1.6 in controls); LP-B infusion was followed by a significant inhibition of cholesterol synthesis (14 ± 1.7); LP-X infusion reduced cholesterol synthesis slightly (24.1 ± 3.6), but not to normal values. Analysis of the cholesterol content of the liver revealed a significant rise of hepatic free cholesterol following LP-X infusion (8.5 ± 1.1, compared to 6.3 ± 1.1 in controls and 6.6 ± 1.3 after LP-B infusion).

7398 EFFECT OF UNSATURATED LIPIDS ON THE BILE FLOW AND BILIARY EXCRETION OF CHOLESTEROL AND BILE SALTS IN RATS. (Eng.) Paul, R.; Ganguly, J. (Indian Inst. Science, Bangalore-560012, India). *Chem. Phys. Lipids* 17(2/3):315-323; 1976.

The effect of feeding safflower oil or coconut oil and the effect of phospholipid EPL (soyalecithin containing 70% linoleic acid) or egg phospholipid administration on serum, liver, and bile cholesterol and biliary flow were studied in male albino rats. Food intake of rats on a basal diet was measured, and the oils were administered by stomach tube twice daily so that total oil intake was 10% of diet. The phospholipids were administered in a similar fashion, except daily intake was 500 mg of phospholipid. After 30 days on the oil diet and 7 days on the phospholipid diet, the rats were given 4-^{14}C-cholesterol (0.25 μCi, p.o.), and the radioactivity of serum cholesterol, liver, and bile was measured. In addition, fatty acids and phospholipids of liver and bile and bile salts were determined. In rats fed the relatively less saturated safflower oil, there was an increase in the linoleic acid content of the liver cholesterol esters and triglycerides, as well as an increase in biliary phospholipids, usually at the expense of the oleic and palmitic contents of these esters. The rate of bile flow and the concentration of cholesterol in the bile were markedly higher in rats receiving the more unsaturated lipids. It is concluded that feeding lipids with a higher polyunsaturated fatty acid content causes an increase in the unsaturation of the biliary phospholipids, which, in turn, causes increased excretion of cholesterol via the bile.

7399 INCREASED SULFATION AND DECREASED 7α-HYDROXYLATION OF DEOXYCHOLIC ACID IN ETHINYL ESTRADIOL-INDUCED CHOLESTASIS IN RATS. (Eng.) Jensen, R. T.; Davis, R. A.; Kern, F., Jr. (Univ. Colorado Sch. Medicine, Denver, CO 80220). *Gastroenterology* 73(2):314-320; 1977.

To determine whether intolerance to deoxycholic acid is involved in ethinyl estradiol-associated cholestasis, deoxycholic acid conjugation, transport capacity, and metabolism were compared in control and ethinyl estradiol-treated rats. Control rats had a lower capacity to transport deoxycholic acid than taurodeoxycholic acid ($p < 0.001$) and both were decreased by ethinyl estradiol treatment (by 31% and 49%, resp.). During [24-^{14}C]sodium deoxycholate infusion, [^{14}C]biliary bile acid secretion increased, but bile flow did not change significantly in either control or ethinyl estradiol-treated rats. Ethinyl estradiol-treated animals excreted significantly less ^{14}C as taurocholic acid than did control animals (ethinyl estradiol, 23.3 ± 1.7 versus control, 29.1 ± 1.9, $p < 0.05$), consistent with an impairment of 7α-hydroxylation of taurodeoxycholic acid. Ethinyl estradiol treatment did not impair conjugation of deoxycholic acid, but did result in an increase in sulfation of taurodeoxycholic acid from 1.5% in controls to nearly 4.0% ($p < 0.01$). These results are consistent with the hypothesis that the rat has a poorer tolerance for deoxycholic acid than do certain other species. Furthermore, the rat converts deoxycholic acid, a poor choleretic, to taurocholic acid, a good choleretic. When this conversion is impaired with ethinyl estradiol treatment, sulfation may be an important alternate pathway for excretion of this potentially harmful bile acid.

7400 THE EFFECT OF BILE SALTS ON THE FORMATION AND HYDROLYSIS OF CHOLESTEROL ESTERS BY RAT LIVER ENZYMES. (Eng.) Neelon, V. J.; Lack, L. (Dept. Physiology, Univ. North Carolina at Chapel Hill, Chapel Hill, NC 27514). *Biochim. Biophys. Acta* 487:137-144; 1977.

Rat liver homogenates or rat liver microsomes containing ^{14}C-labeled cholesterol were incubated with varying amounts of different bile salts to determine the effects of bile salts on the formation and hydrolysis of cholesterol esters. Bile salts inhibited the formation of cholesterol esters in liver homogenates or liver microsomes, with chenodeoxycholate, glycochenodeoxycholate, and taurochenodeoxycholate being more potent inhibitors than their comparable cholate analogues. For example, 0.5 μmol/ml of the dihydroxy bile salt sodium taurochenodeoxycholate inhibited esterification in liver homogenates by nearly 90%, while the trihydroxy compound sodium taurocholate resulted in less than 50% inhibition at the same concentration. Microsomes prepared in potassium phosphate buffer showed similar properties with respect to esterification as did liver homogenates. Hydrolysis of cholesterol esters in liver homogenates was stimulated by bile salt addition, e.g., a 60% increase over controls was observed with 0.25 μmol/ml of taurochenodeoxycholate, while at 0.5 μmol/ml the hydrolysis was 90% greater than control values. The trihydroxylated bile salt taurocholate also stimulated the hydrolysis of cholesterol oleate in liver homogenates, but to a lesser extent (73% at 0.5 μmol/ml). Bile salts inhibited hydrolysis in microsomal preparations under conditions identical to those required for inhibition of esterification. In the presence of 100 μmol/ml potassium phosphate buffer at either pH 7.4 or 6.1, the addition of 0.5 μmol/ml of taurochenodeoxycholate inhibited hydrolysis by over 70%. This inhibitory effect was also produced by substituting potassium chloride or sodium chloride for potassium phosphate. In contrast, the presence of taurochenodeoxycholate in the absence of potassium phosphate buffer resulted in a threefold stimulation of hydrolysis. These results suggest that bile salts can significantly alter the cholesterol-cholesterol ester profile in the liver and that these effects may be influenced by small changes in the intracellular environment in the region where these reactions occur.

7401 TOXICITY OF CHENODEOXYCHOLIC ACID IN THE LIVER, GASTROINTESTINAL TRACT, KIDNEY, AND ADRENAL GLANDS OF THE RAT. (Ger.) Leuschner, U.; Schneider, M.; Loos, R.; Kurtz, W. (Zentrum der Inneren Medizin, Johann-Wolfgang-Goethe-Universitat, Theodor-Stern-Kai 7, D-6000 Frankfurt am Main, W. Germany). *Res. Exp. Med.* 171(1):41-55; 1977.

The liver, gastrointestinal tract, kidneys, and adrenal glands of 80 female Wistar rats treated with chenodeoxycholic acid (CDCA) were examined by light and electron microscopy. CDCA was administered by an endopharyngeal tube over a period of up to 60 days in daily doses of 150, 250, 500, and 1,000 mg/kg (groups 1, 2, 3, and 4, resp.). Animals were sacrificed on days 5, 15, 30, 60, and 74. All group 1-3 animals survived, but all group 4 animals died within the first 30 days. Diarrhea was not seen. The first changes in the liver (round-cell infiltration of the periportal areas, marked nuclear polymorphism, giant nuclei formation, and connective tissue proliferation) were seen after 60 days in group 1 but after only 5 days in the other groups. The morphological differences among the four groups were quantitative, not qualitative. A slight necrosis was seen in groups 2-4. By day 74, the morphological changes had regressed almost completely in group 1, and partial regression was found in groups 2 and 3. Suspect pathological changes in the gastrointestinal tract (sparse round-cell infiltration of the gastric mucosa and, occasionally, jejunal and ileal mucosa) were seen in groups 3 and 4 only. Dilated renal tubuli filled with protein cylinders were found after 5 days in 39/40 animals in groups 3 + 4. No changes were seen in groups 1 and 2. The cortex and medulla of the adrenal glands were not altered in any group. The occurrence of morphological changes in the liver, even at low doses of CDCA and in spite of potent detoxication mechanisms, suggests the existence of toxic metabolites of CDCA.

7402 ENZYMATIC DIFFERENTIATION OF HUMAN LIVER: COMPARISON WITH THE RAT MODEL. (Eng.) Greengard, O. (Harvard Medical Sch., Boston, MA). *Pediatr. Res.* 11(5):669-670; 1977.

An attempt was made to provide comprehensive data on the overall pattern of hepatic biochemical differentiation. The results of determinations of the concentration of 15 randomly selected enzymes in normal and fetal liver were collated with comparable literature data on 15 additional enzymes. The findings suggest that the quantitative pattern of enzymes in the second trimester fetal liver is significantly different from that of adult liver. Based on a specially devised activity quotient (measured as U/g immature liver over U/g adult liver), it was found that in the developing human liver, the concentrations of the various enzymes tend to change in the same direction as they do in rat liver.

7403 ENZYME ACTIVITIES OF CELLS OF DIFFERENT TYPES ISOLATED FROM LIVERS OF NORMAL AND CHOLESTATIC RATS. (Eng.) Wootton, A. M.; Neale, G.; Moss, D. W. (Royal Postgraduate Medical Sch., DuCane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 52(6):585-590; 1977.

The distribution of three membrane-bound enzymes, alkaline phosphatase, 5'-nucleotidase, and γ-glutamyl transferase, was examined in rat liver; livers were fractionated into parenchymal cells, a Kupffer cell fraction, and a biliary tract fraction by perfusion with collagenase solution. In control rat livers, the highest enzyme concentrations were found in Kupffer cell preparations. The fraction enriched with biliary tract cells showed concentrations two to four times higher than those in isolated parenchymal cells. At 24 hr after bile duct ligation there was a fourfold increase in alkaline phosphatase activity in parenchymal cells and a 2.5-fold increase of enzyme activity in the biliary tract fraction. The concentration of alkaline phosphatase in Kupffer cells remained unchanged. 5'-Nucleotidase and γ-glutamyl transferase concentrations tended to decrease after bile duct ligation for 24 hr, the most marked changes being found in Kupffer cells. After bile duct ligation for 7 days, the overall activities of hepatic alkaline phosphatase and γ-glutamyl transferase increased fourfold, and there was a small rise in 5'-nucleotidase activity. For alkaline phosphatase and γ-glutamyl transferase, the changes were found primarily in parenchymal cells and in the biliary tract fraction. There was a small rise in the activity of 5'-nucleotidase in parenchymal cells and a fall in activity in Kupffer cells. These data show marked differences in the distribution and behavior of three enzymes that are often used as alternatives in the assessment of patients with liver disease.

7404 ENZYME ACTIVITIES IN HUMAN LIVER BIOPSIES: ASSAY METHODS AND ACTIVITIES OF SOME LYSOSOMAL AND MEMBRANE-BOUND ENZYMES IN CONTROL TISSUE AND SERUM.

(Eng.) Seymour, C. A.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 52(3):229-239; 1977.

Micromethods for assaying 14 enzymes in small samples of human liver (approximately 10 mg) obtained by percutaneous needle biopsy are described, and enzyme activities for normal liver tissue and serum are reported. The plasma membrane enzymes 5'-nucleotidase and alkaline phosphatase were assayed with the use of adenosine monophosphate and 4-methylumbelliferyl (4-MeUm) phosphate, resp., as substrates. The microsomal enzymes neutral α-glucosidase and leucyl-2-naphthylamidase were assayed using 4-MeUm α-D-glucopyranoside and L-leucyl-2-naphthylamide, resp., as substrates. The biliary canalicular enzyme γ-glutamyltransferase was assayed using γ-glutamyl-2-naphthylamide as substrate. The nine acid hydrolases, acid phosphatase, phosphodiesterase, β-glucosidase, α-glucosidase, α-galactosidase, β-galactosidase, α-mannosidase, *N*-acetyl-β-glucosaminidase, and β-glucuronidase, were assayed using 4-MeUm phosphate, 4-MeUm pyrophosphate diester, 4-MeUm β-D-glucopyranoside, 4-MeUm α-D-glucopyranoside, 4-MeUm α-D-galactopyranoside, 4-MeUm β-D-galactopyranoside, 4-MeUm α-D-mannopyranoside, 4-MeUm 2-acetamide-2-deoxy-β-D-glucopyranoside, and 4-MeUm β-D-glucuronide trihydrate, resp., as substrates. Comparison of enzyme activities in normal liver tissue and control serum, resp., were: 5'-nucleotidase--liver 1.28 ± 0.17 mU/mg protein, serum 12.40 ± 0.62 mU/ml; alkaline phosphatase--liver 1.35 ± 0.17 mU/mg protein, serum 12.08 ± 0.95 mU/ml; α-glucosidase--liver 13.7 ± 2.4 mU/mg protein, serum 5.56 ± 0.76 mU/ml; leucyl-2-naphthylamidase--liver 5.08 ± 0.81 mU/mg protein, serum 1.21 ± 0.09 mU/ml; α-glutamyltransferase--liver 0.60 ± 0.06 mU/mg protein, serum 0.061 ± 0.008 mU/ml; acid phosphatase--liver 10.9 ± 0.91 mU/mg protein, serum 19.9 ± 0.7 mU/ml; phosphodiesterase--liver 0.390 ± 0.08 mU/mg protein, serum 0.024 ± 0.007 mU/ml; β-glucosidase--liver 0.840 ± 0.018 mU/mg protein, serum 0.008 ± 0.001 mU/ml; α-glucosidase--liver 0.310 ± 0.02 mU/mg protein, serum 0.029 ± 0.004 mU/ml; α-galactosidase--liver 0.060 ± 0.01 mU/mg protein, serum 0.010 ± 0.001 mU/ml; β-galactosidase--liver 0.420 ± 0.10 mU/mg protein, serum 0.073 ± 0.02 mU/ml; α-mannosidase--liver 0.250 ± 0.02 mU/mg protein, serum 0.096 ± 0.006 mU/ml; *N*-acetyl-β-glucosaminidase--liver 2.03 ± 0.28 mU/mg protein, serum 1.06 ± 0.06 mU/ml; and β-glucuronidase--liver 4.84 ± 0.43 mU/mg protein, serum 0.613 ± 0.11 mU/ml.

7405 COENZYME-INDUCED CONFORMATIONAL CHANGES AND SUBUNIT INTERACTIONS OF LIVER ALCOHOL DEHYDROGENASE.

(Eng.) Branden, C. I. (Dept. Chemistry, Agricultural Coll. Sweden, S-750 07 Uppsala, Sweden). *Biochem. Soc. Trans.* 5(3):612-615; 1977.

Coenzyme (NAD^+)-induced conformational changes and subunit interactions of liver alcohol dehydrogenase were studied. To investigate the possible importance of the hydrogen bond between the carbonyl oxygen atom of the carboxamide group and the side chain of threonine-178 for the proper positioning of the nicotinamide moiety of the coenzyme, the binding of coenzyme analogues was studied. The NAD^+ analogues either had the carboxamide group removed (leaving pyridine-adenine dinucleotide) or were substituted with an iodine atom (creating 3-iodopyridine-adenine dinucleotide). Both analogues bind in the same conformation and do not induce the isomerization reaction of the enzyme. The binding of the adenosine moiety is very similar to that of ADP-ribose or NAD^+ bound to the enzyme. The pyridine ring is not situated in the active-site pocket as is the nicotinamide ring in bound NAD^+, but lies at the surface of the crevice between the two domains of the subunit, approximately 0.15 nm away from the catalytically active zinc atom. This conformational difference is mainly accomplished by a difference in the orientation and position of the pyrophosphate group so that the sugar-phosphate chain obtains a completely different direction with respect to the enzyme in these complexes. The hydrogen bond between threonine-178 and the carboxamide group is thus an essential factor for the proper positioning of the nicotinamide moiety of NAD^+ with respect to liver alcohol dehydrogenase.

7406 MICROSOMAL HEXOSE-6-PHOSPHATE DEHYDROGENASE IN INJURED LIVER.

(Eng.) Watanabe, A. (Okayama Univ. Medical Sch., 2-5-1 Shikata-cho, Okayama, Japan). *Enzyme* 22(5):322-329; 1977.

The level of rat liver microsomal hexose-6-phosphate dehydrogenase (H6PD) during carbon tetrachloride- and thioacetamide-induced liver injury and under various pathological and physiological conditions was measured. Kinetic, immunologic, and electrophoretic studies clearly differentiated H6PD in rat liver microsomes from glucose-6-phosphate dehydrogenase (G6PD) localized in liver supernatants. H6PD activity decreased markedly 1-2 days following the administration of CCl_4 (0.5 ml/100 g by intubation) or thioacetamide (0.26 mmol/100 g, i.p.) to male Sprague-Dawley rats from a control value of 3.8 ± 0.5 mU/mg microsomal protein (well-fed rats) to 0.9 ± 0.7 ($p<0.05$) and 1.7 ± 1.2 at 24 and 48 hr, resp., after CCl_4 treatment and to 2.4 ± 1.0 at 48 hr after thioacetamide treatment. After similar treatments, G6PD activity increased significantly ($p<0.05$) from a control value of 35.1 ± 2.3 mU/mg of supernatant protein to corresponding values of 76.3 ± 13.4, 103.4 ± 20.6, and 91.4 ± 10.9. In partially hepatectomized rats or in rats receiving a glucose-casein feeding for 3 days after a 2-day starvation, G6PD activity increased significantly ($p<0.05$) to values of 49.8 ± 3.4 and 413.4 ± 52.4 mU/mg, resp., but H6PD activities were relatively unchanged at this level of significance. The decreased H6PD activities observed during liver damage may be due to the repression of H6PD synthesis but not to release of the enzyme from the damage microsome, since increases in H6PD activity were not detected in liver supernatants from CCl_4-injured liver. Decreased levels of microsomal enzymes might be primarily responsible for the impairment of drug-metabolizing capacities in injured livers.

7407 BILE 5'-NUCLEOTIDASE IN THE SERUM OF JAUNDICED RATS.

(Eng.) Mullock, B. M.; Issa, F. S.; Hinton, R. H. (Wolfson Bioanalytical Centre, Univ. Surrey, Guildford, Surrey GU2 5XH, England). *Clin. Chim. Acta* 79(1):129-140; 1977.

Serum enzymes were measured in male hooded rats (Univ. Surrey strain) made cholestatic by common bile duct ligation. Three days after ligation, serum 5'-nucleotidase, L-leucyl-β-naphthylamidase, and β-glycerophosphatase activities increased and alkaline *p*-nitrophenylphosphatase and alkaline phosphodiesterase remained unchanged or decreased. The relationship of these five enzymes to enzymes in the liver plasma membrane was investigated by affinity chromatography of the serum with an immobilized antiserum raised against highly purified liver plasma membrane. In the serum of normal rats, only L-leucyl-β-naphthylamidase was related to liver plasma membrane. In the serum of cholestatic rats, much of the 5'-nucleotidase activity and probably small proportions of alkaline *p*-nitrophenylphosphatase and phosphodiesterase were related to the corresponding enzymes in liver plasma membrane. The 5'-nucleotidase of bile was almost entirely of the liver plasma membrane type. It is concluded that changes in the serum level of this enzyme after bile duct ligation are due to leakage of bile into the blood. Another explanation for the increased levels would be the presence of fragments of plasma membrane in the sera; however, no fragments could be detected in the rat sera at the time of enzyme measurement.

7408 REDUCED INACTIVATION OF TYROSINE AMINOTRANSFERASE IN THE PERFUSED RAT LIVER IN THE PRESENCE OF ETHANOL.

(Eng.) Morland, J. (Inst. Medical Biology, Univ. Tromso, N-9000 Tromso, Norway). *Acta Pharmacol. Toxicol.* 40(1):106-114; 1977.

The effect of 0.2% ethanol on the activity of tyrosine aminotransferase was investigated in the perfused rat liver in the presence and absence of dexamethasone (final concentration 20 μg/ml) and/or cycloheximide (final concentration 25 μg/ml). Ethanol increased tyrosine aminotransferase activity both in the presence and absence of dexamethasone. The addition of ethanol or its main metabolite acetaldehyde to the enzyme assay mixture did not increase enzyme activity. Ethanol also failed to reduce the leakage of enzyme from liver to perfusate or bile. Tyrosine aminotransferase activity declined more slowly in ethanol-treated livers than in control livers when protein synthesis was inhibited by cycloheximide. Ethanol did not influence either the activity of tryptophan oxygenase or the radioactivity remaining in labeled proteins 1.5 hr after the administration of cycloheximide. It is concluded that ethanol increases tyrosine aminotransferase activity in perfused livers by specific inhibition of enzyme inactivation.

7409 DOES CHRONIC ALCOHOL CONSUMPTION REALLY INDUCE HEPATIC MICROSOMAL GAMMA-GLUTAMYLTRANSFERASE ACTIVITY?

(Eng.) Morland, J.; Huseby, N. E.; Sjoblom, M.; Stromme, J. H. (Inst. Medical Biology, Univ. Tromso, N-9001 Tromso, Norway). *Biochem. Biophys. Res. Commun.* 77(3):1060-1066; 1977.

The effect of chronic alcohol consumption on hepatic microsomal γ-glutamyltransferase (GT) activity was investigated. When male Wistar rats were fed ethanol (mean daily intake 12.5-14.2 g/kg, or 35% of caloric intake) for 6-7 weeks, they showed elevated liver and plasma GT activities (0.888 ± 0.160 U/g liver and 5.83 ± 0.35 U/l, resp.) compared with enzyme activities in control animals fed carbohydrates isocalorically (0.137 ± 0.010 U/g liver, $p<0.016$, and 4.37 ± 0.41 U/l, $p<0.047$, resp.). Similar differences in hepatic GT activity were observed after these diets were fed to rats for 1 or 4 weeks. The difference in GT activities between ethanol-fed and control rats was due to a fall in the GT activity of the latter (35-50% of zero-time value); in ethanol-treated rats, GT activity remained close to the initial pre-experimental values. Since neither ethanol nor carbohydrate feeding influenced the subcellular distribution of hepatic GT activity, no evidence for ethanol-induced microsomal GT activity was obtained. The results raise the question whether pair feeding with ethanol against carbohydrates is a proper model when the effect of ethanol on enzyme activities is to be studied.

7410 HEPATIC ALCOHOL OXIDATION AND ITS METABOLIC LIABILITY.

(Eng.) Thurman, R. G. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *Fed. Proc.* 36(5):1640-1646; 1977.

The pathways responsible for ethanol oxidation and the toxic results of its metabolism are reviewed. The predominant pathway for ethanol oxidation at low ethanol concentrations involves alcohol dehydrogenase. However, at high alcohol concentrations, up to 50% of ethanol uptake is 4-methylpyrazole-insensitive. Oxidation of ethanol under these conditions is associated with a change in the steady-state concentration of catalase-H_2O_2. Based on recent evidence, it is concluded that it is unnecessary to postulate that ethanol is oxidized directly via cytochrome P-450. Acetaldehyde production from ethanol via the microsomal subfraction can be accounted for by the combined activities of catalase-H_2O_2 and alcohol dehydrogenase. The metabolism of ethanol via alcohol dehydrogenase produces a marked reduction in the hepatocellular NAD-NADH systems. This reduction is indirectly responsible for the inhibition of glycolysis, gluconeogenesis, citric acid cycle activity, and fatty acid oxidation and may be related to some of the pathological effects observed following chronic alcohol consumption. Attempts to inhibit alcohol dehydrogenase with alkylpyrazoles and activate catalase with substrates for peroxisomal H_2O_2-generating flavoproteins, while successful, have limited applicability because of the native toxicity of the substrates themselves. Fructose and chronic pretreatment with ethanol both enhance the rate of hepatic ethanol metabolism via a similar mechanism: stimulation of mitochondrial NADH oxidation to provide NAD^+ for the alcohol dehydrogenase reaction.

7411 SOME BIOCHEMICAL ASPECTS OF CHRONIC ALCOHOL INTOXICATION. (Eng.) Pokrovsky, A. (Nutrition Inst., USSR Acad. Medical Sciences, Ustinsky pr. 2/14, Moscow C 240, USSR). *Nutr. Metab.* 21(1/2/3):194-196; 1977.

Pathways of ethanol transformation and their respective metabolic disorders in the cell are discussed. Acetaldehyde plays a role in the toxic effect of ethanol. Acetaldehyde has a significant effect on the metabolism of biogenic amines in brain tissue. Chronic alcohol intoxication at a certain stage is associated with a considerable reduction in the ratio of alcohol dehydrogenase:acetaldehyde dehydrogenase activities; this ratio determines the severity of clinical signs in intoxication. The inhibition of acetaldehyde dehydrogenase activity is the enzymological basis of hallucinations and delirium tremens. Good nutrition plays an important role in protecting against ethanol toxicity.

7412 EFFECTS OF NICOTINIC ACID ON INDUCTION OF HEPATIC DRUG METABOLIZING ENZYMES BY CHRONIC ETHANOL ADMINISTRATION. (Eng.) Tuma, D. J.; Sorrell, M. F.; Vanderhoof, J. A.; Barak, A. J. (Veterans Admin. Hosp., 4101 Woolworth Ave., Omaha, NB 68105). *Proc. Soc. Exp. Biol. Med.* 155(1):67-70; 1977.

The content of cytochrome P-450 and the activities of aniline hydroxylase and glucose-6-phosphatase were determined in the livers of Sprague-Dawley rats fed ethanol and nicotinic acid (0.5 mg/ml) singly and in combination for 4 weeks. Similar determinations were conducted in livers from rats administered 0.1% phenobarbital and nicotinic acid (150 mg/kg/day) in the drinking water alone and in combination for 4 weeks. Both chronic ethanol feeding and phenobarbital administration increased the content of cytochrome P-450 and the aniline hydroxylase activity. Glucose-6-phosphatase activity was elevated by ethanol feeding but not by phenobarbital. Nicotinic acid treatment increased the content of cytochrome P-450 and aniline hydroxylation in the ethanol-treated but not in the control or phenobarbital-treated animals. Nicotinic acid did not influence the activity of glucose-6-phosphatase in either the ethanol- or phenobarbital-treated rats. The results are consistent with the existence of a unique cytochrome P-450 that is induced by ethanol feeding, and the induction of this hemoprotein is further enhanced by the concomitant administration of nicotinic acid with ethanol.

7413 EFFECTS OF A SINGLE INGESTION OF SODIUM TAUROCHOLATE ON ESTERIFIED CHOLESTEROL CONCENTRATION IN LIVER AND CHOLESTEROL TURNOVER IN THE RAT. (Eng.) Mathe, D.; Chevallier, F. (Laboratoire de Physiologie de la Nutrition, Universite Paris-Sud, Batiment 447 F 91405 Orsay Cedex, France). *Lipids* 12(8):676-681; 1977.

To test the hypothesis that exogenous taurocholate stimulates the accumulation of hepatic esterified cholesterol and that this accumulation secondarily influences bile acid production, the overall response of cholesterol metabolism to a single ingestion of taurocholate (80 mg) was studied in rats, using the isotopic equilibrium method. The bile acid production, measured by the daily $^{14}CO_2$ output of [26-^{14}C]-cholesterol, initially decreased and then increased. Conversely, the hepatic concentration of esterified cholesterol first increased and then decreased. Moreover, the administration of 80 mg taurocholate to increase the intestinal absorption coefficient of dietary cholesterol decreased the fecal excretion and the intestinal biosynthesis of cholesterol, resulting in an excess cholesterol inflow. The classical hypothesis of negative feedback regulation of bile acid production fails to explain the observed biphasic effect of taurocholate. When the origin of taurocholate is exogenous, it appears to stimulate the storage of esterified cholesterol in the liver at the expense of bile acid synthesis. The accumulation includes not only the decrease in cholesterol transformation into bile acids but also the excess inflow of cholesterol. As exogenous taurocholate was eliminated from the body, cholesteryl ester hydrolysis occurred and provided a supplementary source of free cholesterol for bile acid synthesis.

7414 BARBITURATE-INDUCED CHOLERESIS: POSSIBLE INDEPENDENCE FROM MICROSOMAL ENZYME INDUCTION. (Eng.) Capron, J. P.; Dumont, M.; Feldmann, G.; Erlinger, S. (Hopital Beaujon, Clichy, France). *Digestion* 15(6):556-565; 1977.

The influence of four barbiturates (phenobarbital, barbital, thiopental, and pentobarbital) on bile secretion and on the hepatic microsomal system was studied in anesthetized rats to clarify the relationship between the increase in bile flow and the microsomal enzyme induction produced by barbiturates. The barbiturates were injected i.p. (8-14 mg/day/ 100 g body weight) for 4 days and the animals were studied on the 5th day. Phenobarbital, barbital, and thiopental significantly increased ($p<0.001$, $p<0.02$, and $p<0.01$, resp.) liver weight, increased cytochrome P-450 concentration in the liver ($p<0.001$), decreased pentabarbital sleeping time ($p<0.001$, $p<0.001$, $p<0.01$ resp.), and induced a hypertrophy of the smooth endoplasmic reticulum in the hepatocytes as visualized by electron microscopy. All four barbiturates significantly increased bile flow. The increase in bile flow was significantly higher in the thiopental-treated rats (+83.7%) than in rats treated with phenobarbital (+20.8%, $p<0.001$), barbital (+27.3%, $p<0.01$) or pentobarbital (+27.1%, $p<0.001$). The bile acid excretion in bile was significantly higher in the thiopental-treated rats than in the controls ($p<0.01$). There was no correlation between the increase in bile flow and the cytochrome P-450 concentration in the liver. It is concluded that the increase in bile flow observed after barbiturate treatment in the rat is possibly independent of the hepatic microsomal enzyme induction produced by these drugs.

7415 BIOCHEMICAL STUDIES OF ISOLATED RAT HEPATOCYTES FROM NORMAL AND PHENOBARBITAL-TREATED LIVER AS OBTAINED BY RATE ZONAL CENTRIFUGATION. (Eng.) Weigand, K.; Richter, E.; Esperer, H. D. (Massachusetts General Hosp., Boston, MA 02114). *Acta Hepatogastroenterol.* 24(3):170-174; 1977.

To determine whether density centrifugation could be used for the separation of centrilobular from perilobular hepatocytes, cell suspensions from normal and phenobarbital-treated rat livers were analyzed by rate zonal centrifugation in ficoll gradients. No difference in the microsomal cytochrome P-450 and NADPH-cytochrome C reductase content or in the incorporation rate of radioactive leucine was noted between light and heavy hepatocytes. After centrifugation of a mixture of radioactive phenobarbital-treated cells and normal liver cells, the specific radioactivity was constant, indicating that the hepatocytes from drug-treated liver had the same density as did the normal hepatocytes.

7416 COMPARATIVE STUDIES ON THE BINDING OF CYTOPLASMIC ^{3}H-DEXAMETHASONE-RECEPTOR COMPLEX BY NUCLEI FROM THE LIVERS OF ADULT, NEWBORN, AND FETAL RATS. (Eng.) Murakami, N.; Ichii, S. (Tottori Univ. Sch. Medicine, Yonago, Tottori 683, Japan). *J. Biochem.* 81(4):885-889; 1977.

To gain insight into the mechanism of age-related changes in tissue responsiveness to glucocorticoids, the binding patterns of dexamethasone (Dex) to cytoplasmic receptor and of cytoplasmic Dex-receptor complex to nuclei were compared in the livers of adult, 7-day-old, newborn, and fetal Wistar rats. Only one binding component with high binding affinity was observed in the cytosol from the fetal liver, while at least two binders that showed high and low affinity to Dex were detected in the cytosol of the adult liver. The dissociation constant (K_d) of the high-affinity binder in the cystosol of fetal liver was 3.6×10^{-9} M, while that in the adult liver was 0.1×10^{-10} M. Cytoplasmic Dex-receptor complexes from the adult and fetal liver were efficiently bound to nuclei from adult, 7-day-old, newborn, and fetal livers. The amount of complex bound to nuclei of the adult liver was largest, and the least binding was observed in nuclei of the newborn liver under the incubation conditions used (1.77 nM ^{3}H-Dex-receptor complex). A high-affinity binding of the receptor complex from the adult liver was observed in fetal nuclei ($K_d=1 \times 10^{-9}$ M), but nuclei from the other tissues showed low-affinity and nonsaturable binding. The Dex-receptor complex from the fetal liver bound to nuclei of the adult liver in a low-affinity and nonsaturable manner, while high-affinity binding ($K_d=6 \times 10^{-10}$ M) was observed in nuclei of the fetal liver. The binding of the fetal complex to nuclei of the 7-day-old and newborn livers showed a transitional binding pattern, with sites of high- and low-affinity binding coexisting. It is concluded that differences in the hepatic cytosol receptor-nuclear acceptor system may be attributable, at least in part, to age-related changes in tissue responsiveness to glucocorticoids.

7417 INHIBITION OF RAT LIVER ACETYL COENZYME A CARBOXYLASE BY LONG CHAIN ACYL COENZYME A AND FATTY ACID: MODULATION BY FATTY ACID-BINDING PROTEIN. (Eng.) Lunzer, M. A.; Manning, J. A.; Ockner, R. K. (Univ. California, Sch. Medicine, San Francisco, CA 94143). *J. Biol. Chem.* 252(15): 5483-5487; 1977.

The hypothesis that cytosolic proteins modulate the inhibition of rat liver acetyl-coenzyme A (acetyl-CoA) carboxylase by long chain acyl-CoA thioesters and fatty acids was tested. During Sephadex G-75 chromatography of rat liver 105,000 x *g* supernatant at 4 C, 59% of added $[^{14}C]$palmitoyl-CoA was hydrolyzed to $[^{14}C]$palmitic acid, reflecting thioesterase activity. However, both unhydrolyzed acyl-CoA and the free fatty acid were principally bound to the 12,000 dalton molecular weight fatty acid-binding protein (FABP) fraction. In experiments with the partially purified FABP fraction, both ligands bound to a limited number of sites and appeared to interact either competitively or through negative cooperativity. Partially purified rat liver acetyl-CoA carboxylase was inhibited 50% by 8 μM palmitoyl-CoA. FABP fraction in physiological concentrations enhanced the activity of acetyl-CoA carboxylase in the absence of added palmitoyl-CoA, and protected against palmitoyl-CoA inhibition of the enzyme. This protection was not attributable to thioesterase activity in the FABP preparation. The effect of oleate was also blocked by FABP fraction. Although albumin, whole cytosol, and other cytosolic fractions also protected against palmitoyl-CoA inhibition of acetyl-CoA carboxylase, the demonstrated preferential binding of inhibitors to the FABP fraction suggests that its protective effect may be relatively specific in the intact cell. These experiments support the concept that FABP may participate in the short-term regulation of lipogenesis by modulating the fatty acid and acyl-CoA inhibition of acetyl-CoA carboxylase activity. This mechanism appears to be analogous to the role of soluble polysaccharides in the modulation of fatty acid synthetase activity in Mycobacteria.

7418 RESPIRATORY ACTIVITIES OF HEPATOCYTES ISOLATED FROM RATS OF VARIOUS AGES. A BRIEF NOTE. (Eng.) Brouwer, A.; Van Bezooijen, C. F. A.; Knook, D. L. (Inst. Experimental Gerontology TNO, Lange Kleiweg 151, Rijswijk, Netherlands). *Mech. Ageing Dev.* 6(4):265-269; 1977.

Isolated liver parenchymal cells were used to study a possible decline in mitochondrial respiration, and an associated production of ATP in liver tissue with age. There were no age-related changes in the endogenous respiration of isolated rat hepatocytes. The ratio between the oxygen consumption of the isolated hepatocytes in the presence of an inhibitor of oxidative phosphorylation (50 μM atractyloside or 10 μg/ml oligomycin) and in the presence of an uncoupler (67 μM) was used as an estimation of the respiratory control ratio of mitochondria inside the isolated parenchymal cell. No significant age-related decline in the functional integrity of the mitochondria was detected.

7419 A COMPARISON BETWEEN THE MORPHOLOGIC CHANGES IN THE LIVERS OF HAMSTERS AND RATS AFTER GALACTOSAMINE TREATMENT AND THEIR CORRELATION WITH ALTERED SERUM TRANSAMINASE LEVELS. (Eng.) Pickering, R. W. (Roussel Lab., Kingfisher Drive, Covingham, Swindon, Wiltshire, England). *Arzneim. Forsch.* 27(II/9):1684-1687; 1977.

The morphologic changes in the livers of hamsters following i.p. galactosamine administration were compared with those in the livers of rats, and attempts to correlate these changes with alterations in serum transaminase levels were made. Galactosamine caused a dose-dependent increase in serum transaminase levels and an increase in the severity of liver damage score in rats. The type of damage seen after 1,500 mg/kg was predominantly submassive or massive necrosis. After 1,000 mg/kg, the predominant type of damage was focal necrosis, and after 500 mg/kg there was a mild acidophilic reaction in only 3 of 10 rats. In hamsters, all animals receiving 800 mg/kg galactosamine showed morphologic liver changes; these included submassive necrosis (1 animal), central necrosis (2), and focal necrosis locally in the periportal areas (7). Nine of 10 hamsters that received 400 mg/kg had a localized inflammatory response in the periportal region or a focal necrosis and inflammatory response in periportal region. A dose of 200 mg/kg caused no morphologic changes in hamsters. In rats receiving 1,500 mg/kg of galactosamine, the mean SGOT value was 1,893 ± 237 IU/l and the SGPT value was 1,163 ± 182 IU/l; the control levels were 54 ± 4 and 32 ± 2 IU/l, resp. In hamsters receiving 500 mg/kg of galactosamine, the mean SGOT and SGPT levels were 1,834 ± 722 and 1,612 ± 382 IU/l, resp. The results suggest that the type of damage seen in the livers of rats after galactosamine administration may be similar to that seen with human hepatitis, but the hamster exhibits a typical toxic hepatitis.

7420 MEASUREMENT OF THE BILIARY TREE VOLUME IN THE RAT UNDER Tm-CONDITIONS. (Eng.) Dammann, H. G. (I. Medical Clinic, Univ. Hamburg, Martinistrasse 52, D-2000 Hamburg, W. Germany). *Experientia* 33(8):1052-1054; 1977.

Biliary tree capacities were determined in Wistar rats under Tm-conditions (i.e., maximal tubular excretory capacity of the kidneys), using ^{35}S-BSP sodium, ^{35}S-BSP glutathione, and ^{14}C-taurocholate sodium as markers. The three agents (0.4 μmol/100 g) were injected i.v., and bile was collected in 20-sec periods up to 300 sec and in 30-sec periods up to 600 sec. The volume of the biliary capacity was calculated in two ways: the first method was based on the fact that the marker does not appear in bile as a flat concentration front, and the second method was based on the assumption that measurable radioactivity probably indicates the time of appearance of the injected dye in the left and right hepatic duct. The biliary tree capacities using ^{35}S-BSP glutathione, ^{14}C-taurocholate sodium, and ^{35}S-BSP sodium as test substances were calculated to be 69.7 ± 8.08 μl and 54.4 ± 5.25 μl, 73.2 ± 11.37 μl and 70.2 ± 11.78 μl, and 136.1 ± 16.82 μl and 115.1 ± 14.56 μl, resp., for the two methods and three substances. These values markedly exceed those reported previously. This difference may have been caused at least in part by a more homogenous distribution of the marker substance throughout the liver parenchyma in contrast to simple bolus injection studies.

7421 ^{125}I-TAN EXCRETION AND LIVER VISUALIZATION IN THE RAT. (Eng.) Pena, H. G.; Katz, J.; Watts, R. S. (Veterans Admin. Hosp., Albuquerque, NM). *Int. J. Nucl. Med. Biol.* 4(1):73-77; 1977.

The excretion of ^{125}I-toluene-azonapthol (TAN) was studied in the rat, and the potential use of this compound as a liver-scanning agent was evaluated. ^{125}I-TAN (20-25 μCi) was injected i.v. in eight male Holtzman rats. After 24 hr, 23% of the administered dose was present in the whole body, and after 9 days, only 5% remained. Excretion, chiefly urinary, was accomplished without the removal of the ^{125}I tag, as suggested by the small amount (2.69%) that appeared in the thyroid. Whole-body scans demonstrated the early hepatic and late intestinal and thyroid concentrations. The lung uptake was found to be 25% of the dose at 10 min.

7422 HEPATIC BINDING PROTEIN: THE PROTECTIVE ROLE OF ITS SIALIC ACID RESIDUES. (Eng.) Stockert, R. J.; Morell, A. G.; Scheinberg, I. H.

(Albert Einstein Coll. Medicine, Bronx, NY 10461). *Science* 197(4304):667-668; 1977.

The functional significance of sialyl residues of the hepatic plasma membrane glycoprotein was investigated. The progressive removal of sialyl residues from the hepatic binding protein (HBP) resulted in the complete abolition of the binding capacity of HBP for asialoorosomucoid; however, that for desialylated ovine submaxillary mucin (DOSM) was reduced by only 20%. This result suggests that the binding sites, which are the same for DOSM and asialoorosomucoid, are not the sialyl residues of HBP. The loss of binding capacity for asialoorosomucoid is probably the result of competition for the binding sites by galactosyl residues of HBP that become terminal after desialylation.

7423 AN AUTORADIOGRAPHIC STUDY OF THE ^{3}H-URIDINE AND ^{3}H-THYMIDINE INCORPORATION IN THE REGENERATING MOUSE LIVER. (Eng.) Lorup, C. (Inst. Zoophysiology, Univ. Lund, Helgonavagen 3b, S-223 62 Lund, Sweden). *Cell Tissue Kinet.* 10(5):477-485; 1977.

An autoradiographic study of the ^{3}H-uridine incorporation into RNA and DNA and ^{3}H-thymidine incorporation into DNA in the nucleus and cytoplasm of parenchymal cells was carried out in regenerating mouse liver after a pulse time of 2 hr. After a decreased uptake of ^{3}H-uridine into the parenchymal nucleus during the first 6 hr compared with the normal value, incorporation increased and was maximal at 36 hr; normal values were restored at 72 hr. The cytoplasmic labeling, after an initial small decrease, reached a maximum at 12 hr; this returned to normal 48 hr after hepatectomy. RNase-digestion of the liver sections left a small incorporation in both nucleus and cytoplasm, presumably DNA since it was removed by DNase treatment. This incorporation was maximal at 12 hr in the nucleus and at 24 hr in the cytoplasm. After RNase plus DNase treatment, somewhat <10% of the labeling persisted, presumably as incorporation into cell compounds other than nucleic acids. After ^{3}H-thymidine pulse, marked precursor uptake into DNA occurred about 24 hr after hepatectomy. This uptake was maximal at 48 hr and reached normal values at 72 hr. A small amount of incorporation of ^{3}H-thymidine into DNA was seen immediately after the operation, and this population of weakly labeled nuclei was still large 72 hr later.

7424 QUANTIFICATION OF TAURINE SYNTHESIS IN THE INTACT RAT AND CAT LIVER. (Eng.) Hardison, W. G. M.; Wood, C. A.; Proffitt, J. H. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *Proc. Soc. Exp. Biol. Med.* 155(1):55-58; 1977.

Total taurine synthesis was studied in isolated perfused rat and cat livers, and the relative importance of taurine synthesis from cystine sulfinic acid (CSA) and from inorganic sulfate was estimated. Rat livers, whether or not depleted of taurine by sodium cholate infusion, all synthesized taurine. Only three of six cat livers appeared to synthesize taurine at a low rate, and the negative mean synthesis rate was not significantly different from zero. Taurine specific activity fell substantially in all rat livers. The greater fall in rat livers infused with sodium cholate (mean decline 72%) than in livers not so infused (mean decline 40%) is probably the result of greater loss of ^{14}C-taurine as taurocholate in bile. The fall in taurine specific activity in the cat livers (mean decline 21%) suggested that taurine synthesis was occurring at a low rate, but this was not significant. The hepatic taurine synthesis rate from CSA was about twice as rapid in the rat as in the cat liver. About six times as much ^{14}C-CSA was decarboxylated, and about four times as much ^{14}C-CSA was converted to taurocholate per gram of liver in the rat as in the cat liver. These data suggest that taurine synthesis via the CSA decarboxylase pathway is more active in the rat than in the cat liver.

7425 ENHANCING EFFECTS OF PHENOBARBITONE AND BUTYLATED HYDROXYTOLUENE ON 2-ACETYLAMINOFLUORENE-INDUCED HEPATIC TUMORIGENESIS IN THE RAT. (Eng.) Peraino, C.; Fry, R. J. M.; Staffeldt, E.; Christopher, J. P. (Div. Biological and Medical Res., Argonne Natl. Lab., Argonne, IL 60439). *Food Cosmet. Toxicol.* 15(2):93-96; 1977.

The enhancing effects of 0.05% dietary phenobarbitone and of 0.5% dietary butylated hydroxytoluene (BHT) on hepatic tumorigenesis were compared in male Sprague-Dawley rats previously fed 0.02% 2-acetylaminofluorene in the diet for 18 days. Prolonged feeding of the BHT diet (for up to 407 days) produced a significant degree of enhancement (7% of controls had tumors, in comparison with 26% of BHT-treated rats, $p<0.001$); this enhancement, however, was both lower in magnitude and delayed in comparison with the enhancement produced by the phenobarbitone diet (62% had tumors). Daily phenobarbitone injections (83 mg/kg, i.p.) stimulated persistent liver enlargement and a transient fourfold increase in DNA synthesis over a 5-day period. Similar treatment with BHT (500 mg/kg) produced less pronounced liver enlargement after a delay of 1 day and did not stimulate DNA synthesis as did phenobarbitone. The results suggest that the dissimilar tumorigenic-enhancing abilities of BHT and phenobarbitone may result from differences in the effects of these agents on biochemical processes related to liver growth.

7426 SHORT-TERM AND PROLONGED TREATMENT WITH ORAL CONTRACEPTIVES AND LIVER FUNCTION. (Eng.) Kulcsar, A.; Kulcsar-Gergely, J. (Univ. Medical Sch., Debrecen 12, Hungary). *Arzneim. Forsch.* 27(II, 9):1694-1697; 1977.

The effects of progesterone and two synthetic progestogens, ethinodiol-diacetate and methylestrenolone, on liver functions were studied in female

Wistar rats. In acute experiments the animals were treated for the duration of one sexual cycle. All three compounds (10 mg/kg, s.c. for 4 consecutive days) prolonged the hexobarbital biotransformation time; this effect was reversible and normalized 48 hr after the end of treatment. Testosterone-induced microsomal mixed function oxidase activity remained at the level of controls after methylestrenolone pretreatment and was even higher in the ethinodiol-diacetate and progesterone-pretreated animals. Subacute and chronic treatment with the progestogens (total dose 60 mg/kg) for two or more sexual cycles resulted in the same slight inhibition of hexobarbital biotransformation. Chronic progesterone administration significantly prolonged the hexobarbital biotransformation time; this impairment was reversible. The results indicate that hexobarbital metabolism is moderately and transiently inhibited during short-term and prolonged progesterone and progestogen treatment. This effect is readily reversed by interrupting drug administration or inducing microsomal enzymes with testosterone.

7427 THE ASSOCIATION OF LYSOSOMAL ENZYMES WITH NUCLEI DURING ENZYME INDUCTION IN RAT LIVER. (Eng.)

Mak, I. T.; Wells, W. W. (Dept. Biochemistry, Michigan State Univ., East Lansing, MI 48824). *Arch. Biochem. Biophys.* 183(1):38-47; 1977.

The association of lysosomal enzymes with nuclei during enzyme induction was studied in the rat liver. Male Holtzman rats were fasted for 3 days and refed a diet high in carbohydrate (68.9%). The induction of liver glucose 6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase was monitored for up to 48 hr after refeeding. Induction occurred by 24 hr, and by 48 hr, 4.2- and 1.5-fold increases were observed for glucose 6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase, resp., compared with that of livers of pellet-fed rats. After refeeding, lysosomes increased in fragility as judged by an increased release of acid phosphatase activity during standard homogenization. Fragility was greatest 3 hr after refeeding, but normal fragility was observed 24 hr after refeeding. Nuclei isolated just before refeeding revealed small latent acid phosphatase activity (4-6%). After refeeding the carbohydrate-rich diet, a transient and significant ($p<0.01$) increase in the latent activity occurred that was maximal (20%) at 1 hr returning to normal by 24 hr. Cross-mixing the 800 x *g* nuclear pellet from livers of animals starved for 3 days with the 800 x *g* supernatant fraction from livers of animals refed the carbohydrate-containing diet did not alter the nuclear lysosomal-free (overt) or latent (detergent-released) enzyme activity. Similarly, mixing the 800 x *g* nuclear pellet from livers of animals refed for 1 hr with the 800 x *g* supernatant fraction from livers of animals starved for 3 days, but not refed, did not change the nuclear lysosomal-free or latent enzyme activity. Purified nuclei lost acid phosphatase activity, but those isolated from the livers of rats refed for 1 hr retained 10% of the enzyme latency, whereas all latency was lost from those isolated from uninduced rats. β-Galactosidase became associated with the nuclei with the same temporal pattern as for acid phosphatase. However, no variation in nuclear content of cytosolic lactate dehydrogenase occurred as a result of feeding the high-carbohydrate diet to starved rats. When similarly starved rats were refed a diet high in lipid and carbohydrate-free, no induction of glucose 6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase was observed. Lysosomes were not temporarily fragile, and purified nuclei did not exhibit increased latency of acid phosphatase activity. The results support the hypothesis that liver lysosomal enzymes participate in early signals in the induction of enzymes of lipogenesis.

7428 HEPATIC PATHWAYS OF ETHANOL AND ACETALDEHYDE METABOLISM AND THEIR ROLE IN THE PATHOGENESIS OF ALCOHOL-INDUCED LIVER INJURY. (Eng.)

Teschke, R.; Hasumura, Y.; Lieber, C. S. (2. Medizinische Universitatsklinik, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Nutr. Metab.* 21(Suppl. 1): 144-147; 1977.

To assess the role of various enzymes in ethanol metabolism of intact liver tissue, rat liver slices were incubated with 50 mM ethanol, and rates of ethanol disappearance were measured by gas liquid chromatography. In addition, hepatic pathways of ethanol and acetaldehyde metabolism and their role in the pathogenesis of alcohol-induced liver injury are reviewed. Compared with control incubations, the addition of the alcohol dehydrogenase (ADH) inhibitor, pyrazole (2 mM), failed to abolish ethanol metabolism and decreased the rates of ethanol oxidation by only 50%. Pretreatment of rats with the catalase inhibitor, 3-amino-1,2,4-triazole, abolished catalase activity in the liver, but had no inhibitory effect on the rates of ethanol metabolism in liver slices in the absence or presence of 2 mM pyrazole when compared with incubations carried out with liver slices of control rats. The pyrazole-insensitive, and therefore ADH-independent, ethanol oxidation in liver slices was decreased by 10 mM butanol, which is substrate and inhibitor of the microsomal ethanol oxidizing system (MEOS). These findings indicate that ethanol metabolism in intact liver tissue can be accounted for by ADH and by the MEOS, whereas, the role of catalase appears to be insignificant. Previous experiments have shown that chronic ethanol consumption results in a decreased capacity of mitochondria to metabolize acetaldehyde. It is concluded that hepatic injury due to chronic ethanol consumption can be attributed at least in part to increased levels of acetaldehyde.

7429 METABOLISM OF ETHANOL HYDROGEN IN MAMMALS. (Eng.)

Lundquist, F.; Grunnet, N.; Damgaard, S. E.; Thieden, H. I. D. (Dept. Biochemistry, Panum Inst., Blegdamsvej 3c, DK-2200, Copenhagen N., Denmark). *Trends Biochem. Sci.* 2(8):173-175; 1977.

The fate of the two carbon-bound hydrogen atoms in the primary alcohol group in ethanol is reviewed.

The metabolism of these two hydrogens is responsible for several metabolic changes seen in the liver after the consumption of even small quantities of ethanol, namely, a reduction in the rate of carbon dioxide formation (through the inhibition of the tricarboxylic acid cycle), an increase in the ratio of reduced to oxidized forms of a number of substrate couples, and, possibly, fat accumulation. Enzyme systems involved in ethanol metabolism (alcohol dehydrogenases, catalase, and hydroxylases or mixed function oxidases), different pathways for ethanol oxidation, intracellular localization of acetaldehyde oxidation, oxidation of cystolic NADH in the respiratory chain, and transhydrogenations and compartmentation of coenzymes and substrate pools are discussed.

7430 BILE ACID EXCRETION: THE ALTERNATE PATHWAY IN THE HAMSTER. (Eng.) Galeazzi, R.; Javitt, N. B. (New York Hosp.-Cornell Medical Center, New York, NY 10021). *J. Clin. Invest.* 60(3):693-701; 1977.

Esterification and urine excretion of bile acids were measured in hamsters to evaluate the importance of this pathway as a model for the study of human liver and biliary disease. Bile acids were quantitated by gas-liquid chromatography after formation of methyl ester acetate derivatives. To study bile acid pool size, ^{14}C-24-labeled bile acids were injected into the jugular vein and following bile duct ligation, bile was removed from the gallbladder and biliary tree 24 hr later. The total serum bile acid levels, 454 μg/ml at 24 hr, dropped to 73 μg/ml by 96 hr; bilirubin rose from 64 to 133 μg/ml during this time period. The aggregate of cholic acid (61-86%) and chenodeoxycholic acid (10-31%) was found to constitute 90% or more of the total serum bile acids. Bile acid concentration in the urine fell continuously with time. The total amount excreted in the urine (4.9-12.9 mg%) probably approximates the primary bile acid pool size, with cholic acid comprising 51-71%; deoxycholate was <11% of the total pool. The percentage of ester sulfates of each bile acid was always greater in urine than in serum. The percentage of ester sulfates in bile taken from the hepatic ducts proximal to the ligature at 96 hr was elevated compared to normal bile but appreciably lower than the quantity in urine. Concomitant bilateral renal pedicle and bile duct ligation produced very high serum bile acid concentrations containing a larger proportion of sulfated bile esters than found following bile duct occlusion alone. Thioacetamide (20 mg/100 g, i.p.) administered in two injections 24 hr apart led to large amounts of serum bile acids (31 μg/ml at 24 hr, 75 μg/ml at 96 hr); a similar regimen given to bile duct-ligated hamsters produced even greater increases. After the 24-hr thioacetamide treatment, serum cholic acid was not sulfated and serum chenodeoxycholate was 10-44% esterified. The thioacetamide-treated hamsters showed no difference in the percentage of sulfation of bile acids in urine, while the total bile acids in the urine was less when compared to the bile duct-obstructed animals. Bile acid excretion as ester sulfates is quantitatively important in the hamster and can serve as a model for studies applicable to humans.

7431 BEHAVIOUR OF ^{125}I-FIBRINOGEN AND ^{131}I-ALBUMIN IN EXPERIMENTAL GALACTOSAMINE-INDUCED HEPATITIS. (Eng.) Mahn, I.; Merkel, H.; Sattler, E. L.; Muller-Berghaus, G. (Section Clinical Immunology and Blood Transfusion, Justus Liebig Univ., Giessen, Germany). *Gut* 18(7):547-555; 1977.

To differentiate between faulty liver synthesis of coagulation factors and alterations of the coagulation components caused by disseminated intravascular coagulation, the turnover of ^{125}I-fibrinogen and ^{131}I-albumin was studied in the course of galactosamine-induced hepatitis in New Zealand rabbits. All animals were injected with ^{125}I-fibrinogen (20-30 μCi) and ^{131}I-albumin (20-30 μCi) 48 hr before the start of the studies. The rabbits (10-15 per group) were treated as follows: group A epsilon-aminocaproic acid (EACA) was injected (1 g/kg, i.v.) and galactosamine (1 g/kg) was consecutively infused for 30 min followed by continuous infusion of EACA (0.5 g/kg/hr); group B received a similar series except that heparin (1,500 U/kg) was injected before the EACA injection and then was continuously infused at 750 U/kg/hr; group C was given EACA in the same dosage as groups A and B; and group D received an isotonic saline infusion (6 ml/hr). Blood samples were removed at 0, 0.5, 4, 8, 12, and 24 hr. Histologic examination of galactosamine-treated rabbits showed foci of hepatic necrosis within all lobules. In group A rabbits only, fibrin-rich microclots were observed (7/12) in kidney glomerular capillaries. The ^{125}I-radioactivity was highest in group A organs except for the lung, which was similar to the other groups. The ^{131}I-radioactivity was distributed equally in all corresponding organs, except that lungs contained twice the activity of the kidneys, liver, or spleen. Partial thromboplastin time rose while prothrombin time and factor V activity fell in groups A and B as compared to groups C and D. Platelet count in group A dropped as compared to groups C and D; heparin (group B) did not alter this decrease, but it slowed the decrease in fibrinogen concentration noted in group B rabbits as compared to those in group A. The hematocrit and ^{131}I-albumin activity decreased equally in all groups. An acceleration of the ^{125}I-fibrinogen elimination from the plasma was observed between 8 and 12 hr after the start of galactosamine infusion. The elimination of ^{131}I-albumin in plasma as well as the distribution of ^{131}I-radioactivity in organs was similar in all rabbits independent of the treatment with galactosamine, EACA, or heparin. The results indicate that, in addition to diminished synthesis of coagulation factors, disseminated intravascular coagulation is involved in galactosamine-induced hepatitis and contributes to the hemostatic disorder. Heparin treatment in severe liver disease is of dubious value.

7432 INFLUENCE OF PHENOBARBITAL ON FACTORS RESPONSIBLE FOR HEPATIC CLEARANCE OF INDO-

CYANINE GREEN IN THE RAT: RELATIVE CONTRIBUTIONS OF INDUCTION AND ALTERED LIVER BLOOD FLOW. (Eng.) McDevitt, D. G.; Nies, A. S.; Wilkinson, G. R. (Dept. Therapeutics and Pharmacology, Queens Univ., Belfast, Northern Ireland). *Biochem. Pharmacol.* 26(13):1247-1250; 1977.

The influence of phenobarbital, 3,4-benzpyrene and 3-methylcholanthrene on indocyanine green (ICG) clearance was investigated in Sprague-Dawley rats. ICG clearance following rapid i.v. administration of 1, 10, and 50 mg/kg was dose-dependent, and pretreatment for 10 days with the inducing agents produced an increase in clearance only in the case of phenobarbital. All three inducers, when given in this manner, have been reported to produce equivalent increases in ligandin; consequently, this protein cannot be a major rate-limiting factor for hepatic ICG removal in the rat. Of the three inducing agents studied, only phenobarbital increases liver blood flow. The relative contribution of this change versus any increase in the liver's intrinsic ability to remove ICG was estimated using a perfusion-limited model of hepatic elimination. Although the influence of the altered flow decreased with increasing ICG dose, the changes in both flow and intrinsic clearance were directly proportional to the increase in liver mass produced by phenobarbital. It is concluded that the influence of phenobarbital on ICG clearance in the rat is due to a larger liver with a proportionate increase in blood flow and is not a consequence of the induction of any specific uptake protein.

7433 ROLE AND MECHANISM OF PERIPHERAL FATTY ACID MOBILIZATION IN 2-MERCAPTOETHANOL-INDUCED FATTY LIVER. (Eng.) Sabourault, D; Giudicelli, Y.; Nordmann, J.; Nordmann, R. (Laboratoire de Biochimie de la Faculte de Medecine de Paris-Ouest, 47, Boulevard de l'Hopital, 75013 Paris, France). *Lipids* 12(8):641-644; 1977.

To test the hypothesis that increased peripheral fat mobilization could be involved in 2-mercaptoethanol- and 2-mercaptoacetate-induced fatty liver, the effects of these two agents on lipolytic activity in rat adipose tissue were studied. The rate of free fatty acid release was enhanced 2.1-fold by 2 mM 2-mercaptoethanol and 2.4-fold by 2 mM 2-mercaptoacetate; the rate of glycerol release was unaffected by 2-mercaptoethanol but significantly increased by 2-mercaptoacetate. These results suggest that these compounds may reduce the free fatty acid re-esterification process in adipose tissue. The ATP level in adipose tissue incubated with 2-mercaptoethanol was depressed 54%, and that in tissue incubated with 2-mercaptoacetate was depressed 60%. When pyrazole was injected prior to 2-mercaptoethanol or 2-mercaptoacetate, the rise in blood free fatty acids occurring 3 or 8 hr after the treatment was almost completely prevented by 2-mercaptoethanol, whereas it was unaffected by 2-mercaptoacetate. Pyrazole reduced or completely abolished the increase in liver triacylglycerol found 3 or 8 hr after 2-mercaptoethanol administration, whereas it failed to affect the magnitude of the 2-mercaptoacetate-induced fatty liver. Lipolysis was studied in fat pads first exposed to 1 mM pyrazole and then incubated in the presence of 2 mM 2-mercaptoethanol or 2-mercaptoacetate. Preincubation with pyrazole resulted in the suppression of the stimulating effect of 2-mercaptoethanol on free fatty acid release; preincubation with pyrazole failed to alter the effects of 2-mercaptoacetate. The results indicate that the increase in free fatty acid mobilization from adipose tissue and the fatty liver induced by 2-mercaptoethanol are due to 2-mercaptoacetate or to one of its metabolites. 2-Mercaptoethanol appears to be oxidized *in vivo* by alcohol dehydrogenase.

7434 CHRONIC COPPER POISONING IN SHEEP. III. THE DISTRIBUTION OF SOLUBLE COPPER- AND ZINC-BINDING LIVER PROTEINS OF LAMBS COMPARED WITH ADULT SHEEP. (Eng.) Soli, N. E.; Froslie, A.; Norheim, G. (Veterinary Coll. Norway, P.O. Box 8146, Dep., Oslo 1, Norway). *Acta Pharmacol. Toxicol.* 40 (5):570-574; 1977.

The distribution of copper- and zinc-binding proteins among soluble hepatic proteins was studied by gel filtration in newborn lambs of one normal ewe and one ewe with chronic copper poisoning. For the normal ewe and her lamb, the copper-binding proteins were separated into three different fractions; the mean molecular weights of these were 64,000 daltons (fraction I), 30,000-35,000 daltons (fraction II), and 8,000-10,000 daltons (fraction III). In these two animals, and in the ewe with copper poisoning, fraction I was the main fraction. In the remaining lamb, fraction III was the dominant one. This lamb had the highest liver copper concentration of all the animals, and a significantly higher amount of copper was found in fraction III, compared with that in the normal lamb. The main zinc-binding fractions in the normal ewe and her lamb corresponded well to fraction I and II with regard to the copper-binding proteins. No zinc was found in the fraction corresponding to fraction III in any of the samples, but a fraction with a molecular weight less than 1,500 daltons was present in all the samples. A high molecular weight (45,000-50,000 daltons) zinc-binding fraction was found in the normal ewe. The percentage of extractable copper for both lambs and ewes fell when the copper concentration in the liver increased. The high copper concentration in the liver of this lamb indicates that a placental transfer and accumulation of copper is possible in sheep.

7435 PORPHYRIN INDUCTION: EQUIVALENT EFFECTS OF 5αH AND 5βH STEROIDS IN CHICK EMBRYO LIVER CELLS. (Eng.) Stephens, J. K.; Fischer, P. W. F.; Marks, G. S. (Dept. Pharmacology, Queen's Univ., Kingston, Ontario, Canada). *Science* 197(4304):659-660; 1977.

The potency of 5αH and 5βH steroids in inducing δ-aminolevulinic acid (ALA) synthetase and porphyrin accumulation was investigated in chick embryo liver cells maintained in serum-free medium. The porphyrin-inducing activities of 5α-pregnane-3,20-dione and of

5α-androstane-3α-ol-17-one did not differ from those of their respective epimers at any of the doses tested (1, 3, and 10 μg/ml). The porphyrin-inducing activities of 5α-androstane-3,17-dione and of 5α-pregnane-3β-ol-20-one did not differ from those of their respective epimers, thus strengthening the conclusion that there is no difference between the porphyrin-inducing activity of 5αH and 5βH epimers. The ALA synthetase-inducing activities of 5α-pregnane-3,20-dione, 5α-pregnane-3α-ol-20-one, and 5α-androstane-3,17-dione (3, 10, and 30 μg/ml) did not differ from those of their respective epimers except in the case of the α-pregnane epimers at doses of 30 μg/ml. The β-pregnane epimers were devoid of activity at this dose because of a direct toxicity to chick embryo liver cells. The results show that there is no steric requirement for activity in steroids in the systems investigated.

7436 PHARMACOLOGY OF CHENODEOXYCHOLIC ACID. I. PHARMACEUTICAL PROPERTIES. (Eng.) van Berge-Henegouwen, G. P.; Hofmann, A. F.; Gaginella, T. S. (Nijmegen Univ. Medical Sch., Nijmegen, Netherlands). *Gastroenterology* 73(2):291-299; 1977.

Chemical and physical properties of eight different commercial preparations of chenodeoxycholic (chenic) acid were defined to provide background information for subsequent bioavailability studies. All samples had high chemical purity by gas-liquid chromatography and by enzymatic analysis, but samples differed considerably in crystal morphology when examined by scanning electron and light microscopy. Only two samples were crystalline by X-ray diffraction, and these two samples had unequivocal endotherms by differential thermal analysis. In buffer, chenic acid showed low equilibrium solubility (less than 0.1 mM) at pH 6, but solubility increased strikingly above pH 6.8. In a miscellar solution simulating intestinal content during digestion, solubility was higher than in buffer below pH 6 and then increased markedly above pH 6.2. When the rate of dissolution of chenic acid in simulated intestinal content was characterized, all of the samples, with the exception of one that was composed of large crystals by microscopy, dissolved rapidly, with most samples showing greater than 90% dissolution by 15 min. After milling, the sample that originally did not dissolve rapidly also dissolved rapidly. It is concluded that pure chenic acid, irrespective of its crystal habit, should dissolve rapidly in intestinal content provided its particle size is small.

7437 CHANGE IN BILE COMPOSITION DURING GALLSTONE FORMATION IN GERBILS. (Eng.) van der Linden, W.; Bergman, F. (Dept. Pathology I, Lasarettet, Umea, Sweden). *Z. Ernahrungswiss.* 16(2): 115-119; 1977.

Changes in bile composition were studied during experimentally induced cholesterol gallstone formation in gerbils. Thirty-eight animals received a diet containing 1% cholesterol and 0.5% cholic acid, and 28 controls received a normal diet. Bile samples were assayed for cholesterol, bile acid, and phospholipid content after 1 or 3 months on the diet. After 1 month on the lithogenic diet, the percentage of biliary cholesterol was 9.83 ± 0.74%, while that in the controls was 4.97 ± 0.36% ($p<0.01$). After 3 months on the experimental diet, gallstones began to appear in the gerbils, and the changes in their bile composition became more pronounced. The cholesterol fraction was 21.86 ± 2.52% in the experimental animals, and the bile acid fraction had decreased from 83.41 ± 2.24% at 1 month to 71.70 ± 2.52% at 3 months; the control level was 89.30 ± 0.70%. There was also a decrease in the bile acid: phospholipid ratio; the ratio was 17.10 in controls, compared with 15.77 after 1 month and 12.89 after 3 months in animals on the experimental diet. The results show that changes in bile composition on a lithogenic diet are essentially due to a change in the relationship between cholesterol and bile acids.

7438 ENZYME ACTIVITIES OF LIVER PLASMA MEMBRANE IN RAT BILE AFTER THE INTRABILIARY RETROGRADE INFUSION OF TRITON X-100. (Eng.) Nakae, H.; Shiomi, Y.; Muranishi, S. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida-shimoadachi-cho, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(6):1447-1449; 1977.

To determine whether a part of the bile canalicular site of the liver plasma membrane is solubilized by Triton X-100 treatment, the bile protein concentration and the activities of three bile canalicular enzymes (alkaline phosphatase, 5'-nucleotidase, and adenosine triphosphatase) were determined in rat liver plasma membrane after the retrograde infusion of a 4% Triton X-100 solution. The protein concentration in bile was increased by a factor of five by the treatment, and this increased level lasted for at least 6 hr without diminution (5.3 ± 2.3 mg/ml before treatment, 24.5 ± 4.0 mg/ml 6 hr after treatment). The activities of all three enzymes were also elevated and were not decreased for 6 hr. The alkaline phosphatase activity was elevated by a factor of 8, and the activities of the other enzymes by 1.5 to 3. The results show that part of the bile canalicular site of the liver plasma membrane is solubilized by the treatment.

7439 PATHOGENESIS OF ALCOHOL-INDUCED ACCUMULATION OF PROTEIN IN THE LIVER. (Eng.) Baraona, E.; Leo, M. A.; Borowsky, S. A.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY 10468). *J. Clin. Invest.* 60(3):546-554; 1977.

The mechanism of protein accumulation in the livers of male weanling CD rats fed diets containing 36% of calories as ethanol was studied to determine the role of increased anabolism and decreased catabolism of liver proteins. L-[^{14}C]leucine (325 mCi/mmol) was injected into the dorsal penile vein, to study the incorporation of label with time, using 0.3-, 1-, 2.5-, 5-, 7.5-, 10-, 30-, 45-, 90-, and 120-min injection intervals before sacrifice. Microtubule concentration was measured by the binding of ^{3}H-cholchicine to free tubulin. When control and ethanol-fed animals were compared, ethanol feeding lowered body weight by 9.4% ($p<0.001$), and increased liver weight (9.72 ± 0.47 g versus 8.47 ± 0.36 g, $p<0.01$), total liver lipids (145 ± 10 to 302 ± 35 mg/100 g, $p<0.01$), and total liver proteins (from 573 ± 23 to 706 ± 40 mg/100 g, $p<0.01$), whereas total liver DNA was similar in both groups of rats. Liver histology revealed hepatocytes with significantly larger areas in ethanol-fed animals than in the control animals. After correcting for recovery and plasma protein contamination, transferrin and albumin concentrations increased in total, microsomal, and cytosol liver extracts after alcohol feeding. Albumin and transferrin showed greater increases per 100 g body weight than per g liver weight due to the hepatomegaly caused by alcohol treatment. Liver ferritin decreased in concentration after ethanol ingestion (0.33 ± 0.03 versus 0.40 ± 0.02 mg/g liver, $p<0.03$). Ethanol-fed rats had a higher serum leucine concentration (235 ± 16 nmol/ml versus 133 ± 17 nmol/ml, $p<0.001$), a higher liver concentration of free leucine (273 ± 32 nmol/g versus 153 ± 15 nmol/g, $p<0.02$), and a lower specific activity of leucyl-t-RNA. Proalbumin contained over 90% of the radioactivity. The radioactive leucine content was maximal in liver proteins by 10 min, and the computed rate of total liver protein synthesis was higher in ethanol-fed rats than in controls (22.4 versus 14.5 mg/hr/100 g). The appearance of radioactivity in serum albumin was delayed, and total tubulin but not free tubulin in liver cytosol was decreased significantly in ethanol-fed rats compared to controls. The results suggest that ethanol feeding may induce changes in liver microtubules leading to protein accumulation with concomitantly elevated protein synthesis in response to lower plasma protein levels.

7440 ACTION OF MICROBIAL FLORA OF THE DIGESTIVE TRACT ON CHOLIC ACID BIOSYNTHESIS IN THE RAT.

(Fre.) Sacquet, E.; Mejean, C.; Leprince, C.; Riottot, M. (Laboratoire des Animaux sans Germes du CNRS, au CNRZ, Jouy-en-Josas, 78350, France). *Biochim. Biophys. Acta* 499(1):67-72; 1977.

The percentage of cholic acid in the feces of axenic rats and the percentage of cholic acid and bacterial metabolites in the feces of holoxenic rats were compared. Male Fisher rats were fed a semisynthetic diet (220 g casein, 580 g cornstarch, 90 g corn oil, 50 g cellulose, plus vitamins, and minerals) containing radioactively labeled 2,4-cholic acid (^{3}H-CA) and 24-chenodeoxycholic acid (^{14}C-CDA) according to three experimental protocols. (1) Four axenic rats were given 100,000 disintegrations/minute (dpm) ^{3}H-CA and 20,000 dpm ^{14}C-CDA per gram of food for 3 weeks, and feces were collected during the third week. (2) Three holoxenic rats were given 180,000 dpm ^{3}H-CA and 14,800 dpm ^{14}C-CDA per gram of food, and feces were collected 12-15 days after introduction of the acids. (3) Three holoxenic rats were given 630,000 dpm ^{3}H-CA and 20,000 dpm ^{14}C-CDA. A second group of three holoxenic rats received 311,000 dpm ^{3}H-CA and 20,000 dpm ^{14}C-CDA. A significant ($p<0.001$) difference was observed in the excretion of ^{3}H-CA by axenic and holoxenic rats (2.5 ± 0.32 and 4.3 ± 0.19 µmol/100 g body weight, resp.) and in the excretion of ^{14}C-CDA (4.9 ± 0.71 and 7.5 ± 0.33 µmol/100 g body weight, resp.). However, the total amount of 12alpha-hydroxylated bile acids expressed as percentage of total biliary acids excreted and corrected for loss of ^{3}H by bacterial metabolism was similar for axenic and holoxenic rats (33.8% and 36.4%-38.3%, resp.), demonstrating that intestinal microflora only slightly modify 12alpha-hydroxylated bile acid synthesis.

7441 TIME SEQUENCE OF CHANGES IN HEPATIC FATTY ACID SYNTHESIS IN RATS MEAL-FED POLYUNSATURATED FATTY ACIDS.

(Eng.) Clarke, S. D.; Romsos, D. R.; Leveille, G. A. (Johns Hopkins Univ., Sch. Hygiene and Public Health, 615 North Wolfe St., Baltimore, MD 21205). *J. Nutr.* 107(8):1468-1476; 1977.

Male Sprague-Dawley rats were fed daily meals containing methyl esters of palmitate ($C_{16:0}$), stearate ($C_{18:0}$), linoleate ($C_{18:3}$), and linolenate ($C_{18:2}$) to determine the influence of these fatty acids on glucokinase and fatty acid synthetase activities and on *in vivo* rates of fatty acid synthesis in the liver. The addition of 7% $C_{16:0}$ or 3% $C_{18:3}$ to a fat-free basal diet did not alter the rate at which the diet was removed from the stomach and small intestine. The consumption of eight meals containing $C_{18:2}$ significantly reduced hepatic fatty acid synthetase activity and *in vivo* rates of fatty acid synthesis by 40%, but did not alter glucokinase activity. At least three meals containing $C_{18:2}$ or $C_{18:3}$ were required to inhibit hepatic fatty acid synthesis. Conversely, after rats consumed $C_{18:2}$, more than two meals of a fat-free diet were required to increase hepatic rates of fatty acid synthesis. Dietary $C_{16:0}$ and $C_{18:0}$ did not alter the rates of hepatic fatty acid synthesis. Glucokinase was not influenced by any of the methyl esters. The results suggest that polyunsaturated fatty acids can specifically influence hepatic fatty acid synthesis and fatty acid synthetase activity without altering glucokinase activity, and that meal-fed rats must consume at least three meals containing polyunsaturated fatty acids before hepatic fatty acid synthesis or fatty acid synthetase activity is altered.

7442 EFFECT OF MATERNAL ETHANOL CONSUMPTION ON FOETAL AND NEONATAL RAT HEPATIC PROTEIN SYNTHESIS.

(Eng.) Rawat, A. K. (Alcohol Res. Center Medical Coll. Ohio, Toledo, OH 43614). *Biochem. J.* 160(3):653-661; 1976.

The effects of maternal ethanol consumption on the rates of protein synthesis were investigated in the livers of fetal and neonatal rats both *in vivo* and *in vitro*; the effects of ethanol consumption on the activities of enzymes involved in protein synthesis and degradation were also studied. The rates of general protein synthesis by ribosomes *in vitro*, studied by measuring the incorporation of [^{14}C]leucine into ribosomal protein, showed that maternal consumption of 6% (volume/volume) ethanol for 2 weeks resulted in an inhibition of the rates of protein synthesis by both fetal and neonatal livers. The rates of incorporation of i.v. injected [^{14}C]-leucine into hepatic proteins were also significantly lower in the fetal, neonatal, and adult livers from the ethanol-fed group (68 ± 6, 100 ± 8, and 76 ± 5 pmol/30 min/mg protein, resp., versus 108 ± 6, 152 ± 10, and 120 ± 10 pmol/30 min/mg, resp., in controls; $p<0.001$, $p<0.01$, and $p<0.001$, resp.). Incubation of adult rat liver slices with ethanol resulted in an inhibition of the incorporation of [^{14}C]leucine into hepatic proteins; however, this effect was not observed in the fetal liver slices. This effect of externally added ethanol was at least partially prevented by the addition of 2 mM pyrazole to the adult liver slices. Pyrazole addition to fetal liver slices was without significant effect on the rates of protein synthesis. Cross-mixing experiments showed that the capacity of both hepatic ribosomes and pH 5 enzyme fractions to synthesize proteins was decreased in the fetal liver from the ethanol-fed group. Maternal ethanol consumption resulted in a decrease in hepatic total RNA content, RNA/DNA ratio, and ribosomal protein content in the fetal liver. Fetal hepatic DNA content was not significantly affected. Ethanol consumption resulted in a significant decrease in proteolytic activity and the activity of tryptophan oxygenase in the fetal, neonatal, and adult livers. The mechanisms of inhibition of protein synthesis observed here in the fetal liver after maternal ethanol consumption may be responsible for at least some of the changes observed in "fetal alcohol syndrome."

7443 TAUROLITHOCHOLATE INHIBITS TAUROCHOLATE UPTAKE BY ISOLATED HEPATOCYTES AT LOW CONCENTRATIONS. (Eng.) Schwenk, M.; Schwarz, L. R.; Greim, H. (Gesellschaft fur Strahlen- und Umweltforschung, Munchen, Abteilung fur Toxikologie, D-8042 Neuherberg, W. Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(2):175-179; 1977.

The inhibitory effect of taurolithocholate on bile acid transport was studied in isolated rat hepatocytes. A Lineweaver-Burk plot showed that taurolithocholate inhibits taurocholate uptake by isolated liver cells noncompetitively. Inhibition was instantaneous and inversely related to the cell number in the incubation mixture. The K_i was 7 μM in the presence of 2 mg cellular protein/ml. Secretion of taurocholate by isolated liver cells was not affected by taurolithocholate up to a concentration of 50 μM. This result indicates a difference between the carrier for taurocholate uptake and the carrier for taurocholate secretion. Inhibition of bile acid uptake by liver cells may be involved in the pathogenesis of lithocholate-induced cholestasis.

7444 REGULATION OF PALMITATE METABOLISM BY CARNITINE AND GLUCAGON IN HEPATOCYTES ISOLATED FROM FASTED AND CARBOHYDRATE REFED RATS. (Eng.) Christiansen, R. Z. (Inst. Medical Biochemistry, Univ. Oslo, Oslo, Karl Johansgt. 47, Norway). *Biochim. Biophys. Acta* 488(2):249-262; 1977.

The effect of glucagon was compared with that of carnitine on the partitioning of fatty acids between oxidation and esterification in isolated liver cells from fasted and fasted-carbohydrate refed Wistar rats. Glucagon stimulated the oxidation of palmitate in the liver cells isolated from carbohydrate-refed rats and incubated in a simple salt medium. The maximal stimulation was observed at a glucagon concentration of 4×10^{-8} M and was noticeable after 5 min of incubation. The stimulation of the oxidation was balanced mainly by the inhibition of triacylglycerol synthesis. The extent of stimulation was not dependent on the concentration of intracellular carnitine, but was decreased at higher concentrations of palmitate in the medium. Glucagon had no significant effect on palmitate metabolism in the cells isolated from fasted rats. It seems probable that those cells are isolated in the activated state as far as it concerns their capacity to oxidize fatty acids. Under optimal conditions (in the presence of glucagon and an excess of carnitine), the refed cells (cells isolated from livers of rats fasted for 48 hr, and refed with carbohydrate for 48 hr) oxidized palmitate at approximately the same rate as fasted cells (cells isolated from livers of rats fasted for 48 hr). However, the refed cells still differed from fasted cells in that they required a much higher intracellular carnitine concentration and a higher palmitate concentration in the medium to reach the maximal level of oxidation. Carnitine decreased the intramitochondrial redox potential in the refed cells, which indicated more specific stimulation of β-oxidation. Glucagon increased the redox potential under all conditions used. Glucagon slightly stimulated carnitine transport into the cells and acetylcarnitine formation, and had a very pronounced stimulatory effect on the synthesis of long-chain acylcarnitines in refed cells. The level of total long-chain acyl coenzyme A (acyl-CoA) was increased by glucagon in refed cells. Carnitine increased the level of total long-chain acyl-CoA in fasted cells. It seems probable that, in the presence of glucagon, the extramitochondrial acyl-CoA level is increased, which may indicate direct inhibition of the triacylglycerol synthesizing enzymes. It is concluded that glucagon acts at least in part at one of the early stages in fatty acid metabolism, i.e., carnitine acyltransferase and/or glycerophosphate acyltransferase.

7445 THE INTERACTION OF QUATERNARY AMMONIUM COMPOUNDS WITH BILE SALTS. I. THE INTERACTION OF DODECYLTRIMETHYLAMMONIUM BROMIDE WITH SODIUM DEOXYCHOLATE. (Eng.) Kellaway, I. W.; Marriott, C. (Dept. Pharmacy, Univ. Nottingham, University Park, Nottingham, NG7 2RD, England). *Can. J. Pharm. Sci.* 12(3):70-73; 1977.

The interaction of dodecyltrimethylammonium bromide (C_{12}TAB) with sodium deoxycholate was investigated.

Although the interaction was examined in dilute solutions at an interface, the primary consideration was given to the bile salt concentrations above the critical micelle concentration, as bile salts exist in a micellar state in the gastrointestinal tract. C_{12}TAB was found to condense surface films of sodium deoxycholate. The critical micelle concentration of sodium deoxycholate was lowered in the presence of C_{12}TAB due to charge neutralization and "salting out" effects. The observed increase in micellar weight and dissymmetry may be explained in terms of mixed micelle formation. This hypothesis was confirmed by measuring the release of bound counter ions when C_{12}TAB was added to sodium deoxycholate.

7446 DIFFERENTIAL ACTIVATION OF RAT LIVER METHIONINE ADENOSYLTRANSFERASE ISOZYMES BY DIMETHYLSULFOXIDE. (Eng.) Hoffman, J. L.; Kunz, G. L. (Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Biochem. Biophys. Res. Commun.* 77(4): 1231-1236; 1977.

The differential activation of rat liver methionine adenosyltransferase (MAT) isozymes by dimethyl sulfoxide (DMSO) is reported. At a concentration of 10%, DMSO stimulated one isozyme of rat liver MAT 50- to 70-fold when the assay was performed at a low (25 μM) methionine concentration. A second liver isozyme was stimulated only 1.5-fold. The more strongly stimulated liver isozyme eluted from diethylaminoethylcellulose and from Sephadex G-150 later than the less-sensitive (higher molecular weight) form. When rat liver, heart, brain, and kidney tissues were surveyed using DMSO activation of MAT in crude homogenates, only liver appeared to have the DMSO-activated isozyme. The ratio of DMSO-stimulated MAT activity/control MAT activity for rat liver tissue was 5.60, compared with ratios of 0.77, 0.58, and 0.75 for the heart, brain, and kidney, resp. Thus, the latter three tissues showed slight inhibition of MAT activity after DMSO treatment. The above results indicate that DMSO activation provides a simple test for determining the relative distribution of liver MAT isozymes.

7447 THE BIOCHEMISTRY OF THE REGENERATING LIVER. (Eng.) Lewan, L.; Yngner, T.; Engelbrecht, C. (Inst. Zoophysiology, Univ. Lund, Lund, Sweden). *Int. J. Biochem.* 8(7):477-487; 1977.

After partial hepatectomy, the remaining liver cells are rapidly depleted of glycogen and protein storage products, but they enlarge mainly because of accumulation of water and lipids. Protein and RNA metabolism change in order to initiate DNA synthesis and mitotic activity in the quiescent cells of the adult liver within 24 hr. The DNA concentration decreases during the prereplicative phase of liver regeneration because of the enlargement of the liver cells. DNA and RNA concentrations reach maximum levels after the wave of proliferation but before the accumulation of storage products. The protein concentration in the liver decreases by about 20% during the first day after partial hepatectomy and is not restored until 10-14 days thereafter, when liver regeneration is completed. Falling levels of serum albumin and blood glucose after partial hepatectomy show that the regenerating liver is unable to fulfill the secretory function of an intact liver. The factors initiating and regulating the regenerative growth of the liver after partial hepatectomy remain obscure.

7448 THE EFFECTS OF CHOLECYSTECTOMY ON THE BILE SALT POOL OF THE SYRIAN HAMSTER. (Eng.) Beher, W. T.; Lin, G. J.; Stradnieks, S.; Konde, W. N.; Rajan, K. S. (Henry Ford Hosp., 2799 W. Grand Blvd., Detriot, MI 48202). *Digestion* 15(4):338-347; 1977.

To clarify some aspects of cholecystectomy (CC), the half-life, distribution, size, and composition of the bile salt pool size was determined in intact and cholecystectomized Syrian hamsters. CC had no effect on the half-life of either the cholate or chenodeoxycholate pool. CC resulted in a significant ($p < 0.01$) shift in the distribution of bile salts from the gallbladder to the small intestine in fed animals. Fasting in intact hamsters resulted in a shift of bile salts ($p < 0.01$) from the small intestine, cecum, and liver to the gallbladder. However, even after a 48-hr fast, the small intestine contained 25.8% of the pool. In CC animals, fasting resulted in moderate but significant ($p < 0.01$) shifts of bile salts from the liver and small intestine to the cecum. CC had no significant effect on the size of the total bile salt pool in fed hamsters. The size of this pool was the same in fed and fasted intact hamsters; however, fasting in cholecystectomized hamsters resulted in a large decrease (37% to 66%, $p < 0.01$) in the pool. There was no significant difference in the bile salt pool composition of intact and cholecystectomized hamsters. Hamsters converted deoxycholate to cholate efficiently (78.3% to 91.6%), and the bile salts were recycled enterohepatically without dietary stimuli.

7449 STUDIES ON INCREASED BILE FORMATION PRODUCED BY POLYOXYBENZENES IN RATS. (Eng.) Tanayama, S.; Kanai, Y. (Medicinal Res. Lab., Takeda Chemical Industries, Ltd., Juso, Yodogawa-ku, Osaka 532, Japan). *Jpn. J. Pharmacol.* 27(1):71-78; 1977.

7450 HEPATIC CITRATE CHANGES IN SURGICAL STRESS. (Eng.) Costello, L. C.; Fadika, G.; Stacey, R. (Coll. Medicine, Howard Univ., Washington, DC 20059). *J. Surg. Res.* 22(2):92-96; 1977.

7451 TANNIC ACID: ACUTE HEPATOTOXICITY FOLLOWING ADMINISTRATION BY FEEDING TUBE. (Eng.) Oler, A.; Neal, M. W.; Mitchell, E. K. (Dept. Pathology, State Univ. New York, Syracuse, NY 13210). *Food Cosmet. Toxicol.* 14(6):565-569; 1976.

7452 CHANGES IN HEPATIC FATTY ACID DEGRADATION AND BLOOD LIPID AND KETONE BODY CONTENT

DURING DEVELOPMENT OF THE RAT. (Eng.) Foster, P. C.; Bailey, E. (Dept. Biochemistry, Univ. Sheffield, Sheffield S10 2TN, England). *Enzyme* 21(5):397-407; 1976.

7453 EFFECT OF ACUTE EXPERIMENTAL UREMIA ON THE STABILITY OF LIVER LYSOSOMAL MEMBRANES. (Eng.) Rodrigues, L. E. A.; Martinelli, R. P.; Cruz, I.; Rocha, H. (Inst. Health Sciences, Salvador, Bahia, Brazil). *Nephron* 18(2):88-92; 1977.

7454 HEPATIC EFFECTS OF SOME [4-CHLORO-6-(2,3-XYLIDINO)-2-PYRIMIDINYLTHIO] ACETIC ACID (WY-14,643) ANALOGS IN THE MOUSE. (Eng.) Reddy, J. K.; Moody, D. E.; Azarnoff, D. L.; Tomarelli, R. M. (Northwestern Univ. Medical Sch., 303 E. Chicago Ave., Chicago, IL 60611). *Arch. Int. Pharmacodyn.* 225(1):51-57; 1977.

7455 CELL-BIOLOGICAL ASPECTS OF THE UPTAKE OF ^{99m}TECHNETIUM-ANTIMONY-SULPHIDE COLLOID BY RAT LIVER CELLS [Abstract]. (Eng.) Wisse, E.; van 't Noordende, J. M.; van der Heide, D.; Pauwels, E. K. J.; Ruiter, D. J.; Daems, W. T. (Lab. Electron Microscopy, Univ. Leiden, Leiden, Netherlands). *Ultramicroscopy* 2(1):139-140; 1976.

7456 FEED-BACK RELATIONSHIP IN THE CLINICAL AND EXPERIMENTAL PHARMACOLOGY OF LIVER PROTECTING DRUGS. (Eng.) Timar, M. (Inst. Pharmaceutical Chemistry, Vitan 112, Bucharest, Rumania). *Farmaco [Prat.]* 32(4):197-200; 1977.

7457 TEMPERATURE-DEPENDENCE OF STRESS-INDUCED HEPATIC AUTOPHAGY. (Eng.) Salas, M.; Tuchweber, B.; Kourounakis, P.; Selye, H. (Institut de Medecine, Universite de Montreal, Montreal, Quebec H3C 3J7, Canada). *Experientia* 33(5):612-614; 1977.

7458 STIMULATION OF HEPATIC LIPOGENESIS BY EICOSA-5,8,11,14-TETRAYNOIC ACID IN MICE FED A HIGH LINOLEATE DIET. (Eng.) Abraham, S.; McGrath, H.; Rao, G. A. (Children's Hosp. Medical Center of Northern California, Oakland, CA 94609). *Lipids* 12(5):446-449; 1977.

7459 DIET AND BILE ACID METABOLISM. (Eng.) Low-Beer, T. S. (No affiliation given). *Clin. Gastroenterol.* 6(1):165-178; 1977.

7460 REGULATION OF NITROGEN CATABOLIC ENZYMES IN CHICK LIVER--EFFECTS OF AMINO ACIDS. (Eng.) Fisher, J. R.; Stewart, T. A.; Wu, J. M.; Nickels, J. S.; High, J. A. (Dept. Chemistry, Florida State Univ., Tallahassee, FL 32306). *Enzyme* 21(5):385-396; 1976.

7461 OBSERVATIONS ON THE FINE STRUCTURE, CYTOCHEMISTRY, AND KINETICS OF SINUSOIDAL LINING CELLS IN NEONATAL AND FETAL RAT LIVER [Abstract]. (Eng.) Naito, M.; Wisse, E. (Fukushima Medical Coll., Japan). *Ultramicroscopy* 2(1):131-132; 1976.

7462 THE SOLUBILITY OF ^{85}KRYPTON IN THE REGENERATING LIVER OF THE RAT. (Eng.) Mathie, R. T.; Leiberman, D. P.; Harper, A. M.; Blumgart, L. H. (Royal Infirmary, Glasgow G4 0SF, Scotland). *Br. J. Exp. Pathol.* 58(3):231-235; 1977.

7463 BILIARY CONJUGATED METABOLITES OF ESTRIOL IN THE RAT. (Eng.) Nambara, T.; Kawarada, Y. (Pharmaceutical Inst., Tohoku Univ., Aobayama, Sendai, Japan). *Chem. Pharm. Bull.* 25(5):942-948; 1977.

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7467 Schistosoma mansoni: ACQUIRED IMMUNITY IN MICE AND HAMSTERS USING ANTIGENS OF Fasciola hepatica. (Eng.) Hillyer, G. V.; del Llano de Diaz, A.; Reyes, C. N. (Dept. Biology, Univ. Puerto Rico, Rio Piedras 00931, Puerto Rico). *Exp. Parasitol.* 42(2):348-355; 1977.

7468 AGGRAVATION OF INJURY TO LIVER LYSOSOMES OF RATS WITH CCl_4 HEPATITIS BY PRELIMINARY PROLONGED ADMINISTRATION OF CHLORPROMAZINE. (Eng.) Korolenko, T. A.; Tsilli, E. I.; Rusova, T. V.; Tsytsorina, T. N.; Yakobson, G. S. (Novosibirsk Medical Inst., Novosibirsk, USSR). *Bull. Exp. Biol. Med.* 83(1):43-46; 1977.

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7481 THE BINDING OF ESTROGENS IN THE LIVER OF THE RAT: DEMONSTRATION AND ENDOCRINE INFLUENCES. (Eng.) Beers, P. C.; Rosner, W. (Roosevelt Hosp., New York, NY). *J. Steroid Biochem.* 8(4):251-258; 1977.

7482 IN VIVO FATTY ACID UTILIZATION OF THE DOG ABDOMINAL ORGANS: UPTAKE AND METABOLISM OF [1-^{14}C]-PALMITIC ACID IN THE DOG LIVER. (Eng.) Miura, Y.; Hisaki, H.; Ueta, N.; Mieno, H.; Noguchi, T.; Hasebe, M.; Shikata, J. (Teikyo Univ. Sch. Medicine, Kaga, Itabashi-ku, Tokyo 173, Japan). *Jpn. J. Exp. Med.* 47(2):99-107; 1977.

See also, 7291, 7292, 7293, 7294, 7338, 7485, 7512, 7515, 7518, 7520, 7659, 7743, 7744, 7746, 7750, 7752, 7754, 7777, 7803, 7805, 7811, 7831, 7848.

SECRETION AND METABOLISM

Intestine

7483 PERFUSION OF RABBIT COLON WITH RICINOLEIC ACID: DOSE-RELATED MUCOSAL INJURY, FLUID SECRETION, AND INCREASED PERMEABILITY. (Eng.) Gaginella, T. S.; Chadwick, V. S.; Debongnie, J. C.;

Lewis, J. C.; Phillips, S. F. (Coll. Pharmacy, Ohio State Univ., Columbus, OH 43210). *Gastroenterology* 73(1):95-101; 1977.

The effect of varying doses of ricinoleic acid perfused into rabbit colon was studied by measuring DNA recovery, fluid secretion, and changes in permeability and by electron microscopic observation of mucosal damage. The isolated colon of male New Zealand white rabbits that were anesthetized after fasting for 48 hr was perfused with 2.5, 5.0, 7.5, or 10 mM solutions of ricinoleic acid or a control solution buffered to pH 8 and with an osmolality of 294 mOsm/kg. Samples of effluents were collected 20 min after initiation of perfusion. DNA loss into the intestinal lumen increased with higher doses of ricinoleic acid. A dose-related increase in fluid secretion was observed with mucus in the effluent when the ricinoleate concentration was above 5 mM. Mucosal permeability increased with increasing concentration of ricinoleic acid as measured by the lumen to plasma flux of low molecular weight polyethylene glycols and the blood to lumen clearance of urea and creatinine. Ultrastructural study of colon samples from killed rabbits showed desquamation of surface epithelial cells after perfusion with ricinoleate but not after control solutions. The effects observed may explain the laxative action of ricinoleic acid, the active ingredient of castor oil.

7484 CYTOTOXICITY OF RICINOLEIC ACID (CASTOR OIL) AND OTHER INTESTINAL SECRETAGOGUES ON ISOLATED INTESTINAL EPITHELIAL CELLS. (Eng.) Gaginella, T. S.; Haddad, A. C.; Go, V. L. W.; Phillips, S. F. (Coll. Pharmacy, Ohio State Univ., Columbus, OH 43120). *J. Pharmacol. Exp. Ther.* 201 (1):259-266; 1977.

Epithelial cells were isolated from hamster small intestine and used to measure cytotoxicity *in vitro* of substances with laxative properties known to stimulate intestinal fluid secretion and to produce mucosal damage *in vivo*. The compounds included ricinoleic acid, dioctyl sodium sulfosuccinate, oleic acid, sodium deoxycholate, and sodium cholate. Cytotoxicity was assessed by (a) exclusion of trypan blue, (b) release of intracellular (prelabeled) ^{51}Cr, and (c) inhibition of cellular uptake of 3-*O*-methylglucose. Ricinoleate produced a dose-dependent (0.1-2.0 mM) cytotoxicity as assessed by all three methods. Oleic acid was less potent. The dihydroxy bile acid, deoxycholate, was equipotent with ricinoleate but its trihydroxy congener, cholate, was less potent. Dioctyl sodium sulfosuccinate had cytotoxicity similar in magnitude to that of ricinoleate and deoxycholate. The cytotoxicity of these agents to isolated cells may be related to their secretory potential *in vivo*, their abilities to produce structural change at the mucosal surface, and their laxative properties.

7485 CHARACTERIZATION OF BILE ACID BINDING TO RAT INTESTINAL BRUSH BORDER MEMBRANES. (Eng.) Wilson, F. A.: Treanor, L. L. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *J. Membr. Biol.* 33 (3/4):213-230; 1977.

The binding of bile acids to intestinal brush border membranes was characterized in rats. Total ^{14}C-taurodeoxycholate binding was similar for brush borders prepared from jejunum and ileum, linear with respect to monomer concentration, uninhibited by a structural analog, and not depressed by boiling or trypsin. A linear relationship existed between binding and the number of hydrogen bonds formed by a bile acid, and the slope of the line corresponded to $\delta \Delta F$ of 300 cal/mol. The binding of bile acids to the 105,000 x g supernatant fraction of sonicated brush borders was similar to the binding of phospholipid liposomes using gel chromatography. These data suggest that the kinetics and characteristics of binding of bile acid to ileal brush borders do not reflect the kinetics and characteristics of active ileal transport previously obtained in whole tissue preparations, but instead reflect those of passive jejunal transport. They also suggest that a determinant of binding is hydrogen bonding with water, that isolated intact brush borders are relatively polar membranes, and that binding to solubilized brush borders may represent partitioning between the aqueous phase and membrane lipid.

7486 THE EFFECT OF FATTY ACID PERFUSION ON INTESTINAL ALKALINE PHOSPHATASE. I. STUDIES ON MAN. (Eng.) Linscheer, W. G.; Malagelada, J. R.; Stolbach, L. L.; Fishman, W. H. (Veterans Admin. Hosp., 800 Irving Ave., Syracuse, NY 13210). *Am. J. Dig. Dis.* 22(6):509-515; 1977.

In 15 healthy subjects (13 men, 2 women) the release of intestinal alkaline phosphatase (IAP), sucrase, and glycylglycine dipeptidase (GD) into the lumen of an isolated segment of the small intestine was measured during fatty acid (FA) perfusion. The small intestine was isolated by a four-lumen, two-balloon tube technique and perfused with a control solution of sodium taurocholate (NaTC) or micellar solutions of FA (C8:0, C12:0, C18:1) in NaTC. Histochemical studies were performed on jejunal biopsies taken from six patients who had undergone Billroth II gastric resection to observe enzymes before and after perfusion with oleic acid (C18). In the healthy subjects, IAP release into bowel juice correlated directly with carbon-chain length of the FA in the perfusate. Sucrase concentration in bowel juice also increased during perfusion with C18:1 and C12:0, but not to the same extent as the IAP increase. GD release was negligible. In the six previously resected patients, IAP was observed by histochemical study of the jejunum to move from the brush border and Golgi region to the mucosal surface and lymph vessels after oleic acid perfusion. When staining for IAP and lipid was combined, it was found that enzyme activity was located in the same areas as fat particles. IAP probably moves from the brush border of the intestinal mucosa into the mucosal lymphatics via the same anatomical pathway as the long-chain triglycerides.

7487 THE EFFECT OF FATTY ACID PERFUSION ON INTESTINAL ALKALINE PHOSPHATASE. II. STUDIES ON THE RAT.

(Eng.) Malagelada, J. R.; Linscheer, W. G.; Fishman, W. H. (Mayo Clinic, Rochester, MI 55901). *Am. J. Dig. Dis.* 22(6): 516-523; 1977.

The translocation of intestinal alkaline phosphatase (IAP) and sucrase (S) in response to perfusion of intestinal loops with a wide range of fatty acids of different carbon chain lengths was studied in male Wistar rats. Perfusion solutions included a control solvent solution of sodium taurocholate (NaTC), a reference fatty acid solution of C18:1 in NaTC, and solutions containing either C16:1, C12:0, C8:0, or C6:0 in NaTC. Each of two adjoining loops of the proximal small intestine were perfused simultaneously with three solutions in random order. Fatty acid solutions induced the release of more enzyme into the intestinal lumen than did NaTC alone, and the relationship between enzyme release and fatty acid chain length was exponential. Histochemical studies of the intestinal mucosa before perfusion and after perfusion with NaTC or octanoic acid (C8) showed IAP in the brush border and Golgi region of the epithelial cells of the villi and crypts. After perfusion with oleic acid (C18), enzyme activity was markedly decreased in the brush border and Golgi region and was observed instead in small granules in the lumen of the intestine. Particles with high IAP activity were located in the same area as fat particles. The data indicate that IAP is associated with intestinal absorption of fat.

7488 SYNTHESIS OF COLLAGEN BY SMOOTH MUSCLE IN THE HYPERTROPHIC INTESTINE.

(Eng.) Gabella, G.; Yamey, A. (Dept. Anatomy, Univ. Coll. London, Gower St., London, England). *Q. J. Exp. Physiol.* 62(3):257-264; 1977.

Changes in the collagen content and concentration in the hypertrophic intestine of male guinea pigs were studied. The 50-mm segments of small intestine, at the oral side of an experimental stenosis, did not increase in length but underwent a sevenfold increase in weight. Segment weights ranged between 360 and 450 mg in the control intestine and about 3,250 mg in the experimental intestine. Collagen content was increased concomitantly; this increase was usually larger than the weight increase, and, therefore, the concentration of collagen is also increased. Total hydroxyproline content per 50-mm segment ranged from 190 to 620 µg in control animals from 1,150 to 5,500 µg in the hypertrophic intestine proximal to the stenosis. The hydroxyproline concentration (µg/mg wet weight) in segments along the length of the hypertrophic gut was greater than that in corresponding segments of control gut. The ratio of the increase in weight of collagen to that of non-collagenous material was greater in the longitudinal muscle than in the wall as a whole. Smooth sarcoplasmic reticulum was observed in control and hypertrophic smooth muscle cells. Cisternae of rough sarcoplasmic reticulum were more common in the hypertrophic muscle cells. It is suggested that some of the collagen is synthesized by the smooth muscle cells in the hypertrophic intestine.

7489 EX VIVO VASCULAR PERFUSION OF THE ISOLATED RAT SMALL BOWEL. IMPORTANCE OF THE INTESTINAL BRUSH BORDER ENZYME-RELEASE IN BASAL CONDITIONS.

(Eng.) Eloy, R.; Raul F.; Pousse, A.; Mirhom, R.; Anana, A.; Grenier, J. F. (Unite 61 de l'Inserm, Av. Moliere, 67200 Strasbourg/Hautepierre, France). *Eur. Surg. Res.* 9(2):96-112; 1977.

A technique for perfusion of the whole isolated intestine of the rat with homologous nondiluted blood is described. The intestinal enzyme and protein release, the hemodynamic vascular perfusion conditions, mechanical and electrical activities, and histological features of the *ex vivo* perfused rat intestine were compared with those of the intact intestine studied in anesthetized rats. No significant differences were noted in the two preparations except for the output of the intestinal brush border enzymes (sucrase, alkaline phosphatase, leucine aminopeptidase, and enterokinase) within the intestinal lumen. The intestinal enzyme output during *in vivo* experiments was usually constant or decreased slowly throughout the 2.5-hr perfusion. In the *ex vivo* 3-hr perfusion, enzyme output (except for alkaline phosphatase) and concentration increased. The early increase of intraluminal sucrase after only 95 min of perfusion indicates subcellular damage not detectable by other viability tests. It is suggested that release of brush border enzymes might be used as a criterion of function in intestinal preparations.

7490 IMMUNOFLUORESCENT LOCALISATION OF ENTEROKINASE IN HUMAN SMALL INTESTINE.

(Eng.) Hermon-Taylor, J.; Perrin, J.; Grant, D. A. W.; Appleyard, A.; Bubel, M.; Magee, A. I. (St. George's Hosp. Medical Sch., London SW17 0QT, England). *Gut* 18(4):259-265; 1977.

The distribution of enterokinase in human intestine was studied in operative mucosal biopsies using specific antiserum to human enterokinase that had been purified previously to apparent homogeneity by affinity chromatography and immunoabsorption. Fluorescence was observed in the brush border microvilli and glycocalyx of the intestinal epithelium in the duodenum and in the proximal 15 cm of jejunum distal to the duodenojejunal flexure. Fluorescence was maximal in the apical parts of the villi. The distal jejunum and ileum as well as the stomach and colon were consistently negative. Brunner's glands and goblet cells were never stained by specific antibody. Preliminary evidence was obtained that the human enterokinase molecule contains a specific antigenic determinant in its polypeptide component and a second determinant in the oligosaccharide moiety that cross-reacts with blood group A. Mucosal synthesis of enterokinase may be impaired in jaundice due to carcinoma of the pancreas and induced in the small intestine distal to the normal limit of synthesis after pancreaticoduodenectomy.

7491 PHOSPHATE-DEPENDENT GLUTAMINASE OF SMALL INTESTINE: LOCALIZATION AND ROLE IN INTESTINAL GLUTAMINE METABOLISM.

(Eng.) Pinkus, L. M.; Windmueller, H. G. (Nassau County Medical Center, East Meadow, NY 11554). *Arch. Biochem. Biophys.* 182(2):506-517; 1977.

The major glutamine-utilizing enzyme in the intestine, L-glutamine amidohydrolase, was identified and studied in detail. A highly active phosphate-dependent glutaminase was found in the mucosal epithelium of rats, dogs, cats, hamsters, rabbits, and monkeys (1.6-5.3 μmol/hr/mg of protein). The activity was lower in the mucosal epithelium of guinea pigs and chickens (0.3-1.4 μmol/hr/mg of protein). The net uptake of glutamine by intestine was greatest in those animals with the highest blood glutamine concentration and tissue glutaminase activity. The specific activity of the enzyme was similar in mucosa of rat duodenum, jejunum, and ileum (3.5-4.2 μmol/hr/mg of protein), but was less in rat stomach, cecum and colon (0.5-1.0 μmol/hr/mg of protein). The enzyme was found in both villus and crypt cells and was associated with mitochondria (57 to 66%). Though the enzyme appears similar in many respects to the phosphate-dependent glutaminase of kidney and brain, unlike the kidney enzyme, its activity was not induced during acidosis. The glutamine analogs, L-2-amino-4-oxo-5-chloropentanoic acid (chloroketone) and 6-diazo-5-oxo-L-norleucine (DON) caused an almost complete, irreversible inhibition of the enzyme activity *in vitro* (1-6% of control) and *in vivo*. Glutamine (100 mM) protected 50-60% of the activity against inhibition. Chloroketone administered luminally into a rat jejunal segment *in situ* resulted in 50% inhibition of glutaminase activity and totally inhibited the hydrolysis of glutamine subsequently absorbed from the lumen, however, the hydrolysis of glutamine taken up from arterial blood was not affected. DON administered arterially inhibited glutaminase almost completely and inhibited the hydrolysis of both luminal and arterial glutamine. It is suggested that metabolism of glutamine to glutamate occurs in mitochondria of both villus and crypt cells and that phosphate-dependent glutaminase in the major glutamine-utilizing enzyme of small intestine.

7492 IMMUNOCHEMICAL STUDIES ON THE SUBUNITS OF RABBIT-INTESTINAL SUCRASE-ISOMALTASE COMPLEX.

(Eng.) Takesue, Y.; Tamura, R.; Nishi, Y. (Res. Inst. Environmental Medicine, Nagoya Univ., Chikusa-ku, Nagoya, Aichi 464, Japan). *Biochim. Biophys. Acta* 483(2):375-385; 1977.

Antibodies specific for sucrase and isomaltase were prepared, and their effects on the enzyme activities and on the agglutination of microvillous vesicles were studied. Purified sucrase-isomaltase complex solubilized by papain from rabbit intestine was dissociated by citraconylation into its subunits, sucrase (specific activity 11.5 U/mg protein, recovery 23.5%) and isomaltase (specific activity 1.49 U/mg protein, recovery 18.5%). These subunits were then isolated in an immunologically and enzymatically active form by affinity chromatography on Sephadex G-200 and by gel filtration on Bio-gel P-300. Antibodies against the purified complex inhibited isomaltase but not sucrase and formed precipitation lines, crossing each other, with isolated sucrase and isomaltase, showing that the two enzymes differ in antigenicity from each other. By absorbing the antibodies with isolated sucrase and isomaltase, antibodies specific for isomaltase and sucrase, resp., were obtained. Similar to the original antibodies, both of the specific antibodies quantitatively agglutinated microvillous vesicles. Sucrase was not inhibited by either of the antibodies, whereas isomaltase was greatly inhibited by the isomaltase-specific antibodies, but not by the sucrase-specific types. The agglutination and inhibition curves of enzyme activity (sucrase or isomaltase) for trypsinized microvillous vesicles were the same as those for the control vesicles. The results indicate that the sucrase moiety is bound to the membrane through the isomaltase moiety.

7493 TRIGLYCERIDE EMULSIFICATION BY AMPHIPATHS PRESENT IN THE INTESTINAL LUMEN DURING DIGESTION OF FAT.

(Eng.) Linthorst, J. M.; Clark, S. B.; Holt, P. R. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10027). *J. Colloid Interface Sci.* 60(1):1-10; 1977.

The emulsification of long-chain triglycerides may be an important preliminary step in overall intestinal fat absorption. To investigate this possibility, the capacity of amphipaths (bile salts, phosphatidylcholine, monolein, and oleic acid) normally present in the intestine for triglyceride emulsification was studied with the use of triolein as the test triglyceride. The triolein-amphipath mixtures were placed in tubes attached to a rack that turned at 60 revolutions/min, a rate that results in very low shear forces. The emulsions produced were studied for stability, particle size, and surface and interfacial tension. The bile salts sodium taurocholate, sodium glycodeoxycholate and glycochenodeoxycholate formed emulsions of low stability. Phosphatidylcholine and sodium oleate, at concentrations similar to those in the small intestine, produced emulsions of great stability. Monolein, a highly effective emulsifier under other physical conditions (sonication, homogenization), failed to emulsify triolein under low shear force. Addition of taurocholate to all other single amphipaths except for monolein resulted in a reduced emulsification of triolein. The combination of taurocholate and monolein, however, resulted in a spectacular increase in the quantity of triolein emulsified. The experiment indicates that at the usual pH of the small intestinal lumen (6.5), monoglyceride, fatty acid, and bile salt monomers interact to reduce the interfacial tension of an oil, allowing emulsification under conditions of low shear force.

7494 PURIFICATION OF HISTAMINE RECEPTOR (III): CHARACTERIZATION OF RECEPTOR RICH MEMBRANE FRACTION OF SMALL INTESTINAL SMOOTH MUSCLE OF

THE CAT. (Eng.) Uchida, M.; Takagi, K. (Dept. Molecular Pharmacology, Meiji Coll. Pharmacy, Setagaya-ku, Tokyo 154, Japan). *Jpn. J. Pharmacol.* 27(1):1-7; 1977.

The localization of specific histamine receptors was studied by investigating the distribution of marker enzymes in the receptor-rich subcellular fractions of the longitudinal smooth muscle of the feline small intestine. Histamine receptors were assayed by quantitation of the difference in binding of ^{14}C-dibenamine (4×10^{-6} M, 20 min at 37 C) alone, and in the presence of diphenydramine (10^{-6} M), which specifically blocks the receptor. A membrane enriched fraction (50,000 x *g*) at the top (1.1 g/cm^3) of a sucrose gradient was found to contain the highest ^{14}C-dibenamine binding activity (0.71 ± 0.06 nmol bound to receptors/mg protein) of all the fractions tested. This fraction was also enriched with the marker enzymes 5'-nucleotidase; true cholinesterase; Mg^{2+}-dependent ATPase; Na$^+$-, K$^+$-, Mg^{2+}-dependent ATPase; and Ca^{2+}-, Mg^{2+}-dependent ATPase, indicating that it consisted primarily of plasma membranes. Mitochondria-associated enzymes such as succinic dehydrogenase and cytochrome c oxidase were largely absent from the plasma membrane fraction. Lysosomal contamination (acid phosphatase) was negligible in the histamine receptor fraction. The overall chemical composition of the receptor-enriched fraction was protein (58.7%), phospholipid (30.8%), and cholesterol (6.7%) with traces of RNA (2.8%), hexosamine, and sialic acid (<1% each). Phosphatidylcholine comprised about 48.2% of the phospholipids. These results demonstrate that histamine receptors in the small intestinal smooth muscle of the cat are located on the cell membrane.

7495 IDENTIFICATION AND CHARACTERIZATION OF INTRINSIC FACTOR AND COBALOPHILIN FROM PIG ILEAL AND PYLORIC MUCOSA. (Eng.) Marcoullis, G.; Grasbeck, R.; Salonen, E. M. (Minerva Foundation Inst. Medical Res., P.O. Box 819, 00101 Helsinki 10, Finland). *Biochim. Biophys. Acta* 497(3):663-672; 1977.

Intrinsic factor and cobalophilin were isolated from pig ileal and pyloric mucosa and characterized. Ileal mucosa bound about 240 ng vitamin B_{12}/g and contained two vitamin B_{12}-binding proteins. One was highly active in the Schilling test, behaved immunologically as intrinsic factor, and was responsible for about half of the total vitamin B_{12}-binding capacity. The other binder was identified as cobalophilin (R-protein). Immunochemical purification of these proteins from pig ileum and pylorus was performed, and the molecular characteristics (sedimentation and diffusion coefficients, Stokes radii, frictional ratios, and molecular weights) of their vitamin B_{12} complexes were estimated. Isoelectric focusing revealed differences between the ileal and pyloric intrinsic factors but not between the cobalophilins. The mean isoelectric points of the pyloric and ileal intrinsic factors were pH 5.79 and 5.30, resp., whereas the corresponding figures for the cobalophilins were 4.13 and 4.10. The results of this and previous studies demonstrate that some intrinsic factor uncomplexed with vitamin B_{12} exists in the ileum of both man and pig.

7496 RAT INTESTINAL GLYCOLIPIDS. III. FATTY ACIDS AND LONG CHAIN BASES OF GLYCOLIPIDS FROM VILLOUS AND CRYPT CELLS. (Eng.) Bouhours, J. F.; Glickman, R. M. (Unite de Recherche de Physiopathologie Digestive, Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Biochim. Biophys. Acta* 487:51-60; 1977.

The fatty acids and long chain bases of the three major rat intestinal glycolipids (glucosylceramide, hematoside, and trihexosylceramide) were extracted and structurally identified to elucidate the differences between differentiated villus and immature crypt cells and the pathways of glycolipid biosynthesis. The glucosylceramide and the hematoside contained one part of normal for two parts of hydroxy fatty acids, while a reverse ratio was found in the trihexosylceramide. In villus cells, hydroxy fatty acids comprised approximately two-thirds of the total fatty acids in the glucosylceramide and hematoside and approximately one-third of the fatty acids in the trihexosylceramide. Behenic acid, the major fatty acid, comprised 18-22% of the nonhydroxy fatty acid weight of the villus glycolipids. In trihexosylceramide, arachidic acid and behenic acid were equally abundant. Trihexosylceramide contained about twice as much hydroxyarachidic acid as the other two major glycolipids. In glucosylceramide and hematoside, about 40% of the hydroxy fatty acids and 25% of the total fatty acids were hydroxylignoceric and hydroxynervonic acids. Thus, the glucosylceramide and hematoside of villus cells are similar, having a high proportion and similar distribution of hydroxy fatty acids, whereas the trihexosylceramide contains chiefly nonhydroxylated fatty acids plus large amounts of arachidic and hydroxyarachidic acids. Crypt cell glycolipids contained more arachidic and hydroxyarachidic acid than did villus cells, while villus cells glycolipids contained a higher proportion of oleic: stearic acid than crypt cells. Phytosphingosine formed 63-73% of the long chain bases in both villus and crypt cells. These results suggest that the hematoside and glucosylceramide may share a precursor, while trihexosylceramide may have a different lactosylceramide precursor. The significance of these results and their relationship to results from previous studies are discussed.

7497 THE INTESTINE AS A SOURCE OF APOLIPOPROTEIN A_1. (Eng.) Glickman, R. M.; Green, P. H. R. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY 10032). *Proc. Natl. Acad. Sci. USA* 74(6):2569-2573; 1977.

The major apoprotein of CD strain rat mesenteric lymph chylomicrons was isolated and shown to be identical to apoprotein A_1 (apo A_1) isolated from serum high density lipoprotein (HDL). During intestinal lipid absorption, active synthesis of apo A_1 was demonstrated by radioactive amino acid incorporation into lymph chylomicron A_1 as well as lymph HDL.

Immunofluorescence studies of intestinal epithelium demonstrated a marked increase in apo A_1 fluorescence, confirming an active synthesis of this apoprotein during lipid absorption. Quantitative immunoelectrophoresis was used to measure apo A_1 in lymph and peripheral blood during various conditions designed to estimate the quantitative importance of intestinal apo A_1 relative to the levels of circulating lipoproteins. The proportion of lymph apo A_1 associated with lymph lipoproteins of density less than 1.006 g/ml increased from a basal level of 15.7 ± 1.9% to 46.2 ± 3.7% during lipid feeding. Thus, whereas in basal lymph most apo A_1 (84.5 ± 2.0%) was in the lipoproteins of density greater than 1.006 g/ml, lipid feeding caused a redistribution of lymph apo A_1 such that almost equal amounts of apo A_1 were found in the two different density fractions of lipoproteins. Biliary diversion, designed to eliminate intestinal lipoproteins of density less than 1.006 g/ml, resulted in a significant ($p<0.005$) decrease in serum apo A_1 levels from 51.6 ± 2.2 mg/100 ml to 42.6 ± 1.8 mg/100 ml. Plasma apo A_1 levels in nonlymph-diverted rats were significantly ($p<0.005$) increased by lipid feeding from 52.3 ± 2.1 mg/100 ml to 56.6 ± 2.0 mg/100 ml. The results indicate that the intestine actively synthesizes apo A_1 and is a significant source of this apoprotein for circulating lipoproteins.

7498 INTERACTIONS OF INTESTINAL LYMPH FLOW AND SECRETION. (Eng.) Granger, D. N.; Mortillaro, N. A.; Taylor, A. E. (Univ. Mississippi Sch. Medicine, Jackson, MS 39216). *Am. J. Physiol.* 232(1):E13-E18; 1977.

Isolated, vascularly perfused, cat ileal preparations were used to study the relationship between lymph flow and intestinal secretion under three experimental conditions: (1) decreased plasma colloid osmotic pressure induced by steady i.v. infusion of Tyrode solution (2.5 ml/min/kg), (2) rapid increase of intestinal venous pressure to 30 mm Hg, (3) exposure to cholera toxin solution (10 g/100 ml) for 1-2 hr. Lymph flow was measured in a large lymphatic vessel emerging from the mesenteric pedicle. Intestinal fluid was collected from an outflow cannula placed in the intestinal lumen, and it was assumed to represent secreted fluid. Under condition 1, peak lymph flow (38 times that of controls) occurred 60-90 min after the start of the Tyrode infusion. Lymph flow then decreased precipitously, accompanied by a rapid increase in intestinal secretion. Under condition 2, lymph flow peaked at 20 times that of controls within 10 min; it then diminished, accompanied again by increased intestinal secretion. Under condition 3, intestinal secretion increased but did not correlate with increase in lymph flow.

7499 INTESTINAL ASSIMILATION OF A TETRAPEPTIDE IN THE RAT: OBLIGATE FUNCTION OF BRUSH BORDER AMINOPEPTIDASE. (Eng.) Smithson, K. W.; Gray, G. M. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *J. Clin. Invest.* 60(3):665-674; 1977.

The intestinal assimilation of a mixed peptide, Gly-L-Leu-Gly-Gly, was studied using specific inhibitors of both peptide transport and the amino-oligopeptidases. Rat jejunum was used for *in vitro* gut sac and *in vivo* perfusion experiments with Gly-L-Leu-Gly-Gly (2 mM) as the test substrate. The tetrapeptide disappeared rapidly from the test solution (20 μmol/S/cm^2 *in vitro*; 17 μmol/S/cm^2 *in vivo*) by sequential removal of amino acid residues from the *N*-terminus to yield amino acids (glycine and leucine) and the C-terminal dipeptide (Gly-Gly). In gut sac experiments, 61-100% of these hydrolysis products appeared in the incubation medium and the remainder, in the tissue. Only small amounts (<39%) of hydrolytic products were found within the intestinal lumen *in vivo*. Gly-L-Pro (10 mM), a peptide known to be transported intact, failed to inhibit Gly-L-Leu-Gly-Gly disappearance, suggesting that the tetrapeptide does not use the intact transport mechanism. Hypoxic conditions (N_2 atmosphere) *in vitro* markedly inhibited ($p<0.005$) transport of glucose, leucine, and Gly-Gly but failed to impair Gly-L-Leu-Gly-Gly disappearance. Thus, hydrolysis of tetrapeptide does not depend on prior transport of the peptide and it does not occur by enzyme free in the medium. Disappearance of the tetrapeptide was blocked completely ($p<0.001$) by L-leucyl-β-naphthylamide (10 mM), a specific substrate for brush border aminopeptidase, and by the phthalimido derivative of L-leucine bromoethyl ketone, a potent peptidase inhibitor. Therefore, the amino-oligopeptidase at the intestinal surface appears to be essential for the initial stages of assimilation of this model tetrapeptide. Since intestinal surface digestion may be crucial to the assimilation of many peptide nutrients, it may be possible to identify patients with intestinal symptoms caused by a genetic defect in the brush border amino-oligopeptidase.

7500 THE EFFECT OF A SINGLE INJECTION OF HYDROXYUREA ON CELL POPULATION KINETICS IN THE SMALL BOWEL MUCOSA OF THE RAT. (Eng.) Al-Dewachi, H. S.; Wright, N. A.; Appleton, D. R.; Watson, A. J. (Dept. Pathology, Univ. Mosul, Mosul, Iraq). *Cell Tissue Kinet.* 10(3):203-213; 1977.

The effects of hydroxyurea (HU) on cell population kinetics in the rat jejunal crypt were studied by administering single i.p. injections (1,840 mg/kg) of HU to male Wistar rats. ^{3}H-thymidine (0.5 μCi/g, i.p., single injection) was given to some animals 1 hr prior to sacrifice and sections of the small bowel were then examined for histological changes; labeling and mitotic indices, the distribution of labeled and mitotic cells, and column count during the period 1-48 hr post-HU. Degenerative changes, localized in the proliferative portion of the crypt, were first observed 2 hr after HU administration, peaked at 7 hr, and were no longer apparent by 24 hr. The labeling and mitotic indices fell to zero by 1 and 3 hr after HU administration, resp. The cell number/crypt column fell from a control value of 32 ± 0.2 to 28.6 ± 0.2 by 10 hr after HU. After 10 hr, mitotic indices and the cell number rose rapidly to 40% and 8%, resp. (slightly higher than control values), by 20 hr and fell to control values by 30 and 32 hr post-HU, resp. At 10 hr, the percent of labeled cells was lowest (0-5%) at the most basal and the highest cell positions, and about 35% in the proliferative region of the crypt (control level was about 60%). By 13 hr, the labeling index in the proliferative zone had increased to 78% and reached a maximum of 80% by 20 hr. A second group of rats were given single i.p. injections of ^{3}H-thymidine (0.5 μCi/g) 15 hr post-HU; the fraction of labeled mitoses in axial sections of crypts was measured to determine the mean cycle times at various crypt cell positions for the next 28 hr. The mean cell cycle time for the whole crypt was 9.6 hr as compared with a control value of 11.3 hr; the change was due chiefly to the halving of the time of cell cycle phase G1. A third group of rats was given 1 mg/kg vincristine sulfate (VS) at 15 hr or 20 hr post-HU; the numbers and positions of mitotic nuclei were quantified in axially sectioned crypts every 15 min for 2.5 hr following versus administration. At 15 hr, there was an increase in cell birth rate in the basal portion of the crypt with smaller values in the proliferative compartment and a second peak at cell positions 13-17; by 20 hr, cell birth rates were high throughout the proliferative compartment. The mechanism of action of HU is discussed. The results suggest that basal crypt cells, which were not as severely affected by HU due to their normally long cell cycle times, were responsible for the repopulation of the damaged proliferative cell region.

7501 COMPENSATION BY THE RESIDUAL INTESTINE AFTER INTESTINAL RESECTION IN THE RAT. I. INFLUENCE OF AMOUNT OF TISSUE REMOVED. (Eng.) Hanson, W. R.; Osborne, J. W.; Sharp, J. G. (Div. Biological and Medical Res., Argonne Natl. Lab., Argonne, IL 60439). *Gastroenterology* 72(4):692-700; 1977.

To determine whether there is a pattern to the adaptive response seen in residual intestine following increasing amounts of intestinal resection, several cell kinetic parameters were investigated in the residual intestine 30 days after the resection of 10-80% of the mid-small intestine (excluding the duodenum) in male Holtzman rats. The degree of intestinal response increased in a stepwise fashion as the amount of tissue removed was increased. The response involved marked increases in DNA synthesis per crypt (expressed as disintegrations per minute of tritium and reflecting [^{3}H]thymidine incorporation), cells per crypt column, ^{3}H-labeled cells per crypt column, cells per villus column, and thickness of all intestinal wall components. These changes occurred throughout the small intestine even at lesser resections. "Crypt profiles" reflected changes in cell counts, but when the labeling frequency of proliferative cells was expressed as a percentage of the total crypt height, there was no change. The total number of crypts in the duodenum remained unchanged and the total number of crypts in the residual jejunum plus ileum decreased proportionally to the amount of tissue removed. Intestinal compensation occurs by increasing the size of the structures present in the residual intestine, not by increasing the number of structural units.

7502 INFLUENCE OF THE THYROID HORMONE ON THE MATURATION OF THE SMALL INTESTINE. (Eng.) Moog, F. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 55-59; 1977.

7503 ADAPTATION AFTER SMALL BOWEL SURGERY. (Eng.) Kim, Y. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 63-67; 1977.

7504 EFFECTS OF TOTAL PARENTERAL ALIMENTATION ON INTESTINAL FUNCTION. (Eng.) Heird, W. C. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 68-72; 1977.

7505 CONTROL OF INTESTINAL LIPID METABOLISM. (Eng.) Holtzapple, P. G. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories): 80-85; 1977.

7506 THE APPARENT MOLECULAR WEIGHTS OF HUMAN INTESTINAL AMINOPEPTIDASE, ENTEROKINASE AND MALTASE IN NATIVE DUODENAL FLUID. (Eng.) Magee, A. I.; Grant, D. A. W.; Hermon-Taylor, J. (St. George's Hosp. Medical Sch., London SW17 0RE, England). *Biochem. J.* 165(3):583-585; 1977.

7507 THE EFFECT OF CADMIUM ON SOLUBLE PROTEINS, ENZYMES, AND ESSENTIAL METALS OF THE DUODENAL MUCOSA. (Eng.) Sugawara, C.; Sugawara, N. (Sapporo Medical Coll., S-1, W-17, Sapporo 060, Japan). *Arch. Environ. Contam. Toxicol.* 6(1):121-128; 1977.

See also, 7288, 7289, 7297, 7300, 7308, 7313, 7314, 7318, 7319, 7436, 7509, 7510, 7511, 7513, 7514, 7647, 7653, 7723, 7885.

7508 THE EFFECT OF AN ANTACID ON THE BIOAVAILABILITY OF INDOMETHACIN. (Eng.)

Galeazzi, R. L. (Inselspital, CH-3010 Bern, Switzerland). *Eur. J. Clin. Pharmacol.* 12(1):65-68; 1977.

The bioavailability of indomethacin from two indomethacin-antacid (aluminum hydroxide magnesium carbonate and magnesium hydroxide) combinations was compared with the bioavailability of p.o. indomethacin in a double blind crossover study of 12 healthy subjects. Relative bioavailability was estimated by three methods: comparison of plasma concentrations at various times, comparison of areas under plasma concentration time curves, and comparison of the amount of drug excreted unchanged in the urine. The combination with the slightly smaller amount of antacid (preparation A) showed significantly decreased bioavailability by all three methods in comparison with indomethacin alone (preparation C). The combination with the larger amount of antacid (preparation B) was also less bioavailable than preparation C. This effect was significant only for the comparison of areas under curves and not for plasma levels, although the mean plasma levels produced by preparation B at all times were lower than those for preparation C. These findings suggest that aluminum hydroxide magnesium carbonate and magnesium hydroxide decrease the bioavailability of indomethacin.

7509 THE RELATION BETWEEN THE INTESTINAL MICROFLORA AND INTESTINAL PARAMETERS IN MICE.

(Eng.) Koopman, J. P.; Janssen, F. G. J.; van Druten, J. A. M. (Central Animal Lab., Catholic Univ. Nijmegen, Geert Grooteplein N 29, Nijmegen, Netherlands). *Z. Versuchstierkd.* 19(1/2):54-61; 1977.

In mice with different microfloras, the relative cecal weight (RCW), pH and oxidation-reduction potential in the cecum, and fecal *Escherichia coli* concentration after a p.o. dose of 10^5 *E. coli* cells were measured to determine if these parameters could be used to assess the normalization of germfree (GF) Swiss mice after association with certain microfloras. The following groups of mice were examined: GF mice, GF mice associated with one anaerobic bacterial strain (GF + 1), GF mice associated with seven anaerobic strains (GF + 7), GF mice associated with a complete culture of colonization-resistance-factor flora (GF + CRF), and GF mice associated with a partial CRF (GF + partial CRF). In addition, ND_2 mice with CRF microflora (CRF), SPF C_3H/StZ mice (SPF), SPF C_3H/StZ mice that had been cecectomized (SPF-cecum), and conventional $C_{57}BL/Rij$ mice were used. Fecal *E. coli* concentration and RCW were the most suitable parameters for assessing the normalization of GF mice (SPF and conventional mice used as the norm). When the RCW's of *E. coli*-untreated GF, CRF, SPF, and conventional mice were compared, GF mice possessed the highest RCW (about 6%), whereas the other three groups had RCW's of <2.5%. When the RCW's were measured 14 days after a p.o. *E. coli* dose, GF mice again had the highest RCW (about 6.5%), followed by GF + 1 mice (about 5.5%), GF + partial CRF mice (about 3%), GF + CRF mice (about 2.75%), CRF mice (2.5%), SPF mice (<2%), and GF + 7 mice (<2%). GF mice contained 10^{10}-10^6 *E. coli*/g feces, but SPF mice contained $<10^2$ *E. coli*/g. GF mice and GF + 1 mice did not show significantly different *E. coli* fecal concentrations, but those of GF + 7 mice were significantly lower. GF + CRF and GF + partial CRF mice had lower fecal *E. coli* concentrations than GF + 7 mice, and CRF mice showed a higher concentration than GF + partial CRF and GF + CRF mice. SPF-cecum mice had remarkably higher fecal *E. coli* concentrations than SPF mice. Contact with *E. coli* increased RCW in GF, CRF, and SPF mice, although the effect for GF mice was less clear than that for the other two groups.

7510 FECAL FLORA OF MAN. V. FLUCTUATION OF THE FECAL FLORA OF HEALTHY ADULTS. (Ger.)

Mitsuoka, T.; Ohno, K. (Inst. Physical and Chemical Res., Wako-shi, Saitama, 351, Japan). *Zentralbl. Bakteriol.* [*Orig. A*] (238):228-236; 1977.

Seven fecal samples were taken from each of six healthy men at 10-day intervals over a 3-month period and analyzed bacteriologically to determine possible individual and temporal variations. All subjects ate their usual diet during the experiment. *Bacteroidaceae*, *Catenabacterium* (eubacterium and anaerobic lactobacillus), *Peptostreptococcus* (anaerobic gram-positive coccus), and *Lactobacillus bifidus* constituted the predominant floras in all subjects. *Spirillaceae*, *Megasphaerae*, and *Clostridium* (except *Cl. perfringens*) also predominated, but only in certain individuals. *Enterobacteriaceae* and *Streptococcus* constituted the accompanying (secondary) floras in all persons, *Veillonella* and *Lactobacillus* in some persons. The residual floras, which consisted of *Cl. perfringens*, *Staphylococcus*, and yeast, were small and they occurred only occasionally, in low numbers. The overall bacterial count was constant in all persons, averaging 1-3 x 10^{11}/g. The number of bacteria in the predominant flora group was also fairly constant in the same person, but there were greater individual variations with respect to the type of flora: each person had a specific individual fecal flora. There were considerable variations in the numbers of bacteria of the accompanying and residual flora groups.

7511 DEPRESSION OF LACTOSE HYDROLYSIS BY YEASTS.

(Eng.) Berman, D. A.; Sobieski, R. J. (Dept. Biology, Wichita State Univ., Wichita, KS 67208). *J. Med. Microbiol.* 10(3):373-376; 1977.

The depression of lactase activity by pathogenic and nonpathogenic yeasts was studied in rabbits. *Candida albicans* strain 1 and strain 2, and *Saccharomyces cerevisiae* all significantly depressed the activity of β-galactosidase in intestinal loops; the percentage depression by the respective yeasts were 99%, 99%, and 87% at 4 C immediately and 75%, 74%, and 62% after 75 min at 22 C. These results indicate that yeasts bind the enzyme without undergoing active metabolism or requiring prolonged contact. Depression of β-galactosidase activity by dead cells of *C. albicans* strain 526 was similar to that produced by living cells; in four experiments, the percentage reductions in activity by autoclaved cells were 42%, 44%, 32%, and 58%, while the corresponding figures for living cells were 37%, 44%, 27%, and 52%. The possibility that the depression of lactase activity is involved in the virulence of *C. albicans* seems remote, as *S. cerevisiae* (which is rarely pathogenic), also possessed a significant degree of inhibitory activity.

7512 ANTIPROLIFERATIVE ACTIVITY OF ANTI-INFLAMMATORY DRUGS IN TWO MAMMALIAN CELL CULTURE LINES.

(Eng.) Hial, V.; De Mello, M. C. F.; Horakova, Z.; Beaven, M. A. (Natl. Heart, Lung, and Blood Inst., Bldg. 10, Rm. 5N107, Bethesda, MD 20014). *J. Pharmacol. Exp. Ther.* 202(2):446-454; 1977.

The inhibition of rat hepatoma cell and human fibroblast proliferation and metabolism by anti-inflammatory drugs was studied. Indomethacin, phenylbutazone, aspirin, and sodium salicylate inhibited cell proliferation in a dose-dependent manner. The inhibition was reversible; normal growth resumed when the cultures were washed free of drug. Protein and nucleic acid synthesis, as measured by isotope incorporation, was also reduced, although this reduction was probably a reflection of the decrease in cell numbers. An exception was that, in low concentrations, salicylamide, salicylic acid, and aspirin stimulated protein and nucleic acid synthesis, but in high concentrations (>1 mM) they inhibited culture growth as well as protein and nucleic acid synthesis. Pharmacologically inactive derivatives, such as *m*-hydroxybenzoic acid and gentisic acid, were not inhibitory in concentrations up to 5 mM. The order of potency in inhibiting culture growth, meclofenamate>indomethacin>salicylamide>phenylbutazone>phenacetin>aspirin=salicylic acid, was similar to that reported for their anti-inflammatory activity and their ability to inhibit prostaglandin synthesis. The antiproliferative activity of these drugs may, in part, account for their anti-inflammatory and toxic actions *in vivo*.

7513 FLUORESCENCE HISTOCHEMICAL STUDIES ON SEROTONIN IN THE SMALL INTESTINE AND THE INFLUENCE OF VAGAL NERVE STIMULATION.

(Eng.) Ahlman, H. (Dept. Surgery III, Univ. Goteberg, Sweden). *Acta Physiol. Scand.* (Suppl. 437):1-30; 1976.

Studies were carried out to determine (a) the effect of extrinsic denervation of the small intestine on bowel function and on monoamine (MA)-containing structures in the intestinal wall of the cat, (b) the possible presence of 5-hydroxytryptamine (5-HT) in nerve fibers of the guinea pig myenteric plexus, (c) the effect of efferent cervical vagal nerve stimulation on 5-HT content in feline enterochromaffin cells, (d) the transmittor mechanism involved in the vagal control of 5-HT in enterochromaffin cells of the cat, and (e) the presence of catecholamine (CA) fibers at different levels in vagal nerves of the cat and man. Extrinsic denervation of the small intestine of long-term surviving cats totally abolished all CA terminals in the wall of the intestine, but no functional changes were observed. The number and the fluorescence intensity of enterochromaffin cells seemed to be unchanged. These results indicate that the extrinsic nerves are not necessary for adequate bowel function. The myenteric plexus of the guinea-pig, when studied before and after reserpine and monoamine oxidase inhibition, was found to contain only CA fluorescence. No evidence for the presence of 5-HT in the nerves of the plexuses was obtained. The intracellular concentration of 5-HT in feline small intestinal enterochromaffin cells, when estimated by a cytofluorimetric method, was clearly reduced by efferent cervical vagal nerve stimulation. The results support the hypothesis of a neurogenic release of 5-HT from enterochromaffin cells. Cholinergic blockade with atropine did not block the vagally induced decrease of 5-HT in the enterochromaffin cells. However, propranolol and adrenergic denervation at the cervical level of the vagal nerves, i.e., removal of the superior cervical ganglia, both blocked this effect; no change in 5-HT fluorescence was induced by nerve stimulation after such pretreatment. Phenoxybenzamine caused *per se* a marked increase in 5-HT fluorescence. The results support the hypothesis of a vagal adrenergic release of 5-HT from enterochromaffin cells and suggest that β-receptor activation is responsible for this release. Whether α-receptors are also involved in the 5-HT release could not be judged. In both cats and man, efferent CA containing nerve fibers were present in the vagal nerve. At the cervical level of cat vagal nerve, many adrenergic axons, originating in the superior cervical ganglia, were observed. At the subdiaphragmatic level, CA-fibers were present, which seemed to originate from other ganglia. In man, the main trunk at the subdiaphragmatic level, as well as the nerve of Latarjet, contained numerous CA-fibers.

7514 GUT-ASSOCIATED LYMPHOEPITHELIAL TISSUE: BIDIRECTIONAL TRANSPORT OF TRACER BY SPECIALIZED EPITHELIAL CELLS ASSOCIATED WITH LYMPHOID FOLLICLES.

(Eng.) Bockman, D. E.; Stevens, W. (Medical Coll. Georgia, Augusta, GA 30902). *J. Reticuloendothel. Soc.* 21(4):245-254; 1977.

Horseradish peroxidase (HP) was used as a tracer to determine whether its transmission through follicle-associated epithelium (FAE), an area of specialized epithelium covering the luminal pole of lymphoid follicles in gut-associated lymphoepithelial tissues, is bidirectional. After the i.v. or intracardiac (i.c.) injection of HP, peroxidase activity was localized in mouse Peyer's patches, rabbit appendix, and chicken bursa of Fabricius using standard techniques. The reaction product was localized in much greater quantities in FAE than in generalized epithelium. The transmission of HP into the lumina of the rabbit appendix and the chick bursa was demonstrated by the presence of peroxidase activity in saline washings from these cavities 15 min after i.c. administration of the tracer. After the injection of HP into the lumen of the bursa of Fabricius of six chickens, the greatest localization of peroxidase activity was in the tufts of FAE that separate the lymphoid follicles from the lumen. Lesser quantities of reaction product were present over the total lymphoid follicle. Reaction product was also much more prominent in FAE of mouse Peyer's patches than in the general epithelium covering the villi after 1 hr of intraluminal HP. It is concluded that FAE is capable of efficient bidirectional transport of macromolecules, some of which may participate in the immunologic activity of gut-associated lymphoepithelial tissues.

7515 ALCOHOL AND BLOOD LIPIDS: THE COOPERATIVE LIPOPROTEIN PHENOTYPING STUDY. (Eng.) Castelli, W. P.; Gordon, T.; Hjortland, M. C.; Kagan, A.; Doyle, J. T.; Hames, C. G.; *et al.* (Natl. Heart, Lung, and Blood Inst., Landow Bldg., Room C841, 7910 Woodmont Ave., Bethesda, MD 20014). *Lancet* 2(8030):153-155; 1977.

Blood lipids and alcohol consumption were studied in five different populations. Alcohol consumption was positively correlated with high-density lipoprotein cholesterol level in all populations (r=0.16-0.30), the lipid level appearing to be a graded response even over the low levels of alcohol consumption reported. Less strong but consistently negative correlations were found with low-density lipoprotein cholesterol. Plasma triglycerides showed a modest positive correlation with alcohol.

7516 INHIBITORY EFFECT OF FUMARIC ACID AND DICARBOXYLIC ACIDS ON GASTRIC ULCERATION IN RATS. (Eng.) Kuroda, K.; Akao, M. (Res. Inst. Chemobiodynamics, Chiba Univ., Chiba, Japan). *Arch. Int. Pharmacodyn.* 226(2):324-330; 1977.

7517 THE EFFECTS OF ZINC SULPHATE ON VAGAL-INDUCED MAST CELL CHANGES AND ULCERS IN THE RAT STOMACH. (Eng.) Cho, C. H.; Ogle, C. W. (Dept. Pharmacology, Univ. Hong Kong, Hong Kong). *Eur. J. Pharmacol.* 43(4):315-322; 1977.

7518 ALPHA-FETOPROTEIN IN RATS TREATED WITH ANTI-THYMOCYTIC SERUM. (Eng.) Boss, J. H.; Okon, E.; Rosenmann, E. (Hebrew Univ. Hadassah Medical Sch., P.O. Box 24035, Jerusalem, Israel). *Biomedicine* 27(4):150-154; 1977.

7519 SOMATOSTATIN PREVENTS CYTSEAMINE-INDUCED DUODENAL ULCER. (Eng.) Schwedes, U.; Usadel, K.; Szabo, S. (Zentrum der Inneren Medizin, Johann Wolfgang Goethe Universitat, Frankfurt/Main, W. Germany). *Eur. J. Pharmacol.* 44(2):195-196; 1977.

7520 A SIMPLIFIED PROCEDURE FOR THE ISOLATION OF BILE ACIDS FROM SERUM BASED ON A BATCH EXTRACTION WITH THE NONIONIC RESIN--AMBERLITE XAD-7. (Eng.) Barnes, S.; Chitranukroh, A. (Royal Free Hosp., Hamstead, London NW3, England). *Ann. Clin. Biochem.* 14(4):235-239; 1977.

7521 THE MODIFIED NISSEN FUNDOPLICATION--REFLUX PREVENTION WITHOUT GAS BLOAT. (Eng.) Donahue, P. E.; Bombeck, C. T. (840 S. Wood, Chicago, IL 60612). *Chir. Gastroenterol.* 11(1):15-27; 1977.

7522 SALMONELLA SEROTYPES, Salmonella typhi PHAGE TYPES, AND ANTI-MICROBIAL RESISTANCE AT THE UNIVERSITY HOSPITAL OF THE WEST INDIES, JAMAICA. (Eng.) French, G. L.; King, S. D.; St. Louis, P. (Dept. Microbiology, Univ. West Indies, Jamaica). *J. Hyg. (Camb.)* 79(1):5-16; 1977. 1977.

7523 DIVISION OF FECAL STREAM AND COLORECTAL CARCINOGENESIS. (Eng.) Winkler, R.; Heitmann, C.; Otto, H. F. (Chir. Univ.-Klinik Hamburg, Martinstr. 52, Hamburg, W. Germany). *Chir. Gastroenterol.* 11(1):105-108; 1977.

7524 REASONS WHY HYPOALBUMINEMIA MAY OR MAY NOT APPEAR IN PROTEIN-ENERGY MALNUTRITION (Eng.) Coward, W. A.; Whitehead, R. G.; Lunn, P. G. (Dunn Nutritional Lab., Univ. Cambridge, Cambridge CB4 1XJ, England). *Br. J. Nutr.* 38(1):115-126; 1977.

See also, 7293, 7297, 7342, 7347, 7475, 7573, 7652, 7810.

DIAGNOSTIC PROCEDURES

7525 EVALUATION OF RAST AS AN IMMUNOLOGICAL METHOD FOR DIAGNOSIS OF MULTILOCULAR ECHINOCOCCOSIS. (Eng.) Ito, K.; Horiuchi, Y.; Kumagai, M.; Ueda, M.; Nakamura, R.; Kawanishi, N.; *et al.* (Dept. Medicine and Physical Therapy, Faculty Medicine, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan). *Clin. Exp. Immunol.* 28(3):407-412; 1977.

A radioallergosorbent test (RAST), which is widely used for detecting IgE antibodies, was used for the diagnosis of multilocular echinococcosis. Antigen material for the test was obtained from alveolar hydatid cysts grown in the peritoneal cavity of experimentally infected cotton rats. The paper disc method of RAST was used, in which one piece of antigen-coupled paper disc was put into 0.05 ml of 10 times diluted serum, shaken gently for 24 hr at 4 C, and washed three times with incubation buffer (0.3% bovine serum albumin and 0.1% Tween 20 in phosphate-buffered saline of pH 7.4). This paper disc was then put into 0.05 ml of ^{135}iodine-labeled anti-IgE (60,000 counts/min), shaken, and washed as mentioned above. Radioactivity of the paper disc was counted by a gammacounter. A positive RAST reaction was defined as more than 1.5 times the mean count obtained with 100 normal sera. A positive RAST was observed in 30 of 34 patients with multilocular echinococcosis and in only 7 of 52 individuals who did not have radiological evidence of the disease but who showed a positive reaction to one or more of the following tests: complement fixation test (CFT), indirect hemagglutination test (IHA), and immunoelectrophoresis test (IE). The difference in RAST counts between these two groups was highly significant ($p<0.001$). The accuracy of RAST was 87%, which is comparable to IHA (87%) and IE (89%) and much higher than for CFT (60%). When RAST was combined with IE and CFT or with IHA, IE, and CFT, the accuracy of diagnosis was increased to 97%.

7526 THE SMALL BOWEL ENEMA: EXPERIENCE WITH 150 EXAMINATIONS. (Eng.) Sanders, D. E.; Ho, C. S. (Toronto General Hosp., 101 College St., Toronto, Ontario M5G 1L7, Canada). *Am. J. Roentgenol.* 127(5):743-751; 1976.

Antegrade small bowel barium enemas were successfully performed in 150 patients; in 10 patients with ileostomies, the barium was administered retrograde through the ileostomy. Indications for small bowel enema included Crohn's disease (89 patients), small bowel obstruction (37), bleeding (12), fistula (5), abdominal pain (2), carcinoid tumor (2), possible lymphoma (1), and malabsorption (2). The results of the procedure showed normal bowel (94 patients), Crohn's disease (37), small bowel obstruction (7), fistula (5), malrotation (2), and jejunal carcinoma, carcinoid tumor, ischemic ileitis, post bulbar ulcer, and malfunctioning ileostomy (1 each). The results of recent conventional small bowel studies were compared with those of the small bowel enema in 26 patients. All lesions observed with conventional studies were also observed with the enema method. Pathology observed at biopsy, surgery, or autopsy was correlated with x-ray results in 15 patients. All but two preoperative radiological diagnoses were confirmed by the pathological studies. These two patients had normal x-ray findings, although one had disseminated carcinomatosis, and the other had Crohn's disease of the ileum. Four representative case reports are included. There were no major side-effects of the procedure. Occasional nausea and vomiting were attributed to the presence of the tube in the stomach, and transient diarrhea occurred if there was a fluid overload of the small bowel. The small bowel enema is the preferred procedure for the assessment of suspected small bowel disease.

7527 COLOSCOPY IN THE DIAGNOSIS OF INFLAMMATORY DISEASES OF THE LARGE INTESTINE. (Ita.) Rossini, F. P.; Ferrari, A. (Ospedale Maggiore di S. Giovanni Battista e della Citta di Torino, Turin, Italy). *Minerva Med.* 67(7):429-432; 1976.

Inflammatory diseases of the colon were found in 493/3,000 patients examined by colonoscopy. A definitive diagnosis was possible in 440 of the 493 cases. Included in these 440 diagnoses, in order of prevalence, were idiopathic ulcerations of the colon and rectum, Crohn's disease, diverticulosis, actinic colitis, mycosis, transitory ischemic colitis, pseudomembranous colitis, tuberculosis, and amebiasis. The remaining cases were grouped as unclassified inflammation of the colon. Description of the endoscopic findings is given for each one of these diseases with emphasis upon the primary diagnostic finding. Colonoscopy has a negligible risk with infrequent complications and is invaluable in the differential diagnosis of inflammatory bowel disease.

7528 DIAGNOSTIC SIGNIFICANCE OF FASTING SERUM BILE ACID IN LIVER DISEASE. (Eng.) Hirayama, C.; Irisa, T.; Arimura, K.; Nakamura, M. (Second Dept. Internal Medicine, Tottori Univ., Yonago 683, Japan). *Acta Hepatogastroenterol.* 23(6):385-391; 1976.

Total serum bile acids was evaluated in 21 healthy subjects and 100 patients with liver disease; extraction was obtained using Amberlite XAD 2 followed by enzymatic and fluorimetric assays, and the diagnostic significance of serum bile acid determination was assessed. The normal value for fasting serum bile acid was 3 ± 2 μM. The serum bile acid level was markedly raised early in the course of acute viral hepatitis, subsequently fell rapidly before resolution of biochemical tests, and was elevated again in relapse. In chronic liver disease, the serum bile acid level was elevated moderately and correlated roughly with disease severity. The serum bile acid level correlated significantly with serum bilirubin, BSP retention, and other liver function tests, with the exception of serum cholesterol. The fasting serum bile acid level is a reliable screening test for a variety of liver diseases. It is useful in assessing functional and morphological hepatic impairment.

7529 LIMITATIONS OF ANGIOGRAPHIC DIFFERENTIAL DIAGNOSIS IN MAJOR HEPATIC PROCESSES. (Eng.) Gutierrez, O. H.; Rosch, J. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *Fortschr. Roentgenstr.* 127(1) 1-8; 1977.

Eleven cases in which hepatic angiography failed to be useful in the diagnosis of liver diseases are reviewed. These cases occurred in a series of 183 consecutive hepatic angiograms in patients with proven hepatic pathology. The angiographic diagnosis was incorrect in four patients and of no value in the differential diagnosis in the remaining seven. In one patient, a hepatocellular carcinoma was misdiagnosed as a liver abscess. In a 3-week-old infant, a liver cyst was thought to be a liver tumor. In the third patient, angiography suggested the presence of a liver neoplasm, but laparotomy revealed micronodular cirrhosis and acute alcoholic hepatitis. In the fourth patient, angiography suggested the presence of metastases from a gastric reticulum cell sarcoma, but multiple multilocular abscesses were found at autopsy. In four patients, enlarged intrahepatic ducts could not be distinguished from liver metastases, and in the remaining three patients, angiography was not useful in distinguishing between acute non-neoplastic processes (i.e., viral hepatitis, recurrent regenerating cirrhosis, and liver necrosis) and tumor metastases. Methods for minimizing diagnostic failure with angiography include infusion angiography and pharmacoangiography.

7530 LIVER AND SPLEEN SCANNING AS A USEFUL DIAGNOSTIC TEST IN THE MANAGEMENT OF LIVER TRAUMA IN YOUNG PATIENTS. (Eng.) Ell, P. J.; Beck, E.; Meixner, M. (Middlesex Hosp. Medical Sch., Mortimer St., London, WIN 8 AA, England). *Fortschr. Roentgenstr.* 127(2):123-126; 1977.

The cases of 11 patients, aged 4-23 yr, in whom liver and spleen scanning with gamma camera was useful in the management of blunt abdominal trauma are summarized. Seven patients had a positive liver and/or spleen scan. No false-negative scan results were obtained. Scans were carried out postoperatively in eight cases, and no false-positive results were obtained in any of these; follow-up scans demonstrated healing. In two cases, the scans revealed no filling defects; surgery was avoided, and the patients recovered without surgical intervention. Liver and spleen scanning is a safe, rapid, and noninvasive diagnostic procedure, and it yields useful information, both pre- and postoperatively.

7531 EARLY EXPERIENCE WITH THE VARIAN SIX SECOND BODY SCANNER IN THE DIAGNOSIS OF HEPATOBILIARY TRACT DISEASE. (Eng.) Harell, G. S.; Marshall, W. H., Jr.; Breiman, R. S.; Seppi, E. J. (Stanford Univ. Medical Center, Stanford, CA 94305). *Radiology* 123(2):355-360; 1977.

The diagnostic efficacy of computed tomography (CT) with the use of the Varian Six Second (VSS) body scanner was evaluated in 34 patients with various liver lesions. Each patient was first radiographed with lead markers taped to the back along the midscapular line to provide a reference level. Scans were then obtained at intervals of approximately 2.5 cm from the top of the right hemidiaphragm to several centimeters below the free edge of the liver. Contrary to previous reports, almost two-thirds of the patients had heterogeneous CT appearance in normal liver tissue. Small oval or Y-shaped areas with lower CT numbers than the surrounding liver parenchyma were correlated with portal vein branches in most cases, with hepatic veins or other parts of the portal triad in the others. These regions could be distinguished from metastases, which in most cases had a more circular appearance. CT appeared to be a reliable indicator of chronic obstructive jaundice, early common bile duct obstruction, and diffuse hepatic diseases. The ability of the scan to differentiate a fluid-filled cyst or abscesses from solid tumors was an important advantage of CT over radionuclide techniques.

7532 THE HISTORY OF GASTROINTESTINAL ENDOSCOPY. (Eng.) Gibbs, D. D. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 1-14; 1976.

7533 INSTRUMENTATION AND TECHNIQUE. (Eng.) McColl, I.; Rendall, M. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 63-72; 1976.

7534 CARE OF THE PATIENT. (Eng.) Prout, B. J.; Schiller, K. F. R. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 73-81; 1976.

7535 ENTEROSCOPY. (Eng.) Classen, M.; Koch, H.; Fruhmorgen, P. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon, (Chicago: William Heinemann Medical Books): 139-146; 1976.

7536 HAZARDS. (Eng.) Schiller, K. F. R.; Prout, B. J. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 147-165; 1976.

7537 THE PATHOLOGIST'S CONTRIBUTION TO ENDOSCOPIC DIAGNOSIS. (Eng.) Thompson, H. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 167-198; 1976.

7538 A RADIOLOGIST'S VIEWPOINT. (Eng.) Burwood, R. J.; Ross, F. G. M. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 199-211; 1976.

7539 ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY (ERCP). (Eng.) Cotton, P. B.; Salmon, P. R. *In: Modern Topics in Gastrointestina Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 213-227; 1976.

7540 THE FUTURE OF GASTROINTESTINAL ENDOSCOPY. (Eng.) Morrissey, J. F. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 297-307: 1976.

7541 POSSIBILITIES FOR RESEARCH. (Eng.) Truelove, S. C. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 309-317; 1976.

7542 GRAY SCALE ULTRASOUND OF THE PEDIATRIC ABDOMEN AND PELVIS. (Eng.) Shkolnik, A. (Children's Memorial Hosp., IL). *Curr. Probl. Diagn Radiol.* 7(4):1-41; 1977.

7543 IMPROVEMENT IN THE ULTRASONIC EVALUATION OF THE GALL BLADDER BY USING THE LEFT LATERAL DECUBITUS POSITION. (Eng.) Foster, S. C.; McLaughlin, S. M. (Mount Auburn Hosp., 330 Mount Auburn St., Cambridge, MA 02138). *J. Clin. Ultrasound* 5(4):253-256; 1977.

7544 COLONIC POLYP DETECTION: ROLE OF ROENTGENOGRAPHY AND COLONOSCOPY. (Eng.) Amberg, J. R.; Berk, R. N.; Burhenne, H. J.; Clemett, A. R.; Dodds, W. J.; Friedland, G. W.; *et al.* (Dept. Radiology, Univ. California, San Diego, CA). *Radiology* 125(1):255-257; 1977.

7545 THE RAPID DIAGNOSIS OF CHOLERA. (Eng.) McArthur, J. (No affiliation given). *J. Trop. Med. Hyg.* 80(5):99-101; 1977.

7546 ULTRASONIC CONTRAST STUDY TO IDENTIFY STOMCH TAP WATER MICROBUBBLES. (Eng.) Yeh, H. C.; Wolf, B. S. (Mount Sinai Hosp., 11 E. 100th St., New York, NY 10029). *J. Clin. Ultrasound* 5(3):170-174; 1977.

7547 ECHOGRAPHIC VISUALIZATION OF NORMAL PANCREATIC TISSUE PATTERNS. (Eng.) Hagen-Ansert, S. L.; Manich, B. (Episcopal Hosp., Philadelphia, PA 19125). *Med. Ultrasound* 1(1): 11-17; 1977.

7548 DOUBLE CONTRAST PREPARATIONS: AN IN VITRO STUDY OF SOME ANTIFOAMING AGENTS. (Eng.) Bagnall, R. D.; Galloway, R. W.; Annis, J. A. D. (BioEngineering Medical Physics Unit, Liverpool Univ., Liverpool L69 3BX, England). *Br. J. Radiol.* 50(596):546-550; 1977.

7549 ANGIOGRAPHY: ITS CONTRIBUTION TO THE EMERGENCY MANAGEMENT OF GASTROINTESTINAL HEMORRHAGE. (Eng.) Athanasoulis, C. A.; Waltman, A. C.; Novelline, R. A.; Krudy, A. G.; Sniderman, K. W. (Massachusetts General Hosp., Boston, MA 02114). *Radiol. Clin. North Am.* 14(2):265-280; 1976.

7550 ASSAY OF AMYLASE AND ISOAMYLASE ACTIVITIES IN SERUM AND URINE: MODIFICATIONS IN METHODS AND RANGE OF NORMAL VALUES. (Eng.) Heffernon, J. J.; Fridhandler, L.; Berk, J. E.; Shimamura, J. (Coll. Medicine, Univ. California, Irvine, CA). *Am. J. Gastroenterol.* 67(5):473-477; 1977.

7551 RECTAL AND COLONIC BIOPSY IN INFLAMMATORY BOWEL DISEASE. (Eng.) Morson, B. C. (St. Mark's Hosp., City Rd., London EC1V 2PS, England). *Am. J. Gastroenterol.* 67(5):417-426; 1977.

7552 CLINICAL DIAGNOSIS WITH THE STABLE ISOTOPE ^{13}C IN CO_2 BREATH TESTS: METHODOLOGY AND FUNDAMENTAL CONSIDERATIONS. (Eng.) Schoeller, D. A.; Schneider, J. F.; Solomons, N. W.; Watkins, J. B.; Klein, P. D. (Dept. Medicine, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637). *J. Lab. Clin. Med.* 90(3):412-421; 1977.

7553 THE ABSENCE OF BACTEREMIA DURING COLONOSCOPY. (Eng.) Hartong, W. A.; Barnes, W. G.; Calkins, W. G. (Univ. Kansas Medical Sch., Kansas City, KS). *Am. J. Gastroenterol.* 67(3): 240-244; 1977.

See also, 7326, 7554, 7560, 7561, 7568, 7586, 7590, 7594, 7606, 7608, 7609, 7610, 7619, 7657, 7658, 7666, 7667, 7675, 7677, 7684, 7687, 7690, 7691, 7694, 7695, 7700, 7706, 7711, 7722, 7725, 7727, 7734, 7741, 7747, 7759, 7761, 7770, 7793, 7800, 7823, 7827, 7832, 7839, 7842, 7844, 7845, 7846, 7852, 7861, 7862, 7863, 7864, 7870.

GASTROINTESTINAL DISEASES

ESOPHAGUS

7554 LOWER ESOPHAGEAL SPHINCTER IN REFLUX ESOPHAGITIS. (Eng.) Scheurer, U.; Halter, F. (Univ. Hosp., Inselspital, 3010 Berne, Switzerland). *Scand. J. Gastroenterol.* 11(6): 629-634; 1976.

Lower esophageal sphincter pressure (LESP) was studied by intraluminal perfusion manometry in the resting state and after graded i.v. doses of pentagastrin in 12 healthy subjects and 27 patients with reflux esophagitis. Eleven patients had ulcerative esophagitis, and 16 had nonulcerative esophagitis, as determined by the histological examination and endoscopic appearance of the inflamed mucosa. The length of the lower esophageal sphincter (LES) was similar in patients and controls. A correlation was found between the magnitude of mean basal end expiratory (mbe) LESP value reduction and the grade of esophageal mucosa inflammation. The lowest mbe occurred in patients with ulcerative esophagitis. It was significantly different from that of patients with nonulcerative esophagitis ($t=3.37$, $p<0.01$). Both values were significantly reduced from that of the controls ($t \geq 2.50$, $p<0.0125$). The responsiveness of the LES to i.v. pentagastrin was quantitatively reduced throughout the whole range of the dose response curve in patients with ulcerative esophagitis, whereas patients with nonulcerative esophagitis only differed in the maximum mbe pressure value from the controls. Four patients showed a paradoxical pressure decrease to i.v. pentagastrin, resulting in a LESP reduction to 8% of the mbe LESP. The i.v. injection of secretin or cholecystokinin led to a similar reaction of the LES in these patients.

7555 REMOTE RESULTS FOLLOWING OPERATIONS OF DIRECT ANASTOMOSIS IN ATRESIA OF THE ESOPHAGUS. (Rus.) Poplavsky, K. E. (Dept. Roentgenology and Radiology, Leningrad Inst. Pediatric Medicine, Lenigrad, USSR). *Vestn. Rentgenol. Radiol.* (6):35-40; 1976.

7556 STENOSIS AND BLEEDING IN THE DISTAL SEGMENT OF THE ESOPHAGUS: DIAGNOSTIC PROBLEMS IN PERFORATING AORTIC ANEURYSMS. (Ger.) Jaeger, M.; Schlumpf, U.; Akovbiantz, A.; Schnaars, P.; Schmid, M. (Medizinische Klinik, Stadtspital Waid, Tiechestr. 99, CH-8037 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):702-703; 1976.

7557 ESOPHAGEAL STENOSIS FOLLOWING BREAST CANCER (STUDY OF FIVE CASES). (Fre.) Romanet, P.; Dumolard, P.; Haguenauer, J. P.; Gaillard, J. (No affiliation given). *Rev. Fr. Gastroenterol.* (127):59-63; 1977.

7558 TREATMENT OF RECURRING BLEEDING FROM ESOPHAGEAL VARICES BY MEANS OF SCLEROSING THERAPY. (Pol.) Schier, J.; Szczepaniak, A.; Rudowski, W.; Milewski, B. (Z Kliniki Chirurgicznej Instytutu Hematologii, Warsaw, Poland). *Pol. Tyg. Lek.* 32(20):745-747; 1977.

7559 SECRETORY ACTIVITY OF THE STOMACH IN PATIENTS WITH HIATUS HERNIA. (Pol.) Szymanski, Z.; Kaszuba, Z. (Klinika Chorob Wewn Instytutu Chor. Wewn. PAM, ul. Unii Lubelskiej 1. 71-344 Szczecin, Poland). *Wiad. Lek.* 30(11):837-840; 1977.

7560 BIOPTIC AND ENDOSCOPIC DIAGNOSIS OF ESOPHAGITIS. (Ger.) Schule, A.; Brandli, H.; Pelloni, S.; Koelz, H. R.; Pirozynski, W. J.; Blum, A. L. (Med. Klinik, Stadtspital Triemli, CH-8063, Zurich, Switzerland). *Z. Gastroenterol.* 14(7):703-704; 1976.

7561 ENDOSCOPIC DIAGNOSIS OF ESOPHAGITIS: PROBLEMS OF DIFFERENTIATION FROM NORMAL. (Ger.) Schule, A.; Brandli, H.; Pelloni, S.; Koelz, H. R.; Pirozynski, W. J.; Blum, A. L. (Pathologisches Institut des Stadtspitals Triemli, Zurich, Switzerland). *Dtsch. Med. Wochenschr.* 102(16):606-609; 1977.

7562 TREATMENT OF REFLUX ESOPHAGITIS BY INFUSION OF ALUMINIUM HYDROXIDE GEL THROUGH AN ESOPHAGEAL TUBE. (Ger.) Olesch, K. (Medizinische Klinik, Stadtkrankenhaus Cuxhaven, Altenwalder Chaussee 10/12, D-2190 Cuxhaven, W. Germany). *Leber Magen Darm* 6(3):185-187; 1976.

7563 THE MALLORY-WEISS SYNDROME. (Ger.) Filippini, L.; Nauer, E. (Medizinische Klinik, Kantonsspital Luzern, CH-6004 Luzerne, Switzerland). *Leber Magen Darm* 6(3):172-179; 1976.

7564 IMMEDIATE AND LONG-TERM RESULTS OF RADIATION AND COMPLEX THERAPY OF ESOPHAGUS CANCER AFTER RADICAL TREATMENT. (Rus.) Musabaeva, L. I.; Inshakov, L. N.; Azhigaliev, N. A.; Turganbaev, A. T.; Shibanova, A. I.; Dementieva, N. I. (Kazakhstan Scientific Res. Inst. Oncology and Radiology, USSR). *Med. Radiol. (Mosk.)* 22(8): 7-13; 1977.

7565 DISORDERS OF VAGAL FUNCTION IN ACHALASIA. (Spa.) De La Fuente Perucho, A.; Cuesta aselles, G.; Gallego Hernandez, A.; Garcia-Calvo livera, M.; Corrales Bueno, J. I.; De La Fuente haos, A. (Hospital Clinico de San Carlos, Madrid, pain). *Rev. Esp. Enferm. Apar. Dig.* 50(5):507-12; 1977.

566 SPONTANEOUS INTRAMURAL RUPTURE OF THE ESOPHAGUS. (Fre.) Moghissi, K.; Joyeux, A. (Castle Hall Hosp., Cottingham, Yorkshire HU16 5JQ, England). *J. Chir. (Paris)* 113(3):263-267; 1977.

See also, 7358, 7532, 7534, 7536, 7537, 7538, 7540, 7541, 7549, 7858, 7859, 7860, 7878, 7884.

STOMACH

567 STOMACH CANCER AMONG HAWAIIANS AND CAUCASIANS IN HAWAII. (Eng.) Wronkowski, Z.; temmermann, G.; Rellahan, W. (Inst. Oncology, Wawelka 15, 00-973, Warsaw, Poland). *Cancer* 39(5):2310-316; 1977.

he ethnic distribution of stomach carcinoma in awaii was studied from a sample of 288 Caucasian nd Hawaiian patients observed between 1960 and 972. There were 232 histologically confirmed carinomas, 114 in Caucasians and 118 in Hawaiians. ost of the Hawaiians were partly Caucasian (32.1%) r partly Chinese (34.3%); 33.6% were pure Hawaiian r a mixture with other racial groups. Diffuse arcinoma (Lauren's classification) was more freuent in women and younger patients, and there were ore long-term survivors among women than among men. ntestinal-type carcinoma was more prevalent in lder patients and men, and it carried a more avorable prognosis than the diffuse type. The ntestinal:diffuse type ratio was 1.12:1 among aucasians and 1.20:1 among Hawaiians, compared to .76:1 among Hawaii Japanese. There was no apparnt association between this ratio and the cancer isk in any of these populations. Prognosis was ot associated with the level of cancer risk. The awaiians shared a high risk with the Japanese and poor prognosis with the Caucasians. An unexpected inding was that 33% of the Caucasian patients with tomach cancer had Portuguese surnames, but Poruguese subjects comprise only 10% of the Caucasian opulation of Hawaii. They are in the lower socioconomic stratum of Caucasian society. This study dentified the Portuguese as another Hawaiian poplation at high risk of stomach cancer.

568 A MODIFIED LEUCOCYTE MIGRATION ASSAY AS INDICATOR OF MALIGNANT AND NON-MALIGNANT ASTRIC MUCOSAL ALTERATION. (Eng.) Zoller, M.; atzku, S.; Rapp, W.; Schulz, U. (German Cancer Res. enter, Im Neuenheimer Feld 280, D-6900 Heidelberg , W. Germany). *Digestion* 15(5):373-384; 1977.

he leukocytes of patients with various gastric ucosal alterations were exposed to normal gastric mucosal extracts and to gastric tumor extracts to correlate the clinical and histological status of patients with leukocyte migration (LM) reactivity. Positive LM reactivity (pathological migration index with at least 3/5 tumor extracts) was observed in 32/35 operable gastric cancer patients before surgery and in 36/39 patients with inoperable gastric cancer. At postoperative times of 10-14 days, 2 weeks to 2 months, 2-6 months, 6 months to 1 yr, and 1+ yr, positive LM reactivity was seen in 26/29, 8/9, 3/16, 1/11, and 3/33 operable gastric cancer patients, resp., who had no symptoms of cancer. Positive LM reactivity was observed in four of five patients surgically treated for gastric cancer who had local recurrences or metastases at 1+ yr after surgery. Among patients with nonmalignant gastric diseases (superficial, interstitial, or atrophic gastritis and duodenal or gastric ulcer), positive LM reactivity against tumor extracts was associated almost exclusively with atrophic gastritis, with and without intestinal metaplasia (24/43 cases). When LM reactivity was tested with a normal gastric mucosal extract, a pathological migration index was generally found only in patients who exhibited positive reactivity with tumor extracts. Among 68 gastric cancer patients who were positive with tumor extracts, 12 showed a pathological migration index with normal gastric mucosal extracts; all 30 patients with nonmalignant gastric diseases who exhibited positive reactivity with tumor extracts were reactive with the normal gastric mucosal extract. When exposed to tumor extracts, the leukocytes of the cancer patients were inhibited four times more frequently than enhanced; in patients with nonmalignant gastric diseases, inhibition was observed less often than enhancement. The reverse was found when reactivity with normal gastric mucosal extracts was tested. The above findings suggest that the LM assay could be valuable for gastric cancer detection.

7569 TUMORS AND TUMOR-LIKE FORMATIONS OF THE STOMACH AND INTESTINE IN CHILDREN. (Rus.) Kushch, N. L.; Kononuchenko, V. P. (Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (6):16-20; 1977.

7570 EFFECT OF GLUCOCORTICOIDS, β-ADRENERGIC STIMULI, AND BLOCKING AGENTS ON PANCREATIC SECRETION. (Rus.) Geller, L. I.; Glinskaya, T. P.; Ozherelieva, N. Ya.; Kazimirchik, A. P. (Khabarovsk Medical Inst., Khabarovsk, USSR). *Klin. Med. (Mosk.)* 55(8):90-95; 1977.

7571 EXCRETORY FUNCTION OF THE PANCREAS IN ULCER DISEASE BEFORE AND AFTER GASTRIC RESECTION. (Rus.) de Oliveira Valensa, A. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (8):64-69; 1977.

See also, 7346, 7353, 7357, 7516, 7517, 7521, 7532, 7533, 7534, 7536, 7537, 7538, 7540, 7541, 7546, 7549, 7573, 7578, 7580, 7583, 7584, 7586, 7587, 7589. 7592, 7593, 7601, 7602, 7603, 7605, 7638, 7655, 7722, 7854, 7857, 7858, 7859, 7860, 7861, 7862, 7868, 7869, 7873, 7876, 7878, 7881, 7884, 7888.

STOMACH

Peptic Ulcers

7572 NOCTURNAL METIAMIDE TREATMENT IN THE MANAGEMENT OF HEALED DUODENAL ULCERATION. (Eng.) Thompson, M. H.; Venables, C. W.; Smith, P. A.; Walker, W. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *Gut* 18(6):438-441; 1977.

Sixteen duodenal ulcer patients were investigated in double-blind trial to determine whether the administration of a nocturnal dose of metiamide would prevent or delay the relapse of duodenal ulceration after initial ulcer healing. Eight patients received metiamide (400 mg, p.o.) at bedtime, and eight received placebo for 12 months. Endoscopically confirmed duodenal ulcer relapses occurred in two of eight on metiamide and six of eight on placebo. When the length of remission in each group was compared with the period of relapse, there was a highly significant prolongation of remission in the patients treated with metiamide; the total number of patient weeks in remission and in relapse in the metiamide-treated group were 240 and 55 weeks, resp., while the corresponding figures in the placebo-treated group were 156 and 128 weeks, resp. ($p<0.001$). There was also a reduction in the extent and severity of duodenitis in the metiamide-treated patients. The results show that nocturnal therapy with metiamide reduces the number of duodenal ulcer relapses and significantly increases the length of remission in this disease.

7573 THERAPEUTIC TESTING BY ACETAZOLAMIDE IN THE DIFFERENTIATION OF A BENIGN FROM A MALIGNANT NICHE. (Eng.) Puscas, I.; Veress, S.; Resiga, C. (Str. Dunarii 28, 4775 Simleu-Silvaniei jud. Salaj, Rumania). *Acta Hepatogastroenterol.* 24(3):205-209; 1977.

The therapeutic value of acetazolamide in gastric ulcer, and its use in differentiating between benign and malignant conditions, was studied in 741 patients with radiologically confirmed gastric ulcer. Acetazolamide (25-30 mg/kg) was administered p.o. daily, together with 3 g sodium bicarbonate, 1 g potassium bicarbonate, and 1.5 g magnesium oxide. The size of the ulcer crater was considerably reduced after 7-9 days of treatment with acetazolamide; the crater disappeared in 2-3 weeks. This favorable result was obtained without a special diet or rest. In 38 patients in whom there was no significant radiologic change after acetazolamide treatment, malignancy of the ulcer crater was confirmed. Acetazolamide is useful in the differentiation between benign and malignant ulcer craters.

7574 THE EFFECT OF VAGOTOMY ON THE LOWER OESOPHAGEAL SPHINCTER: A MANOMETRIC STUDY. (Eng.) Angorn, I. B.; Dimopoulos, G.; Hegarty, M. M.; Moshal, M. G. (Dept. Surgery, Univ. Natal, Durban, South Africa). *Br. J. Surg.* 64(7): 466-469; 1977.

The pressure profile of the gastroesophageal sphincter was studied at rest and during abdominal compression in 16 normal controls, 9 controls with duodenal ulcer awaiting operation, and 26 duodenal ulcer patients after subdiaphragmatic truncal vagotomy with a drainage procedure. An "early" group of 9 patients was investigated 10-14 days after surgery and a "late" group of 17 patients more than 1 yr after operation. The resting lower esophageal sphincter pressures after vagotomy in both the early and late groups were similar to the levels of sphincter pressure in the controls. However, the increase in sphincter pressure always observed during abdominal compression in normal subjects was significantly decreased by complete vagotomy, and the normal increase in the gastro-sphincteric pressure gradient was not produced. All 26 patients were tested for completeness of vagotomy using the insulin/pentagastrin test. In 19 patients, the vagotomy was complete and in 7 patients it was judged to be incomplete. A decrease in the gastro-sphincteric pressure gradient on manometric study of the lower esophageal sphincter was interpreted as indicating complete vagotomy. Accurate correlation between secretory response and compression response was achieved in all patients with complete vagotomy and in five of the seven patients with incomplete vagotomy. The results indicate that some test of vagal innervation should be carried out after every vagotomy.

7575 CIRCADIAN STUDY ON SERUM GASTRIN IN PATIENTS WITH DUODENAL ULCERS AND IN A CONTROL GROUP. (Eng.) Tarquini, B.; Brocchi, A.; Buricchi, L.; Cappelli, G.; Costa, A.; Neri, B.; Cagnoni, M. (Istituto di Semeiotica Medica, Universita degli Studi, Viale Pieraccini, 18, 50139 Firenze, Italy). *Chronobiologia* 4(1): 49-55; 1977.

7576 PROXIMAL GASTRIC VAGOTOMY WITH SUPRAPYLORIC MUCOSAL ANTRECTOMY FOR DUODENAL ULCER. (Eng.) Kronberg, O. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 143:163-166; 1977.

7577 EVALUATION OF PEPTIC ULCER THERAPY. (Eng.) Salmon, P. R. *In: Modern Topics in Gastrointestinal Endoscopy*. Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 99-107; 1976.

7578 PEPTIC ULCER DISEASE--A HETEROGENEOUS GROUP OF DISORDERS? (Eng.) Rotter, J. I.; Rimoin, D. L. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Gastroenterology* 73(3):604-607; 1977.

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7581 MALROTATION OF THE DUODENUM AND DUODENAL ULCER. (Eng.) Gravgaard, E.; Moller, S. H.; Andersen, D. (Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(5): 589-592; 1977.

7582 URINARY EXCRETION OF STEROID HORMONE METABOLITES IN MEN WITH DUODENAL ULCER. (Eng.) Taylor, W. (Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, England). *J. Steroid Biochem.* 8(1):95-97; 1977.

7583 OXYGEN THERAPY AFTER ABDOMINAL SURGERY. (Eng.) Drummond, G. B.; Wright, D. J. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *Br. J. Anaesth.* 49(8):789-797; 1977.

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7585 INFLUENCE OF HIGHLY SELECTIVE VAGOTOMY ON GASTRODUODENAL ULCERS AFTER THE INJECTION OF CYSTEAMINE IN FEMALE RATS. (Fre.) Patricio, J.; Forgacs, A.; Germain, M.; Gremillet, C. (Hopital Henri-Mondor, F 94000 Creteil, France). *Gastroenterol. Clin. Biol.* 1(5):467-471; 1977.

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7589 IATROGENIC LESIONS OF THE COMMON BILE DUCT AND PANCREATIC DUCT COMPLICATING GASTRIC RESECTION FOR DUODENAL ULCER. (Ita.) Marrano, D.; Campione, O.; Grassigli, A.; Liguori, L. (Istituto di Patologia Speciale Chirurgica dell' Universita di Bologna, Bologna, Italy). *Acta Chir. Ital.* 33(1):13-23; 1977.

7590 A CRITICAL COMPARATIVE STUDY OF THE RELATIVE VALUES OF ENDOSCOPY AND RADIOLOGY IN GASTRODUODENAL ULCER: A REPORT OF 308 CASES. (Fre.) Tubiana, J. M.; Rouger, P.; Chalut, J. (Hopital Saint Antoine, 184 Faubourg Saint Antoine, F 75571 Paris Cedex 12, France). *Ann. Radiol.* 20(2):173-177; 1977.

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7594 LIPASE AND PEPSIN ACTIVITY IN GASTRIC JUICE COLLECTED DURING INFUSION OF GRADED DOSES OF PENTAGASTRIN IN PATIENTS WITH DUODENAL ULCER. (Pol.) Trompeter, G.; Szafran, H.; Litwin, A. (Acad. Medicine, Krakow, Poland). *Przegl. Lek.* 34(5):481-487; 1977.

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7596 SPECIFIC FEATURES OF HEMOSTASIS IN PATIENTS WITH PEPTIC ULCER COMPLICATED BY HEMORRHAGE (PROBLEMS OF PATHOGENESIS, PROGNOSIS, AND TREATMENT). (Rus.) Belousov, A. S.; Yumashkina, A. G.; Sharova, Yu. A.; Dolbaeva, G. M. (Central Inst. Postgraduate Medicine, Moscow, USSR). *Ter. Arkh.* 49(5):103-105; 1977.

7597 CLINICAL PERSPECTIVES OF STUDIES OF TRYPSIN--TRYPSIN INHIBITOR SYSTEM, PLASMA KININS, AND FIBRINOGEN DEGRADATION PRODUCTS IN PEPTIC ULCER. (Rus.) Makarevich, Ya. A.; Balashov, V. I.; Panova, T. N.; Panov, A. A.; Pelov, E. Ya.; Prikazchikov, Yu. A. (Astrkhan Medical Inst., Astrakhan, USSR). *Ter. Arkh.* 49(5):89-92; 1977.

7598 ADMINISTRATION OF GROWTH HORMONE, INSULIN, GASTRIN, AND CORTISOL IN DUODENAL ULCER. (Rus.) Bulgakov, S. A. (Ministry Health USSR, Moscow, USSR). *Ter. Arkh.* 49(5):86-89; 1977.

7599 SUBMICROSCOPIC CHARACTERISTICS OF PARIETAL CELLS OF THE GASTRIC MUCOSA IN PATIENTS WITH DUODENAL ULCER WITH HYPERACID SYNDROME (AN ULTRASTRUCTURAL STUDY). (Rus.) Morozov, I. A.; Aruin, L. I.; Nezhdanova, G. A. (Inst. Nutrition, Acad. Medical Science, Moscow, USSR). *Arkh. Patol.* 39(3):11-16; 1977.

7600 HIGHLY SELECTIVE VAGOTOMY IN DUODENAL ULCER. STUDY OF THE CLINICAL AND PARACLINICAL RESULTS IN 97 CASES. (Fre.) Hollender, L. F.; Marrie, A.; Meyer, C.; Starlinger, M. (Hopital Civil, 67005 Strasbourg Cedex, France). *Ann. Chir.* 31(3):241-248; 1977.

7601 DYNAMICS OF MOTOR FUNCTION OF THE RESECTED STOMACH IN PATIENTS WITH ULCER DISEASE. (Rus.) Chupryna, V. V. (Voroshilovgrad Medical Inst., Voroshilovgrad, USSR). *Klin. Khir.* (3):19-23; 1977.

7602 FUNCTIONAL STATE OF THE PANCREAS IN PATIENTS WITH ULCER DISEASE. (Rus.) de Oliveira Valenca, A. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (6):89-91; 1977.

7603 STMULATION OF H$^+$ SECRETION AND SERUM GASTRIN BY INTRA-OPERATIVE ELECTRICAL VAGAL STIMULATION BEFORE AND AFTER PROXIMAL SELECTIVE VAGOTOMY. (Ger.) Schacht, U.; Fritsch, W. P.; Rumpf, P.; Jacobs, G.; Hausamen, T. U. (Chirurgische Klinik A der Universitat, Moorenstr. 5, 4000 Dusseldorf 1, W. Germany). *Dtsch. Med. Wochenschr.* 102(24):894-896; 1977.

7604 EXPERIENCE IN THE TREATMENT OF DUODENAL ULCER USING "HIGHLY SELECTIVE VAGOTOMY." (Pol.) Politowski, M.; Kolodziejczyk, Z.; Szpak, E. (Acad. Medicine, Krakow, Poland). *Pol. Tyg. Lek.* 32(24):921-924; 1977.

7605 FACTORS AFFECTING THE VITAMIN B_1, B_6, PP, AND C BLANACE IN PATIENTS WITH ULCER DISEASE. (Rus.) Litinskaya, E. V. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (6):91-93; 1977.

See also, 7357, 7459, 7519, 7521, 7538, 7541, 7571, 7881.

7606 BARIUM STUDIES IN SMALL-BOWEL INFARCTION. (Eng.) Joffe, N.; Goldman, H.; Antonioli, D. A. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Radiology* 123(2):303-309; 1977.

The diagnostic efficacy of the barium examination was studied in seven patients with proved intestinal infarction. The primary presenting symptoms were abdominal pain and mild gastrointestinal bleeding in six patients and intestinal obstruction symptoms in one. Four main patterns of radiological abnormality of the affected small bowel loops were observed: slight to moderate dilatation with thickening of the mucosal folds; spasm and irritability with a more or less uniform scalloping of the bowel; moderate dilatation with a smooth or finely serrated contour and complete effacement of the mucosal pattern; and marked dilatation and flaccidity with evidence of gross ulceration. Immediately after radiography, the patients underwent surgical resection. In two patients, the necrosis was limited to the mucosa, but five patients had transmural infarction. Comparison of the radiographic and pathological findings showed that with the former, only three patients were evaluated correctly with regard to the integrity of the bowel wall. In addition, the radiographic findings failed to predict nonviability of the bowel in four of five patients with transmural infarction.

7607 ISCHAEMIC STRICTURES OF THE SMALL INTESTINE IN NIGERIA. (Eng.) Subbuswamy, S. G.; Iweze, F. I. (Dept. Pathology, Univ. Benin, Benin City, Nigeria). *Gut* 18(4):266-273; 1977.

The clinical and pathological features of eight cases of ischemic small intestinal stricture are reported. In five cases, the ischemia was related to inguinal hernia, with herniorrhaphy a few weeks before surgery for stricture in four cases. The prominent symptoms were postprandial abdominal pain, weight loss, and constipation. The mucosal surface underlying the strictures showed transverse ulcers involving the entire intestinal circumference. The ulcers showed highly vascular granulation tissue with a diffuse nonspecific chronic inflammatory infiltrate, in which a number of hemosiderin-laden histiocytes were seen. The mucosa surrounding the ulcers showed loss of the villous pattern, increased numbers of goblet cells, branching of glands, and pyloric metaplasia. Atherosclerotic narrowing of arteries could have been responsible for the ischemia in three cases. The most important factor in making a clinical or pathological diagnosis of ischemic stricture of the small intestine appears to be awareness of the condition. The importance of studying the mesentery, with particular attention to lymph nodes and blood vessels, before making a final diagnosis on intestinal lesions is emphasized.

7608 ANGIOGRAPHIC DIAGNOSIS OF INTRINSIC DUODENAL INFLAMMATORY DISEASE. (Eng.) Glickman, M. G.; Itzchak, Y. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Radiology* 123(2):297-302; 1977.

The efficacy of angiography for differentiating between pancreatic and peripancreatic lesions was evaluated in seven patients with duodenal inflammation. The histological diagnosis, made by surgical exploration in six patients and endoscopic biopsy in one, were ruptured duodenal diverticulum with periduodenal inflammation in one patient, chronic periduodenal inflammation due to prior perforation of a duodenal ulcer in five, and duodenal inflammation due to acute pancreatitis in one. Angiographic distinction between the pancreatic and duodenal processes was made preoperatively in all patients. In the six patients with inflammatory disease due to a primary duodenal process, arterial abnormalities (arterial displacement, hypervascularity, contour irregularities) affected the arterial branches that supplied the duodenum, while the pancreatic arteries had a normal appearance. In the patient with pancreatitis, abnormalities were present in both the pancreatic and duodenal arteries. Attention to the shape and direction of vascular displacement and to separate evaluation of pancreatic and duodenal arteries will help to distinguish duodenal from pancreatic disease.

7609 PLASMA LEVELS AND INTESTINAL ABSORPTION OF 25-HYDROXYVITAMIN D IN PATIENTS WITH SMALL BOWEL RESECTION. (Eng.) Compston, J. E.; Creamer, B. (St. Thomas' Hosp., London, England). *Gut* 18(3):171-175; 1977.

Plasma levels of 25-hydroxyvitamin D (25-OHD) and intestinal absorption of 25-hydroxyvitamin D$_3$ (25-OHD$_3$) were investigated in 38 patients (25 women and 13 men; mean age, 41.9 yr) who had undergone some form of small bowel resection. The mean plasma 25-OHD level for these patients was 9.9 ± 0.86 ng/ml (range, 1.3-24.1 ng/ml) compared with a mean level of 18.3 ± 0.9 ng/ml (range, 11.0-29.7 ng/ml) for controls ($p < 0.0005$). Plasma levels of 25-OHD in these patients after a p.o. dose of 25-OHD$_3$ (10 μg/kg) were also reduced in relation to controls, with mean values at 4, 8, and 24 hr after 25-OHD$_3$ administration being 78.8 ± 9.5 (range, 32-140), 87.1 ± 6.7 (range, 56-136), and 69.4 ± 7.0 (range, 32-117) ng/ml, resp., for patients with small bowel resection compared with corresponding mean values of 124.6 ± 5.4 (range, 78-155), 135.6 ± 6.3 (range, 103-186), and 93.8 ± 6.8 (range, 56-143) ng/ml, resp., for controls. Although the dietary intake of vitamin D tended to be low in many patients (mean, 1.75 μg/day versus a recommended daily intake of 2.5 μg/day), seasonal variations of plasma 25-OHD levels indicated normal exposure to sunlight for most of the patients studied. It is suggested that these observations provide some evidence for malabsorption of 25-OHD after small bowel resection, and it is postulated that this may be due to interruption of the enterohepatic circulation of bile acids and 25-OHD. These factors may contribute to the low plasma levels of 25-OHD found in the patient group.

7610 MALROTATION OF THE DUODENUM. FREQUENCY IN A RADIOGRAPHIC CONTROL GROUP. (Eng.) Gravgaard, E.; Moller, S. H.; Andersen, D. (Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(5):585-588; 1977.

7611 RESULTS AFTER OPERATION FOR CONGENITAL DUODENAL OBSTRUCTION. (Eng.) Daum, R.; Bolkenius, M.; Schuler, B. (Chirurgischen Zentrums der Universitat Heidelberg, Im Neuenheimer Feld 110, 6900 Heidelberg, W. Germany). *Z. Kinderchir. Grenzgeb.* 20(3):253-261; 1977.

7612 A CASE OF MALIGNANT LYMPHOMA OF THE SMALL INTESTINE WHICH INVOLVED SPECIFICALLY MENINGES AND CRANIAL NERVES. (Jpn.) Yamamoto, H.; Tanimura, A.; Shibata, H.; Nakashima, T.; Maeyama, R.; Yamagata, J. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Jpn. J. Cancer Clin.* 21(8):636-641; 1975.

7613 DIVERTICULI OF THE SMALL INTESTINE. (Ita.) Liguori, L.; Viti, G.; Campione, O. (Istituto di Patologia Speciale Chirurgica dell'Universita di Bologna, Bologna, Italy). *Acta Chir. Ital.* 33(2):189-199; 1977.

7614 COINCIDENCE OF INTRALUMINAL AND EXTRALUMINAL DUODENAL DIVERTICULA. (Ger.) Kovacs, J.; Szontagh, E. (Rontgenabteilung des Stadtischen Krankenhauses, Kossuth Lajos sugut 42, Szeged, Hungary). *Fortschr. Geb. Roentgensgtr. Nuklearmed.* 126(4):392-393; 1977.

7615 DIVERTICULOSIS OF THE JEJUNUM [Abstract]. (Dut.) Ruseler, C. H.; Jakimowicz, J. J. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(33):1310; 1977.

7616 CLINICAL ENDOSCOPIC PICTURE OF CHRONIC DUODENITIS. (Rus.) Vorob'ev, L. P.; Skachkova, N. P. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Ter. Arkh.* 49(2):128-131; 1977.

7617 ENDOMETRIOSIS OF THE SMALL INTESTINE. (Ger.) Krauss, J.; Baars, H. G.; Woraschk, H. J. (Chirurgische Universitatsklinik, Leninallee 16, DDR-402 Halle, Saale, E. Germany). *Zentralbl. Gynaekol.* 99(2):109-112; 1977.

7618 EXTERNAL FISTULA OF THE SMALL INTESTINE IN THE INFANT AND CHILD. MEDICAL ASPECTS AND INTENSIVE THERAPY. 19 CASES. (Fre.) Navarro, J.; Mougenot, J. F.; Nicoladze, D.; Lupold, M.; Gruner, M.; Polonovski, C. (Hopital Prousseau 24, av. du D'Arnold-Netter, F 75012 Paris, France). *Nouv. Presse Med.* 5(39):2611-2615; 1976.

7619 MALROTATION OF THE DUODENUM. FREQUENCY IN A RADIOLOGICAL CONTROL MATERIAL. (Dan.) Gravgaard, E.; Moller, S. H.; Andersen, D. (Egebjergvej 23, DK-8220 Brabrand, Demnark). *Ugeskr. Laeger* 138(51):3268-3270; 1976.

7620 PRIMARY AND SECONDARY INTESTINAL LESIONS DUE TO DULL ABDOMINAL TRAUMA. (Ger.) Nothiger, F.; Hoffmann, R.; Oesch, I.; Muller, H. P. (Chirurgisches Departement, Kantonsspital, CH-5001 Aarau, Switzerland). *Helv. Chir. Acta* 44(1/2):119-121; 1977.

7621 THE ROLE OF THE PORTAL VEIN BRANCH BLOCK IN THE PATHOGENESIS OF INTESTINAL OBSTRUCTION. (Rus.) Darensky, D. I. (Surgical Clinic, Chita Medical Inst., Chita, USSR). *Khirurgiia (Mosk.)* (4):89-91; 1977.

7622 SHUNT OPERATIONS OF THE SMALL INTESTINE IN CASES OF EXTREME ADIDOPOSITY. (Ger.) Alnor, P. C.; Kaufmann, H. (Chirurgische Klinik des Stadtischen Krankenhauses Braunschweig, Salzdahlumer Strasse 90, Brunswick, W. Germany). *Med. Klin.* 72 (13):549-553; 1977.

7623 SURGICAL MANAGEMENT OF EXCESSIVE OBESITY. (Ger.) Hell, E.; Bolzano, K.; Steiner, H. (I. Chirurgische Abteilung, Landeskrankenanstalten Saltzburg, Mullner Hauptstrasse 48, A-5020 Salzburg, Austria). *Wien. Med. Wochenschr.* 126(16/17):212-217; 1976.

7624 SURGICAL TREATMENT OF EXCESSIVE OBESITY. (Ger.) Goral, R.; Tuszewski, M. (Gastroenterologische Klinik, Institut fur Chirurgie der Medizinischen Akademie Poznan, ul. Przybyszewskiego 49, Poznan, Poland). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):229-231; 1976.

7625 ASSESSMENT OF LIVER FUNCTION AND CONCENTRATION OF MAIN ELECTROLYTE COMPONENTS OF THE SERUM IN PATIENTS TREATED SURGICALLY FOR EXTREME OBESITY. (Pol.) Tuszewski, M.; Woszcyk, J.; Ruszkowska, J. (Z Kliniki Chirurgii Gastroenterologicznej Instytutu Chirurgii AM, ul. Przybyszewskiego 49, 60-355 Poznan, Poland). *Pol. Tyg. Lek.* 31(45):1925-1928; 1976.

7626 ARTHRITIS RELATED TO INTESTINAL ANASTOMOSES. (Fre.) Hubault, A.; Pasquier, P.; Danowski, R. (Hopital de la Croix St. Simon, 18, rue de la Croix St. Simon, F 75960 Paris Cedex 20, France). *Rev. Rhum. Mal. Osteoartic.* 43(10):555-560; 1976.

7627 DUODENAL-JEJUNAL ANASTOMOSIS BENEATH THE LIGAMENT OF TREITZ. (Eng.) Greene, H. G. (No affiliation given). *Abdom. Surg.* 19(7/8): 175-177; 1977.

7628 SOME PSYCHOLOGICAL ASPECTS OF INTESTINAL OBSTRUCTION. (Eng.) Breiner, S. J. (Faculty Medicine, Michigan State Univ., East Lansing, MI). *Abdom. Surg.* 19(7/8):165-169; 1977.

7629 ARTHRITIS AFTER JEJUNOILEOSTOMY FOR INTRACTABLE OBESITY. (Eng.) Fernandez-Herlihy, L. (605 Commonwealth Ave., Boston, MA 02215). *J. Rheumatol.* 4(2):135-138; 1977.

7630 METABOLISM AFTER JEJUNOILEOSTOMY IN THE TREATMENT OF EXTREME OBESITY. (Eng.) Husemann, B. (Chirurgische Klinik mit Poliklinik der Universitat, D-8520 Erlangen, W. Germany). *Prog. Surg.* 15:77-108; 1977.

7631 CARCINOMA OF THE DUODENUM. (Eng.) Verta, M.; Woodruff, A.; Battifora, H.; Poticha, S.; Beal, J. (Northwestern Memorial Hosp., Northwestern Univ., Evanston, IL). *Ill. Med. J.* 152(1): 59-62; 1977.

7632 ENZYME ADAPTATION AFTER INTESTINAL INJURY. (Eng.) Greene, H. L. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Prout's Neck, Maine, June 13-16, 1976.* Ross Laboratories. (Columbus, Ohio): pp. 72-75; 1977.

See also, 7513, 7526, 7532, 7533, 7534, 7535, 7536, 7537, 7538, 7549, 7569, 7571, 7581, 7584, 7633, 7643, 7644, 7650, 7651, 7652, 7654, 7655, 7656, 7680, 7756, 7834, 7859, 7860, 7861, 7862, 7868, 7869, 7877, 7878, 7880, 7881, 7884, 7888, 7891, 7892, 7897, 7898.

SMALL INTESTINE

Malabsorption

7633 ACRODERMATITIS ENTEROPATHICA: II. ZINC DEFICIENCY AND ULTRASTRUCTURAL FINDINGS. (Eng.) Braun, O. H.; Heilmann, K.; Rossner, J. A.; Pauli, W.; Bergmann, K. E. (Kinderklinik des Stadt. Krankenhauses, Kanzlerstr. 2-6, D-7530 Pforzheim, W. Germany). *Eur. J. Pediatr.* 125(2):153-162; 1977.

Clinical and ultrastructural findings in two siblings suffering from acrodermatitis enteropathica (AE) who were treated with zinc sulfate therapy are reported. The basic defect in AE is zinc deficiency caused by zinc malabsorption. Both patients were originally treated with oxyquinolines for an extended period of time with varying clinical success. The daily p.o. administration of zinc sulfate in various forms at doses ranging from 110-220 mg/day resulted in a permanent clinical remission, with normalization of serum zinc levels. Zinc concentration in the hair was not significantly correlated with the type of therapy used in these patients. Prior to zinc sulfate therapy, Paneth cells in the jejunal mucosa of these patients contained pleomorphic, irregular granules with an inhomogeneous matrix and showed confluence of the granules with the formation of giant granules. The Paneth cells also displayed fibrillar cytoplasmic inclusions. Jejunal biopsies, taken 9 and 13 months after zinc substitution was started and at a time when serum zinc levels were normal, revealed an almost complete normalization of the pathology of Paneth cells; Paneth cell granules at this time showed only slight pleomorphy, the matrices were homogeneous, there were no inclusions, and there were no giant granule formations. It is concluded that pathologic changes in Paneth cells in AE are the result and not the cause of zinc deficiency.

7634 JEJUNAL MUCOSAL IMMUNOGLOBULINS AND COMPLEMENT IN UNTREATED COELIAC DISEASE. (Eng.) Scott, B. B.; Scott, D. G.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *J. Pathol.* 121 (4):219-223; 1977.

The basement membrane and lamina propria of jejunum specimens of treated and untreated patients with celiac disease were examined for extracellular immunoglobulin and complement. Immunofluorescence studies showed that there was a significantly increased incidence of extracellular IgA and complement in the basement membrane zone and lamina propria of untreated adult celiac patients compared to celiac patients on a gluten-free diet. IgG was also demonstrated with complement, particularly in the untreated patients. These findings, taken together with those of other studies, suggest that a local antibody-antigen reaction involving IgA and complement may be responsible for the ongoing mucosal damage in untreated celiac disease as well as for the acute damage following gluten challenge of the treated patient. Furthermore, consequent upon this damage there may be a secondary IgG antibody response, possibly reticulin antibody, contributing to the mucosal damage.

7635 DNA-SYNTHESIZING CELLS IN THE BLOOD IN COELIAC DISEASE AND INFLAMMATORY BOWEL DISEASE. (Eng.) Holmes, G. K. T.; Bratt, P. M.; Ling, N. R.; Cooke, W. T. (Selly Oak Hosp., Birmingham B29 6JD, England). *Clin. Exp. Immunol.* 28 (3):484-489; 1977.

DNA synthesis was studied in the blood of 63 patients with celiac disease, 35 patients with inflammatory bowel diseases, and 9 controls. The level of ^{3}H-labeled thymidine ([^{3}H]TdR) incorporation of blood cells of patients with celiac disease was shown, in two separate studies, to be significantly lower than that of the normal control group. In the first study, the "background" DNA synthesis in unstimulated cultures containing a standard number of blood lymphocytes was measured on days 4, 5, and 6. In the second study, a standard volume of freshly drawn whole blood was added to culture medium, and the [^{3}H]TdR incorporation was measured over the first 24 hr and from 48 to 72 hr. In all cases, the [^{3}H]TdR incorporation of cells of celiac patients on a normal or a gluten-free diet was lower than that of the control group. It is suggested that sequestration of DNA-synthesizing cells in the mucosa of the small bowel may partly explain these results. In whole-blood cultures from patients with inflammatory bowel disease in remission, [^{3}H]TdR incorporation over the first 24 hr was raised in Crohn's disease but normal in ulcerative colitis.

7636 THE GASTROINTESTINAL ABSORPTION OF PENICILLIN V IN CHILDREN WITH SUSPECTED COELIAC DISEASE. (Eng.) Bolme, P.; Eriksson, M.; Stintzing, G. (Dept. Pediatrics, St. Goran's Hosp., Box 12500, S-112 81 Stockholm, Sweden). *Acta Paediatr. Scand.* 66(5):573-578; 1978.

The gastrointestinal absorption of penicillin V (pc-V) was studied in 13 infants with a long history of diarrhea and clinical manifestations of malabsorption. Calcium pc-V was given after at least 2 hr of fasting in a dose of 20 mg/kg, p.o.; absorption was evaluated by measuring the plasma concentration of pc-V at 30-min intervals for 3 hr. An age-matched group of children who were being treated with pc-V for an upper respiratory tract infection served as controls. After they were subjected to an initial diagnostic examination, the diarrhea patients underwent a small bowel biopsy. They could be divided into two groups: (1) six patients with provisional diagnosis of celiac disease and (2) seven patients in whom diagnosis of celiac disease could be ruled out. The plasma concentration of pc-V in group 1 was significantly lower than that in controls, but the children in group 2 showed no significant impairment of pc-V absorption. The gastrointestinal absorption of calcium pc-V in the group 1 patients gradually improved after they were fed a gluten-free diet. After 6-8 months, the plasma concentration of pc-V showed a definite normalization in three of six patients. The variability in the results stresses the importance of clinical symptoms rather than the result of an absorption test in the diagnosis of celiac disease.

7637 EFFECT OF ORAL AMINO ACID SUPPLEMENTATION ON LIVER DISEASE AFTER JEJUNOILEAL BYPASS FOR MORBID OBESITY. (Eng.) Lockwood, D. H.; Amatruda, J. M.; Moxley, R. T.; Pozefsky, T.; Boitnott, J. K. (Univ. Rochester, Sch. Medicine and Dentistry, 601 Elmwood Ave., Rochester, NY 14642). *Am. J. Clin. Nutr.* 30(1):58-63; 1977.

In an attempt to prevent liver disease, six morbidly obese patients were orally supplemented with essential amino acids for 4 months after jejunoileal bypass. Amino acid supplementation only partially influenced protein malnutrition and had no effect on deterioration of hepatic morphology and dysfunction. Although this mode of therapy appears to be ineffective in preventing postoperative liver abnormalities, other studies suggest that oral oligopeptide supplementation and parenteral administration of amino acids are beneficial.

7638 PATHOPHYSIOLOGY AND SIGNIFICANCE OF MALABSORPTION AFTER ROUX-EN-Y RECONSTRUCTION. (Eng.) Bradley, E. L., III; Isaacs, J. T.; Del Mazo, J.; Hersh, T.; Chey, W. Y. (Emory Univ. Sch. Medicine, 69 Butler St., S.E., Atlanta, GA 30303). *Surgery* 81(6):684-691; 1977.

Metabolic studies were conducted in five patients after total gastric resection with Roux-en-Y reconstruction and in five normal controls to determine the nutritional consequences of this particular technique of restoring gastrointestinal continuity. Malabsorption of fat (19.2 ± 2.2%) and nitrogen (22 ± 2.5%) in the study patients was moderate but significantly ($p<0.01$) greater than in normal controls; the absorptive loss was approximately three times the normal values. However, positive nitrogen balances (+0.33 ± 0.18 g/day) were maintained in the study patients, suggesting that malabsorption after the above surgical technique is not usually of clinical significance. The study patients exhibitied a significantly lower average jejunal concentration of lipase (5.0 ± 1.8 Teitz

U/cm^3, $p<0.01$) and trypsin (6.5 ± 1.8 μg/cm^3, $p<0.001$) than did controls (lipase and trypsin values of 37.4 ± 8.1 Teitz U/cm^3 and 162.7 ± 39.6 μg/cm^3, resp.) over a 60-min postcibal period. Also, the concentrations of lipase and trypsin were lower at each point in time in study patients versus controls. The maximum concentration of lipase and trypsin achieved in study patients occurred 30-60 min after ingestion of the test meal, thereby effectively preventing proper concentrations of pancreatic enzymes from reaching ingested food in the jejunum. Malabsorption of fat and nitrogen in study patients improved after exogenous pancreatic enzyme administration but not after the administration of tetracycline. Bacterial overgrowth as a cause of postoperative malabsorption thus may be less important than previously thought. It is suggested that malabsorption after total gastric resection with Roux-en-Y reconstruction is due primarily to maldigestion brought about by duodenal bypass that, in turn, results in either an absolute or a relative pancreatic enzyme insufficiency.

7639 ACQUIRED ICHTHYOSIS AND TOXIC EPIDERMAL NECROLYSIS AND MESENTERIC RETICULUM CELL SARCOMA AND MALABSORPTION. (Eng.) Brooks, A. P.; Harrington, C. J. (Western General Hosp., Edinburgh, Scotland). *Br. Med. J.* 2(6089):739-740; 1977.

7640 SELECTIVE MALABSORPTION OF VITAMIN B_{12} WITHOUT PROTEINURIA OR STRUCTURAL RENAL TRACT ANOMALY. (Eng.) Attock, B.; Marsh, G. W.; Rossiter, M.; Hoffbrand, A. V. (North Middlesex Hosp., London N18, England). *Br. Med. J.* 2(6090): 807; 1977.

7641 TREATMENT OF OSTEOMALACIA WITH ORAL 1-ALPHA-HYDROXYVITAMIN D_3 IN A PATIENT WITH MALABSORPTION. (Eng.) Compston, J. E.; Horton, L. W. L.; Tighe, J. R. (Rayne Inst., London, England). *Br. Med. J.* 2(6087):612; 1977.

7642 MALABSORPTION ASSOCIATED WITH DIARRHEA AND INTESTINAL INFECTIONS. (Eng.) Rosenberg, I. H.; Solomons, N. W.; Schneider, R. E. (Univ. Chicago Pritzker Sch. Medicine, 950 E. 59th St., Chicago, IL 60637). *Am. J. Clin. Nutr.* 30(8):1248-1253; 1977.

7643 CATEGORY III--LYMPHATIC OBSTRUCTION. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 192-212; 1977.

7644 CATEGORY V--UNEXPLAINED. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 213-254; 1977.

7645 LACTOSE MALABSORPTION IN PRESCHOOL BLACK CHILDREN. (Eng.) Paige, D. M.; Bayless, T. M.; Mellits, E. D.; Davis, L. (Johns Hopkins Univ. Sch. Hygiene and Public Health, 615 N. Wolfe St., Baltimore, MD 21205). *Am. J. Clin. Nutr.* 30(7):1018-1022; 1977.

7646 THE GEOGRAPHY AND BIOLOGY OF LACTOSE DIGESTION AND MALABSORPTION. (Eng.) Kretchmer, N. (Natl. Inst. Child Health and Human Development, Natl. Inst. Health, Bethesda, MD 20014). *Postgrad. Med. J.* 53(Suppl. 2):65-70; 1977.

7647 THE BASIC ASPECTS OF THE CHEMICAL BACKGROUND OF LACTASE DEFICIENCY. (Eng.) Dahlqvist, A. (Dept. Nutrition, Univ. Lund, Lund, Sweden). *Postgrad. Med. J.* 53(Suppl. 2):57-62; 1977.

7648 ALBUMIN METABOLISM AND GASTROINTESTINAL LOSS OF PROTEIN IN CHRONIC RENAL FAILURE. (Eng.) Johansson, S. V.; Odar-Cederlof, I.; Plantin, L. O.; Strandberg, P. O. (Karolinska Hosp., Stockholm, Sweden). *Acta Med. Scand.* 201(4):353-358; 1977.

7649 SUCROSE MALABSORPTION. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 1(6076):1558-1559; 1977.

7650 CLINICAL FEATURES OF MALABSORPTION. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 51-54; 1977.

7651 PATHOPHYSIOLOGY OF MALABSORPTION. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 55-64; 1977.

7652 IMMUNOLOGY AND THE GASTROINTESTINAL TRACT. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 91-103; 1977.

7653 BACTERIOLOGY OF THE GASTROINTESTINAL TRACT. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major*

Problems in Internal Medicine. Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 104-111; 1977.

7654 MALABSORPTION SYNDROMES IN CHILDREN (INCLUDING CYSTIC FIBROSIS). (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 112-129; 1977.

7655 CLASSIFICATION AND DESCRIPTION OF THE MALABSORPTION SYNDROME. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 130-151; 1977.

7656 CATEGORY II--MUCOSAL CELL ABNORMALITY AND INADEQUATE SURFACE. (Eng.) Sleisinger, M. H.; Brandborg, L. L. *In: Malabsorption: Volume 13 in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 152-191; 1977.

See also, 7722, 7866, 7869, 7892, 7900.

LARGE INTESTINE

7657 ANGIODYSPLASIA AS A SOURCE OF INTESTINAL BLEEDING. (Eng.) Marx, F. W., Jr.; Gray, R. K.; Duncan, A. M.; Bakhtiar, L. (10921 Wilshire Blvd., Los Angeles, CA 90024). *Am. J. Surg.* 134(1):125-130; 1977.

Selective mesenteric angiography was performed in seven patients with hematochezia of obscure origin. Six had histories of repeated hemorrhages for as long as 5 yr. Three patients had undergone surgery (splenectomy, vagotomy-antrectomy, or vagotomy-pyloroplasty followed by exploratory laparotomy and, later, transverse colostomy) in unsuccessful attempts to control the bleeding. In all patients, the cause of the hematochezia was identified by mesenteric angiography as angiodysplasia. In two additional patients, an area of angiodysplasia was accidentally discovered at preoperative diagnostic aortography for an aortic aneurysm. The site of the abnormality was the cecum in seven of nine, the cecum and jejunum in one, and the midileum in one. One patient, who also had lung cancer and suspected brain metastases, was treated only by transfusions; there was one more hemorrhage before his death from cancer 10 months later. The affected bowel was resected in the other symptomatic patients, and they had no further episodes of hemorrhage. The patients with fortuitously discovered angiodysplasia and no histories of gastrointestinal hemorrhage showed no evidence of hematochezia after resection of their aneurysms.

7658 LIVER METASTASIS OF COLON ADENOCARCINOMA DEMONSTRATED ON ^{99m}Tc-PYROPHOSPHATE BONE SCAN. (Eng.) Stevens, J. S.; Clark, E. E. (Portland Adventist Medical Center, 10123 SE Market, Portland, OR 97216). *Clin. Nucl. Med.* 2(8):270-271; 1977.

The case of a patient with colon adenocarcinoma in whom a ^{99m}Tc-sulfur colloid liver scan showed a large focal defect due to a metastasis is presented. A ^{99m}Tc-pyrophosphate bone scan showed no osseous abnormality, but incidentally labeled the liver metastasis. Neither the primary colon tumor nor the liver metastasis showed evidence of calcification or ossification. There was a desmoplastic response with abundant mature and immature collagen in the primary tumor and in the metastasis, suggesting that the mechanism of the ^{99m}Tc-pyrophosphate labeling may have been related to the presence of collagen.

7659 METABOLIC EPIDEMIOLOGY OF COLON CANCER: FECAL BILE ACIDS AND NEUTRAL STEROLS IN COLON CANCER PATIENTS AND PATIENTS WITH ADENOMATOUS POLYPS. (Eng.) Reddy, B. S.; Wynder, E. L. (American Health Foundation, Valhalla, NY 10595). *Cancer* 39(6):2533-2539; 1977.

Because of the potential significance of cholesterol (Ch) metabolites and bile acids in the pathogenesis of colon cancer, fecal neutral sterols and bile acids were determined in 99 adults of both sexes. There were 31 patients with untreated colon cancer, 13 with adenomatous polyps, 9 with other digestive diseases (spastic colon, rectal ulcer, Crohn's colitis, irritable colon, or diverticulosis), and 34 normal subjects, all American Caucasians consuming a mixed Western diet. There were also 12 Japanese controls who consumed at least two Japanese meals a day. The patients with colon cancer or adenomatous polyps showed higher fecal levels of Ch, coprostanol, coprostanone, total bile acids, deoxycholic acid, and lithocholic acid than either normal control group. The patients with other digestive diseases and the American controls had similar results. The Japanese controls (a low-risk population for colon cancer) showed significantly lower levels of fecal bile acids and Ch metabolites than the American controls (a high-risk population). The results suggest that possible interactions between bile acids and Ch metabolites and the colonic epithelium may be relevant in colon carcinogenesis.

7660 AN UNUSUAL ALIMENTARY DUPLICATION. (Eng.) Bedford, A. F. (Westminster Children's Hosp., England). *Br. J. Clin. Pract.* 31(6):76-77; 1977.

The case of a 6-yr-old boy with a colonic duplication cyst is presented. The patient presented with paraumbilical pain associated with a gradual increase in abdominal girth; there was no change in bowel habit. Radiologic studies demonstrated large bowel displacement and the presence of a colonic mass that did not fill with contrast medium. At laparotomy, a 16 x 13 x 10 cm cyst was found attached to the antimesenteric border of the colon; it was attached by a pedicle that had undergone three turns. The cyst was thin walled, contained dark-brown fluid, and was supplied by large branches of the inferior mesenteric vessels; these vessels did not supply the adjacent bowel. The cyst was removed by ligating the vessels and resecting the colon to which the cyst was attached. The cyst fulfilled two of three previously proposed criteria for alimentary duplication, i.e., it was adherent to some part of the gastrointestinal tract, and it contained smooth muscle in its wall. However, the presence of an alimentary mucous membrane could not be confirmed. The attachment of the cyst to the antimesenteric border of the colon is unusual, and a blood supply separate from that of the adjacent bowel has not been previously described.

7661 INTESTINAL OBSTRUCTION CAUSED BY AN ABERRANT UMBILICAL VEIN. (Eng.) Svendsen, L. B.; Johansen, T. S.; Kristensen, P. (Hvidovre Hosp., Kettegard Alle 30, 2650 Hvidovre, Denmark). *Acta Chir. Scand.* 143(3):191-192; 1977.

The case of a 31-yr-old woman with intestinal obstruction associated with an aberrant umbilical vein is reported. The patient had a 9-yr history of recurrent abdominal pain and obstipation. Laparotomy revealed that the umbilical vein was positioned in such a way that it compressed both the transverse colon and the terminal ileum against the abdominal wall.

7662 PREOPERATIVE ORAL ANTIBIOTICS REDUCE SEPTIC COMPLICATIONS OF COLON OPERATIONS: RESULTS OF PROSPECTIVE, RANDOMIZED, DOUBLE-BLIND CLINICAL STUDY. (Eng.) Clarke, J. S.; Condon, R. E.; Bartlett, J. G.; Gorbach, S. L.; Nichols, R. L.; Ochi, S.; *et al.* (Surgical Service [112], Veterans Admin. Hosp., Wood, WI 53193). *Ann. Surg.* 186(3):251-259; 1977.

The effectiveness of short-term, low dose, preoperative p.o. administration of neomycin (1.0 g) and erythromycin base (1 g) combined with vigorous purgation in reducing the incidence of wound infections and other septic complications of elective colon and rectal operations was studied in a prospective, randomized, double-blind trial of 116 patients. All patients received mechanical preparation; 56 received neomycin-erythromycin base while 60 received placebo. The two patient groups were comparable in age distribution, clinical diagnoses, associated systemic diseases, types of operation performed, and similar clinical features. The overall rate of directly related septic complications was 43% in the placebo group and 9% in the group receiving neomycin and erythromycin base. The wound infection rates were 35% in placebo and 9% in antibiotic treated patients. The p.o. administration of neomycin and erythromycin base together with vigorous mechanical cleansing reduces the risk of septic complications after elective colorectal operations.

7663 COMPARISON OF CATGUT AND POLYGLYCOLIC ACID SUTURES IN COLONIC ANASTOMOSES. (Eng.) Clark, C. G.; Wyllie, J. H.; Haggie, S. J.; Renton, P. (Univ. Coll. Hosp. Medical Sch., University St., London WCIE 6JJ, England). *World J. Surg.* 1(4): 501-506; 1977.

The use of catgut sutures was compared with that of polyglycolic acid sutures in a randomized prospective trial of patients undergoing colonic surgery. In all cases, the sutures were used for the all-coats layer in a two-layer anastomosis, where the seromuscular layer was interrupted silk. When polyglycolic acid sutures were used, only 8 95 anastomoses leaked, whereas when catgut was used, 24 of 99 anastomoses leaked; this difference was significant at the 1% level (Chi square=7.7). The leakage rates were 36.2% on the left side of the colon and 5.4% on the right side when catgut was used, compared with 14.3% on the left and 0% on the right using polyglycolic acid ($p<0.05$). Eleven (5.7%) of the patients died; the anastomosis was performed with catgut in seven and polyglycolic acid in four. In four patients in the catgut group and in two in the polyglycolic acid group, the deaths could be attributed primarily to breakdown of the anastomosis. The results suggest that if colonic anastomoses are to be made by a two-layer technique, the use of polyglycolic acid sutures is superior to that of catgut sutures.

7664 A CONTROLLED COMPARISON OF ONE- AND TWO-LAYER TECHNIQUES OF SUTURE FOR HIGH AND LOW COLORECTAL ANASTOMOSES. (Eng.) Goligher, J. C.; Lee, P. W. G.; Simpkins, K. C.; Lintott, D. J. (General Infirmary, Leeds, England). *Br. J. Surg.* 64(9):609-614; 1977.

A controlled trial of one- and two-layer inverting techniques of suture for the construction of high and low colorectal anastomoses was conducted on 137 patients. The integrity of the suture lines was assessed clinically and by routine radiological examination after a Gastrografin enema. Anastomotic leakage was diagnosed clinically in nine patients, but subclinical dehiscence was demonstrated radiologically in a further 39 patients. There was a slightly greater incidence of dehiscence after the one-layer technique of suture for both high and low anterior resection.

7665 ADENOCARCINOMA OF THE COLON PRESENTING AS ANAEMIA. (Eng.) Hall, J.; Hare, J.; Douglas, M. (Austin Hosp., Heidelberg, Victoria 3081, Australia). *Med. J. Aust.* 2(2):61-62; 1977.

7666 USEFUL RADIOLOGICAL SIGNS IN ACUTE APPENDICITIS IN CHILDREN. (Eng.) Bakhda, R. K.; McNair, M. M. (Western Infirmary, Glasgow, Scotland). *Clin. Radiol.* 28(2):193-196; 1977.

7667 THE VALUE OF LIVER SCAN IN THE FOLLOW-UP STUDY OF PATIENTS WITH ADENOCARCINOMA OF THE COLON AND RECTUM. (Eng.) Cedermark, B. J.; Schultz, S. S.; Bakshi, S.; Parthasarathy, K. L.; Mittelman, A.; Evans, J. T. (Roswell Park Memorial Inst., Dept. Health--State of New York, Buffalo, N.Y.). *Surg. Gynecol. Obstet.* 144(5):745-748; 1977.

7668 ON THE PATHOGENESIS OF COMPENSATORY ADAPTATION RESPONSES OF THE GASTRO-INTESTINAL TRACT IN COLONIC POLYPOSIS. (Eng.) Malyshev, Yu. I.; Katorkin, E. N.; Pytieva, G. P.; Kramar, V. S.; Isaev, V. R.; Rusakov, V. M.; Uglova, M. V. (Flat 14, Hause 18, Ulianovskaja St., Kuibyshev on Volga, USSR). *Am. J. Proctol.* 28(3):49-51, 53-54; 1977.

7669 ENDOSCOPIC POLYPECTOMY OF THE LARGE INTESTINE. (Eng.) Koyama, Y.; Kodaira, S.; Hojo, K.; Fukutomi, H.; Ushio, K.; Hirota, T. (Natl. Cancer Center Hosp., 1-1, 5-chome, Tsukiji, Chuoku, Tokyo, Japan). *Am. J. Proctol.* 28(3):57-58, 60-63; 1977.

7670 HIRSCHSPRUNG'S DISEASE: 25-YEAR EXPERIENCE AT THE MOUNT SINAI HOSPITAL (NEW YORK) AND REVIEW OF THE LITERATURE. (Eng.) Soto, J. M.; Soto, R. T.; Aufses, A. H., Jr.; Bleicher, M.; Krasna, I. H. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Mt. Sinai J. Med.* 44(2):241-256; 1977.

7671 A CONTROLLED TRIAL OF FENTONIUM BROMIDE IN THE TREATMENT OF THE IRRITABLE COLON SYNDROME. (Eng.) Moroni, M.; Frigerio, G. (Dept. Medicine IV, Milan Univ., Milan, Italy). *Curr. Ther. Res.* 21(5):619-628; 1977.

7672 ANORECTAL CANCER MASQUERADING AS BENIGN PERIANAL DISEASE: CASE REPORTS. (Eng.) Kovalcik, P. J.; Peniston, R. L.; Mullen, J. T. (Naval Regional Medical Center, Portsmouth, VA 23708). *Milit. Med.* 142(9):710-711; 1977.

7673 CLOACOGENIC TRANSITIONAL CARCINOMA OF THE ANUS. (Eng.) Capers, T. H. (No affiliation given). *Tex. Med.* 73(9):62-65; 1977.

7674 DIVERTICULAR DISEASE OF THE COLON. (Eng.) Jarrett, F. (Univ. Wisconsin Hosp., 1300 University Ave., Madison, WI 53706). *Wis. Med. J.* 76(8):S106-S108; 1977.

7675 COLONOSCOPY IN A COMMUNITY HOSPITAL. (Eng.) O'Connor, J. J. (916 19th St. N.W., Washington, DC 20006). *Am. Surg.* 43(8): 483-487; 1977.

7676 VILLOUS PAPILLOMA OF THE COLON AND RECTUM. (Eng.) Takolander, R. J. (Univ. Central Hosp., Helsinki, Finland). *Acta Chir. Scand.* (Suppl. 473):1-76; 1977.

7677 COLONOSCOPY. (Eng.) Dean, A. C. B. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 229-243; 1976.

7678 CARCINOID TUMORS OF THE APPENDIX IN CHILDREN: A REPORT OF 25 CASES. (Eng.) Andersson, A.; Bergdahl, L. (Central Hosp., Kristianstad, Sweden). *Acta Chir. Scand.* 143(3):173-175; 1977.

7679 COLONOSCOPIC EXCISION OF LARGE SESSILE POLYPS. (Eng.) Christie, J. P. (7400 N. Kendall Dr., S. Miami, FL 33156). *Am. J. Gastroenterol.* 67(5):430-438; 1977.

7680 VISCERAL ISCHAEMIA FOLLOWING COELIAC- AND SUPERIOR MESENTERIC ARTERY OCCLUSION: REPORT OF A CASE. (Eng.) Semb, B. K. H.; Halvorsen, J. F.; Fossdal, J. E.; Eide, J. (Haukeland Sykehus, Univ. Bergen, Bergen, Norway). *Acta Chir. Scand.* 143(3):185-190; 1977.

7681 THE DEVELOPMENT OF CARCINOMA OF THE COLON. (Eng.) Waye, J. D. (1065 Park Ave., New York, NY 10028). *Am. J. Gastroenterol.* 67(5):427-429; 1977.

7682 COLONIC POLYPS AND POLYPECTOMY. (Eng.) Williams, C. B.; Riddell, R. H. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 245-274; 1976.

7683 BRAIN DAMAGE FOLLOWING A HYPERTONIC PHOSPHATE ENEMA [Letter to Editor]. (Eng.) Loughnan, P.; Mullins, G. C. (Royal Children's Hosp., Parkville 3052, Melbourne, Australia). *Am. J. Dis. Child.* 131(9):1032; 1977.

7684 PATIENT PREPARATIONS TO DECREASE BOWEL GAS: EVALUATION BY AN ULTRASONOGRAPHIC MEASUREMENT. (Eng.) Sommer, G.; Filly, R. A. (Dept. Radiology, 380-M, Univ. California, San Francisco, CA 94143). *J. Clin. Ultrasound* 5(2):87-88; 1977.

7685 APPENDECTOMY WOUNDS DO HERNIATE. (Eng.) Pollet, J. (Royal Infirmary, Aberdeen, Scotland). *J. R. Coll. Surg. Edinb.* 22(4):274-276; 1977.

7686 MYCOTIC ANEURYSM FROM UNRECOGNISED COLONIC SEPSIS. (Eng.) Kerr, A. I. G.; Tilney, N. L. (City Hosp., Edinburgh, Scotland). *J. R. Coll. Surg. Edinb.* 22(4):271-273; 1977.

7687 THE VALUE OF BOWEL PREPARATION IN Ga-67 CITRATE SCANNING: CONCISE COMMUNICATION. (Eng.) Zeman, R. K.; Ryerson, T. W. (Yale--New Haven Hosp., New Haven, CT 06510). *J. Nucl. Med.* 18(9):886-889; 1977.

7688 RAW SURFACE REIMPLANTATION OF URETER IN BLADDER AND COLON CONDUIT. (Eng.) Golimbu, M.; Morales, P.; Schinella, R. (560 First Ave., New York, NY 10016). *Urology* 10(3):219-222; 1977.

7689 MORTALITY AND MORBIDITY IN TRANSVERSE LOOP COLOSTOMY CLOSURE. (Eng.) Jarrett, L. N.; Balfour, T. W.; Bourke, J. B. (General Hosp., Nottingham, England). *J. R. Coll. Surg. Edinb.* 22(3):208-213; 1977.

7690 CONGENITAL POSITIONAL ANOMALIES OF THE COLON: RADIOGRAPHIC DIAGNOSIS AND CLINICAL IMPLICATIONS. I. ABNORMALITIES OF ROTATION. (Eng.) Balthazar, E. J. (New York Medical Coll., 5th Ave. and 106th St., New York, NY 10029). *Gastrointest. Radiol.* 2(1):41-47; 1977.

7691 CONGENITAL POSITIONAL ANOMALIES OF THE COLON: RADIOGRAPHIC DIAGNOSIS AND CLINICAL IMPLICATIONS. II. ABNORMALITIES OF FIXATION. (Eng.) Balthazar, E. J. (New York Medical Coll., 5th Ave. and 106th St., New York, NY 10029). *Gastrointest. Radiol.* 2(1):49-56; 1977.

7692 GIANT DIVERTICULA OF THE COLON. (Eng.) Camprodon, R.; Guerrero, J. A.; Mendoza, C. G.; Crespo, C. (Ciudad Sanitaria "Francisco Franco," Barcelona, Spain). *Br. J. Surg.* 64(9):628-629; 1977.

7693 COLONIC ENDOCRINE CELLS IN MAN: A LIGHT AND ELECTRON MICROSCOPIC STUDY. (Fre.) Le Bodic, L.; Le Bodic, M. F.; Lefranc, G.; Pradal, G.; Helias, H.; Hamza, H.; Mussini-Montpellier, J. (Clinique Medicale, C.H.U., F 44000 Nantes, France). *Arch. Fr. Mal. App. Dig.* 65(5):379-389; 1976.

7694 COLONOSCOPY, A MAJOR DIAGNOSTIC ACHIEVEMENT IN THE DIAGNOSIS OF NONSPECIFIC COLONIC DISEASES. (Ger.) Heinkel, K.; von Gaisberg, U.; Kimmig, J. M.; Kleen, U.; Spanknebel, H. (Medizinische Klinik, Priessnitzweg 24, D-7000 Stuttgart 50, W. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):199-202; 1976.

7695 DOUBLE-CONTRAST VISUALIZATION OF THE COLON AS THE PRINCIPAL X-RAY DIAGNOSTIC METHOD. (Ger.) Sharif, J.; Reisinger, W.; Richter, K. (I. Medizinische Klinik des Bereichs Medizin, Humboldt-Universitat zu Berlin, Schumannstr. 20/21, DDR-104 Berlin, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):195-197; 1976.

7696 CHRONIC NONSPECIFIC DISEASES OF THE LARGE INTESTINE. (Ger.) Kojecky, Z. (II. Medizinische Universitatsklinik, I. P. Pavlova 6, CSSR-775-20 Olomouc, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):193-194; 1976.

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7698 FUNCTIONAL DISORDERS OF THE DISTAL COLON IN CHILDREN. (Ger.) Willital, G. H.; Groitl, H.; Zeisser, E.; Riedl, A. (Kinderchirurgie Abteilung Chirurgischen Universitatsklinik Erlangen, D-8520 Erlangen, W. Germany). *Monatsschr. Kinderheilkd.* 125(1):2-7; 1977.

7699 SOME NEW ASPECTS OF APPENDICITIS. (Ger.) Schmitt, W.; Troeger, H. (Chirurgischen Klinik des Bereichs Medizin der Wilhelm-Pieck-Universitat, Rostock, E. Germany). *Zentralbl. Chir.* 102(9):516-530; 1977.

7700 ACUTE AND CHRONIC APPENDICITIS: GYNECOLOGIC LAPAROSCOPY. (Ger.) Kolmorgen, K.; Havemann, O.; Hausswald, H. R. (Bezirkskrankenhaus, Medizinisches Zentrum Sud, Otto-Grotewohl-Ring, DDR-25, Rostock, E. Germany). *Zentralbl. Chir.* 102(9):531-539; 1977.

7701 ACUTE APPENDICITIS WITH PERFORATION PRESENTING AS A TUMOR MASS. (Ita.) De Bernardis, F.; Venza, E.; Rizzo, C. (Ospedale Generale Provinciale di Cittadella, Padua, Italy). *Acta Chir. Ital.* 33(2):320-323; 1977.

7702 NON-SPECIFIC INFLAMMATORY TUMORS OF THE CECUM. (Pol.) Lewandowski, A. (I Klinika Chirurgii Ogolnej Instytutu Chirurgii CKP WAM, ul. Szaserow 128, 04-349, Warsaw, Poland). *Wiad. Lek.* 30(11):853-858; 1977.

7703 CHEMOTHERAPY IN RECTAL CANCERS. (Fre.) Israel, L. (Centre Hospitalier et Universitaire Lariboisiere, 2, rue Ambroise-Pare, 75475 Paris Cedex 10, France). *Ann. Gastroenterol. Hepatol.* 13(2):111-117; 1977.

7704 MULTIPLE AND CIRCUMSCRIBED LIPOMAS OF THE COLON. CASE REPORT. (Fre.) Segal, A.; Diot, J.; Gournet, C. I.; Caulet, T.; Segal, S. (Rue Laurent Deramez 18, F-51100 Reims, France). *Acta Gastroenterol. Belg.* 40(1/2):66-76; 1977.

7705 NEOPLASTIC FISTULAE OF THE SIGMOID COLON AND URINARY BLADDER (CLINICAL CASE). (Ita.) Mezzanotte, B.; Tonelli, A.; Fornasiri, R. (Ospedale Generale di Zona "SS. Salvatore" di S. Giovanni in Persiceto, Bologna, Italy). *Acta. Chir. Ital.* 33(2):170-188; 1977.

7706 DIAGNOSTIC AND CLINICAL PROBLEMS OF ISCHEMIC COLITIS. (Ger.) Krikstopaitis, M.; Irnius, A.; Triponis, V.; Krikstopaitis, A. (Lehrstuhl fur Propedeutik Innerer Krankheiten, V.-Kapsukas-Universitat, Ciurlionio 15-4, UdSSR-232009 Vilnius, USSR). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):203-204; 1976.

7707 MORPHOLOGICAL AND CLINICAL FINDINGS IN INFLAMMATORY DISEASES OF THE LARGE INTESTINE. (Ger.) Wohlgemuth, B.; Reichmann, J. (Pathologisches Institut, Karl-Marx-Universitat, Liebigstr. 26, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Soffwechselkr.* 36(3/4):189-192; 1976.

7708 SIGMOIDO-RECTAL INTUSSUSCEPTION IN THE ADULT. REPORT ON THREE CASES. (Fre.) Stalport, J.; van den Noortgate, D.; Horeczky, G.; Kestens, P. J.; Bourdeaux, L. (Clinique Reine Astrid, Huy, Belgium). *Acta Gastroenterol. Belg.* 40(1/2):86-96; 1977.

7709 CECAL COMPLICATIONS IN DISTAL COLONIC OBSTRUCTION. (Ger.) Winkler, R.; Koch, G. (Chirurgische Universitatsklinik, Martinstr. 52, D-2000 Hamburg, W. Germany). *Zentralbl. Chir.* 102 (14):877-882; 1977.

7710 SINGLE POLYP OF THE SIGMOID COLON IN AN INFANT. (Ita.) De Bernardis, F.; Venza, E.; Silvestre, G.; Brisotto, P. (Ospedale Generale Provinciale di Cittadella, Padua, Italy). *Acta. Chir. Ital.* 33(2):324-332; 1977.

7711 BIOPSY ASSESSMENT OF BENIGN AND MALIGNANT POLYPS OF THE LARGE INTESTINE. (Ger.) Holle, G. (Pathologisches Institut, Karl-Marx-Universitat, Liebigstr. 26, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):205-209; 1976.

7712 ASTRONAUT DIET AS A PREREQUISITE FOR PROGRESS IN LARGE INTESTINAL SURGERY. (Ger.) Bojanowicz, K.; Berner, J. (Gastroenterologischen Klinik, Medizinischen Akademie, ul. Rewolucji 1905 r. 76 m. 1, Lodz, Poland). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):233-235; 1976.

7713 RECTOSIGMOID INJURIES DURING GYNECOLOGICAL OPERATIONS. (Pol.) Jaworski, E. (Z Oddzialow polozniczo-ginekologicznych Szpitali w Inowroclawiu i Strzelnie, ul. Torunska 32, 88-100, Inowroclaw, Poland). *Pol. Tyg. Lek.* 32(20):759-760; 1977.

7714 THE UROLOGIC COMPLICATIONS AFTER RECTAL AMPUTATION BY MILES. (Ita.) Berengo, M.; Moschini, A.; Dodi, G.; Segato, G. (Istuto di Clinica Chirurgica Generale dell'Universita di Padova, Padua, Italy). *Acta. Chir. Ital.* 33(2):165-169; 1977.

7715 TECHNIQUE AND RESULTS OF LOCO-REGIONAL AND SEQUENTIAL CHEMOTHERAPY OF ADVANCED CASES OF CANCER OF THE RECTUM. (Fre.) Bessot, M.; Mauuary, G.; Lorenzini, C. I.; Fays, J.; Duprez, A. (Laboratoire d'Anatomie pathologique, Faculte "A" de Medecine, rue Lionnois, 54000 Nancy, France). *Ann. Gastroenterol. Hepatol.* 13(2):119-126; 1977.

7716 LOWER ANTERIOR RESECTION WITH TRANSANAL ANASTOMOSIS [Abstract]. (Dut.) Vos, L. J. M. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(33):1310; 1977.

See also, 7459, 7523, 7532, 7540, 7541, 7544, 7549, 7553, 7569, 7584, 7620, 7621, 7628, 7635, 7656, 7717, 7718, 7720, 7721, 7735, 7765, 7858, 7859, 7860, 7861, 7862, 7864, 7869, 7876, 7878, 7879, 7880, 7881, 7884, 7890, 7893, 7897, 7898, 7899, 7900.

LARGE INTESTINE

Ulcerative Colitis

7717 FECAL BILE ACIDS AND CHOLESTEROL METABOLITES OF PATIENTS WITH ULCERATIVE COLITIS, A HIGH-RISK GROUP FOR DEVELOPMENT OF COLON CANCER. (Eng.) Reddy, B. S.; Martin, C. W.; Wynder, E. L. (American Health Foundation, Valhalla, NY 10595). *Cancer Res.* 37(6):1697-1701; 1977.

Fecal neutral steroids and bile acids were measured in 15 patients with ulcerative colitis, 15 family controls who were immediate relatives of patients, 15 patients with other digestive diseases, and 40 healthy unrelated controls. The mean fecal excretion of cholesterol, coprostanol, and cholestane-3β-5α,6β-triol was higher in patients with ulcerative colitis (12.5 ± 2.9, 26.6 ± 7.0, 0.3 ± 0.02 mg/g dry feces) than in other groups ($p<0.05$). Patients with other diseases, family controls, and unrelated controls excreted comparable levels of neutral sterols. Patients with ulcerative colitis excreted levels of bile acids in their feces comparable to those excreted by other groups. Since patients with chronic ulcerative colitis are at an increased risk of developing colon carcinoma, these findings suggest that possible interactions between cholesterol metabolites and colonic epithelial cells may be relevant in colon carcinogenesis.

7718 INDICES OF GRANULOCYTE ACTIVITY IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Koldkjaer, O.; Klitgaard, N. A.; Schmidt, K. G. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Dan. Med. Bull.* 24(2):72-76; 1977.

Four parameters reflecting granulocyte activity were investigated in cases of ulcerative colitis and Crohn's disease: plasma and neutrophil lysozyme concentration, neutrophil alkaline phosphatase activity, and Nitro Blue Tetrazolium (NBT) reducing capacity of neutrophils. Sixty-five untreated patients were investigated, 35 with ulcerative colitis, 14 with hemorrhagic proctitis, and 16 with Crohn's disease. Patients with active ulcerative colitis and severe Crohn's disease showed the most pronounced signs of granulocyte activity. The differential diagnosis between ulcerative colitis and Crohn's disease based on plasma lysozyme measurements was not possible. Severe cases of ulcerative colitis and Crohn's disease were distinguishable from the other patient groups by the neutrophil/plasma lysozyme concentration ratio. Adding the results of the alkaline phosphatase measurements and the NBT-test was valuable in identifying patients with severe Crohn's disease.

7719 ANTI-INFLAMMATORY AND IMMUNOSUPPRESSIVE TREATMENT OF NON-SPECIFIC INFLAMMATORY DISEASES OF THE INTESTINE. (Pol.) Bartnik, W.; Ruzyllo, E. (Klinika Gastroenterologii i Przemiany Materii CMKP, ul. Goszczynskiego 1, 02-616 Warsaw, Poland). *Pol. Tyg. Lek.* 31(47):2017-2020; 1976.

7720 BIFICOL EFFECT ON INTESTINE MICROFLORA OF PATIENTS WITH CHRONIC COLITIS ENGAGED IN ANTIBIOTIC PRODUCTION. (Rus.) Vilshanskaya, F. L.; Mazitova, O. P; Steinberg, G. B.; Pospelova, V. V.; Rakhimova, N. G. (Moscow Res. Inst. Epidemiology and Microbiology, Moscow, USSR). *Antibiotiki* 22(2):181-184; 1977.

7721 CONTROLLED THERAPEUTIC COLORECTAL INSTILLATION IN SERIOUS COLITIS. ORIGINAL METHOD, ITS INDICATIONS AND RESULTS (57 CASES) [Abstract]. (Fre.) Levy, E.; Malafosse, M.; Huguet, C.; Bloch, P.; Loygue, J. (INSERM, Hopital Saint-Antoine, 75012 Paris, France). *Gastroenterol. Clin. Biol.* 1(4):398; 1977.

See also, 7527, 7541, 7551, 7635, 7707, 7900.

PANCREAS

7722 TIME-RELATED ENZYME CONCENTRATIONS IN DUODENAL ASPIRATES AFTER INGESTION OF A TEST MEAL. (Eng.) Ihse, I.; Lilja, P.; Evander, A.; Skude, G. (Dept. Surgery, Univ. Lund, S-221 85 Lund, Sweden). *Scand. J. Gastroenterol.* 12(5):629-635; 1977.

Enzyme concentration curves of trypsin, pancreatic isoamylase, phospholipase, and lipase in normal subjects and in patients with gastrointestinal disease are described. Enzyme concentrations were determined in duodenal aspirates during the first 2 hr of digestion of a test meal. In normal subjects, the concentration curves for all enzymes were biphasic, with an initial peak occurring after 10-20 min followed by a small increase during the second hour of enzyme collection. In patients with pancreatic cancer and chronic pancreatitis, the initial peak, if at all present, was not as pronounced as in normal individuals. In patients who had undergone a Billroth II resection, trypsin and phospholipase concentrations increased gradually. In these patients, as in the celiac disease patients, the lipase curve was different from that of trypsin and phospholipase. As lipase did not differ from the other enzymes in normal subjects, this phenomenon might reflect a nonparallel enzyme secretion in celiac disease and gastric resection patients as a consequence of altered stimulation. It may, however, also be related to the fact that lipase is secreted from the pancreas in an active form, while trypsin and phospholipase are secreted in a zymogen form. It is suggested that the enzyme concentration curves reflect pancreatic secretion. Because of the fairly considerable variation in enzyme concentration values from different individuals, it is concluded that the usual Lundh test (pool determinations) gives as good information as that obtained from complete concentration curves.

7723 FEEDBACK REGULATION OF PANCREATIC ENZYME SECRETION BY INTESTINAL TRYPSIN IN MAN.

(Eng.) Ihse, I.; Lilja, P.; Lundquist, I. (Dept. Surgery, Univ. Lund, S-221-85, Lund, Sweden). *Digestion* 15(4):303-308; 1977.

The effect of duodenal infusions of different substances on bile-pancreatic secretion was studied in a 70-yr-old man in whom a papilla of Vater tumor completely obstructed bile-pancreatic flow into the intestine. Pancreatic secretion in the subject was directed into the bile duct via a common channel that made it possible to sample the bile-pancreatic juice using a percutaneous transhepatic cholangiography catheter. Both bile-pancreatic secretion and the pancreatic output of amylase and lipase were markedly suppressed when the patient's own bile-pancreatic juice was returned to the duodenum at a rate of 1 mg/min. When an intraduodenal infusion of 1 mg/min of 0.05 M $NaHCO_3$ was given to the subject over a 30-min period, the amylase and lipase outputs were 3,989 and 4,986 U/15 min., resp., at the end of the 30-min period compared with amylase and lipase outputs of 2,015 and 3,503 U/15 min, resp., after a subsequent 30-min period when the patient's bile-pancreatic juice was returned to the duodenum. When trypsin inhibitor in combination with bile-pancreatic juice was returned to the duodenum over a subsequent 30-min period, the amylase and lipase outputs were increased to values of 5,053 and 9,766 U/15 min, resp. During a second series of experiments, an intraduodenal infusion of trypsin (1 mg trypsin/ml $NaHCO_3$) over a 30-min period decreased the flow and enzyme output from the pancreas, with the amylase and lipase outputs being 3,626 and 4,361 U/15 min, resp., compared with control values of 5,530 and 8,496 U/15 min, resp., after a 30-min infusion of 1 ml/min 0.05 M $NaHCO_3$. The results support the hypothesis that trypsin in the upper part of the intestine exerts a negative feedback regulation on pancreatic secretion in man.

7724 MASSIVE PANCREATIC ASCITES WITHOUT CARCINOMA: REPORT OF THREE CASES.

(Eng.) Hotz, J.; Goebell, H.; Herfarth, C.; Probst, M. (Medical Clinic, Univ. Essen, Hufelandstrasse 55, D-4300 Essen 1, W. Germany). *Digestion* 15(3):200-216; 1977.

The pathogenesis of benign pancreatic ascites is discussed on the basis of 3 personal cases and 94 literature cases. The common characteristics of the syndrome were chronic alcoholism (documented in 56 cases and suspected in 11), intermittent abdominal pain, nausea, vomiting, and considerable weight loss despite massive fluid accumulation. Markedly elevated protein and amylase levels in the ascitic fluid, hyperamylasemia, and hypoalbuminemia were the major diagnostic features. Two of the three new patients were chronic alcoholics. One showed subtotal hemorrhagic necrosis of the pancreas (diagnosed only at exploratory laparotomy), and the other had silent chronic pancreatitis with pseudocysts, possible slight leakage from a pseudocyst, as well as persistent thrombosis of the portal vein leading to portal hypertension with a distinct collateral circulation. The predominant cause of ascites was not apparent in this patient. The third patient, who was not alcoholic, had an acute attack of chronic pancreatitis with formation and rupture of a small pseudocyst of the main pancreatic duct. In this patient, the ascites disappeared after pancreaticojejunostomy. Endoscopic retrograde pancreatography was of diagnostic value in this patient.

7725 PROBLEMS IN THE DIAGNOSIS OF PANCREATIC CARCINOMA BY ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY.

(Eng.) Gregg, J. A.; Gramm, H. F.; Clouse, M. E. (New England Deaconess Hosp., 185 Pilgrim Rd., Boston, MA 02215). *Gastrointest. Radiol.* 2(1):61-65; 1977.

Diagnostic problems occurred in 5 of 55 patients undergoing endoscopic retrograde cholangiopancreatography who subsequently proved to have carcinoma of the pancreas; the case reports of these five patients and of two others in whom pancreatic duct abnormalities simulated carcinoma are presented. In one patient the pancreatic duct was normal, two had nonspecific ductal abnormalities, one had pancreas divisum, and one had ductal ectasia. Two patients with nonspecific changes on retrograde pancreatography had evidence of tumor on their retrograde cholangiogram. In the two patients with ductal obstruction simulating pancreatic cancer, one was due to compression by the thoracic spine, and the other was due to compression by inflammatory changes.

7726 PLEOMORPHIC CARCINOMA OF THE PANCREAS. AN ANALYSIS OF 15 CASES.

(Eng.) Tschang,

T. P.; Garza-Garza, R.; Kissane, J. M. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Cancer* 39(5):2114-2126; 1977.

In a retrospective histological study of 230 cases of pancreatic carcinoma, 15 pleomorphic carcinomas (PCP) were identified. PCP is characterized by a noncohesive, sarcoma-like growth pattern and mono- and multinucleated giant cells. Tumors were more likely to be located in the body and/or tail of the pancreas (9) than in the head or head and body of the pancreas (5). One tumor involved the entire pancreas. Size of the tumors varied from 3 to 15 cm with a median of 10 cm. The presenting symptoms of patients usually included pain, either of the abdomen or back, and (in two patients) in the chest. About half the patients experienced weight loss associated with anorexia, nausea, and vomiting. Only one patient had extensive surgery for the tumor (pancreaticoduodenectomy); this patient was the only long-term survivor (35 months). The other 14 patients died within 6 months of the onset of symptoms.

7727 PANCREATIC CYSTS IN ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY--A DIFFERENTIAL DIAGNOSTIC PROBLEM. (Ger.) Stuby, K.; Ammann, R.; Sulser, H.; Deyhle, P. (Departement fur Innere Medizin, Universitat Zurich, CH-8091 Ramistrasse 100, Zurich, Switzerland). *Z. Gastroenterol.* 14(7):689; 1976.

7728 INTRATHORACIC PANCREATIC CYSTS AND FISTULAS. (Ger.) Steiger, M.; Rossetti, M. (Universitatskinderklinik, Romergasse 8, CH-4058 Basel, Switzerland). *Helv. Chir. Acta* 44(1/2): 153-161; 1977.

7729 PANCREATIC FISTULAE. (Ger.) Walzel, C. (Krankenhauses der Barmherzigen Bruder, Grosse Mohrengasse 9, A-1020 Vienna, Austria). *Wien. Klin. Wochenschr.* 89(12):406-409; 1977.

7730 STANDARD AND AUGMENTED SECRETIN TEST IN CHRONIC PANCREATIC INFLAMMATORY DISEASE. (Ita.) Bordalo, O.; Noronha, M.; Lamy, J.; Dreiling, D. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Minerva Med.* 67(55):3599-3606; 1976.

7731 STIMULATION OF PANCREAS EXCRETION IN ITS INSUFFICIENCY WITH EUPHYLLINE AND CALCIUM GLUCONATE. (Rus.) Geller, L. I.; Glinskaya, T. P. (Dept. Therapy, Khabarovsk Medical Inst., Khabarovsk, USSR). *Ter. Arkh.* 49(2):85-88; 1977.

7732 FIVE CASES OF SUBCUTANEOUS CELL AND FAT NECROSIS OF PANCREATIC ORIGIN [Abstract]. (Fre.) Guivarc'h, M.; Mornet, P.; Morin, M.; Marquand, J. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3):306-307; 1977.

7733 PANCREATIC PAIN: CLINICAL EXPERIMENTAL STUDY. (Ger.) Rehner, M.; Schilling, K.; Soehendra, N.; Werner, B. (Chirurgische Universitatsklinik Hamburg, Mundsburger Damm 45, D-2000 Hamburg 76, W. Germany). *Z. Gastroenterol.* 14(7): 681-683; 1976.

See also, 7316, 7539, 7542, 7547, 7589, 7602, 7611, 7655, 7734, 7736, 7749, 7750, 7828, 7843, 7858, 7859, 7860, 7861, 7862, 7876, 7884.

PANCREAS

Pancreatitis

7734 ANGIOGRAPHY OF MASSIVE HEMORRHAGE SECONDARY TO PANCREATIC DISEASE. (Eng.) Walter, J. F.; Chuang, V. P.; Bookstein, J. J.; Reuter, S. R.; Cho, K. J.; Pulmano, C. M. (Palo Alto Medical Clinic, 300 Homer Ave., Palo Alto, CA 94301). *Radiology* 124(2):337-342; 1977.

Angiographic findings from 20 patients with massive abdominal hemorrhage related to chronic pancreatitis, pancreatic neoplasms, and arteriovenous malformations are described. Abdominal hemorrhage in this group of patients drained most frequently into the gastrointestinal tract (18 patients) but also flowed through cutaneous drain sites and fistulas (3 patients) and once into a large pancreatic tumor. The most common angiographic observation in patients with bleeding secondary to pancreatitis was pseudoaneurysm formation (8 patients). The splenic artery was involved in six of these eight patients, the right gastroepiploic artery in one, and the transverse pancreatic artery in one patient. Frank contrast material extravasation, either into the gastrointestinal tract or i.p., was observed four times, with the angiographic appearance in these patients being no different than the usual findings in hemorrhage secondary to mucosal ulceration. Opacification of the entire pseudocyst was seen three times, and in each case the size of the pseudocyst at surgery corresponded to the structure observed angiographically. Pancreatic ductal filling, presumably due to erosion of an arterial wall directly communicating with the pancreatic duct, was seen along with flashing artery sign in one patient. Two patients with arteriovenous malformation had dilated, racemose feeding arteries and early dense filling of the draining veins. Three patients had pancreatic carcinoma and documented bleeding from gastroesophageal varices related to portal or splenic vein occlusion by the tumor.

7735 INFLAMMATION AND NECROSIS OF THE TRANSVERSE COLON SECONDARY TO PANCREATITIS.

(Eng.) Thompson, W. M.; Kelvin, F. M.; Rice, R. P. (Duke Univ. Medical Center, Durham, NC 27710). *Am. J. Roentgenol.* 128(6):943-948; 1977.

Radiographically demonstrable colon abnormalities secondary to acute pancreatitis were demonstrated in 12 of 220 patients (ages, 23-65 yr) with acute pancreatitis. Four patients showed dilatation localized to the transverse colon with no other colon abnormalities. Large inflammatory pancreatic masses displaced the transverse colon inferiorly in two patients and superiorly in a third patient. The inflammatory masses produced localized areas of spiculation of the mucosa at the site of displacement in one patient. Inflammation of the transverse colon, as evidenced by radiographic findings of narrowed lumen, irregularity of the colon wall, and/or a grossly abnormal haustral pattern, was observed in five patients. Stricture was radiographically demonstrated in one patient, and a large inflammatory mass in the tail of the pancreas extending around the splenic flexure was demonstrated at surgery. In one patient, a large pancreatic abscess eroded into the colon and produced a fistula from the pancreatic bed that communicated with the splenic flexure and the skin. Direct injection of the sinus demonstrated the fistula. One patient with initial radiographic findings of transverse colon inflammation subsequently developed necrosis of the transverse colon. A retrospective review of abdominal radiographs revealed an unchanged position of a dilated ahaustral splenic flexure over a 6-day period, suggesting the presence of colon necrosis. Transverse colon inflammation secondary to pancreatitis may be appreciated on plain abdominal radiographs; however, a contrast enema, which demonstrates that the abnormality is localized to the transverse colon and is not an ulcerative process, should help differentiate the transverse colon inflammation of pancreatitis from other entities. A water soluble contrast enema is recommended if there is any evidence of colon necrosis or fistula. The aggressive use of contrast enemas in patients with pancreatitis who are suspected of having a severe colon abnormality should speed the recognition of these complications.

7736 STEROIDS REVISITED. I. IS THERE A PLACE FOR STEROIDS IN THE TREATMENT OF PANCREATIC INFLAMMATION?

(Eng.) Dreiling, D. A.; Nacchiero, M.; Kaplan, M. H. (Mt. Sinai Sch. Med., City Univ. New York, 100th St. and Fifth Ave., New York, NY 10029). *Am. J. Gastroenterol.* 67(1):21-28; 1977.

The role of steroids in the treatment of pancreatic inflammation is discussed. Administration of prednisone (20-40 mg/day for 4-12 weeks) produced good to excellent results in 13/27 patients with subacute or persistent acute pancreatitis, 30/46 patients with intractable pain in pancreatic cancer, 8/8 patients with minipancreatitis following major pancreatic resection, 64/86 patients with intractable pain in chronic alcoholic pancreatitis, 6/12 patients with pancreatic ascites, and 2/2 patients with allergic pancreatitis. Average pancreatic secretory responses were studied in five fistula dogs undergoing secretin testing with or without acute steroid administration by injection or infusion. The values for pancreatic secretion rate (ml/5 min), bicarbonate concentration (mEq/l), bicarbonate output (mEq/5 min), protein concentration (mg/ml), and protein output (mg/5 min) were 3.78 ± 0.15 ($SP \leq 0.025$), 120.43 ± 3.94, 0.50 ± 0.04 ($SP \leq 0.010$), 11.95 ± 2.04 ($SP \leq 0.050$), and 52.25 ± 4.76, resp., with hydrocortisone (500-2,000 mg) and 4.29 ± 0.53 ($SP \leq 0.025$), 128.48 ± 2.97, 0.52 ± 0.04 ($SP \leq 0.010$), 11.95 ± 1.24 ($SP \leq 0.050$), and 45.51 ± 9.52 ($SP \leq 0.050$), resp., with prednisolone (80-160 mg), compared with control values of 5.54 ± 0.06, 119.41 ± 11.76, 0.69 ± 0.04, 11.04 ± 0.40, and 58.32 ± 10.87, resp. When two fistula dogs were given hydrocortisone (2 mg/kg/day) and/or prednisone (3.5 mg/kg/day) for 3 months, there was a reduction in basal flow, bicarbonate output, and protein output, but stimulated flow, bicarbonate output, and protein secretion were statistically increased. These findings are the end result of steroid-induced parenchymal augmentation, however, they do not explain the place of steroids in the treatment of pancreatic inflammation.

7737 SURGERY IN CHRONIC PANCREATITIS. A SURVEY OF A HOMOGENOUS SERIES OF FORTY CASES.

(Fre.) Dive, Ch.; Melange, M.; Dion, R.; Kestens, P. J.; Baeten, Y.; Otte, J. B. (Cliniques Universitaires Saint-Luc, UCL, Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):553-574; 1976.

7738 COMPARISON BETWEEN THE PATHOLOGICAL AND MICRORADIOLOGICAL DATA RECORDED IN A SERIES OF SURGICAL CASES OF CHRONIC PANCREATITIS AND THE EXAMINATION OF NECROPSIC MATERIAL.

(Fre.) Haot, J.; Mathy, J. P.; Engelholm, L.; Meersseman, F. (Cliniques Universitaires Saint-Pierre, Brusselsestraat 69, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):585-594; 1976.

7739 RESULTS OF SURGICAL TREATMENT OF CHRONIC PANCREATITIS. REVIEW OF THE LITERATURE.

(Fre.) Govaerts, J. P.; Kestens, P. J.; Kiekens, R.; Dion, R. (IMC d'Ixelles, Rue J. Pacquot 65, B-1050 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):595-602; 1976.

7740 THE LOSS OF EXOCRINE PANCREAS FUNCTION FOLLOWING OPERATION FOR PANCREATITIS.

(Ger.) Rumpf, K. D.; Pichlmayr, R. (Klinik fur Abdominal und Transplantationschirurgie, Medizinische Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Med. Klin.* 72(13):560-563; 1977.

See also, 7547, 7570, 7722, 7728, 7730, 7731, 7841, 7878, 7888.

LIVER AND BILIARY TRACT

7741 THE USE OF ABDOMINAL CONTRAST TOMOGRAPHY IN LIVER DISEASE.

(Eng.) Dalla Palma, L.; Bacarini, L.; Bazzocchi, M. (Istituto di Radiologia dell'Universita, Ospedale Maggiore, 34125, Trieste, Italy). *Br. J. Radiol.* 50(595):483-488; 1977.

The diagnostic value of abdominal contrast tomography in liver diseases was assessed in 44 patients with liver disease and in 145 patients with a normal liver. A high dose of urographic contrast medium (66.8% sodium iothalamate, 150 ml) was used and infused rapidly in each patient. The method was useful in showing cysts, abscesses, and hepatic masses. Hypertrophy or atrophy were well visualized when the liver outline was deformed. The severity of the disease could be estimated by the degree of liver deformity and shrinkage. The technique was particularly valuable in the diagnosis of space occupying lesions with a poor blood supply; these showed areas of lucency. Hydatid cysts were identified by a sharp border with a regular wall surrounding a large space. Polycystic liver disease was also easily identified. Metastases appeared as homogeneous lucent areas with a sharp smooth margin if the lesion was encapsulated and with an irregular, sometimes blurred outline, if the lesion was infiltrating. Normal bile ducts were not seen, but became visible when they were dilated. The results show that rapid injection of a high dose of water soluble contrast medium results in good parenchymal opacification and that this technique is useful in the diagnosis of various liver diseases.

7742 THE RATE OF SYNTHESIS OF GLYCOSAMINOGLYCANS AND COLLAGEN BY FIBROBLASTS CULTURED FROM ADULT HUMAN LIVER BIOPSIES.

(Eng.) Galambos, J. T.; Hollingsworth, M. A.; Falek, A.; Warren, W. D. (Emory Univ. Sch. Medicine, Atlanta, GA 30303). *J. Clin. Invest.* 60(1):107-114; 1977.

Adult human liver biopsies from normal subjects and from patients with alcoholic hepatitis, chronic active hepatitis, fibrosis + alcoholic hepatitis (active cirrhosis), inactive cirrhosis, and drug hepatitis, were cultured to estimate the rate of synthesis of collagen (C) and glycosaminoglycans (GAG) by the cells. C synthesis was estimated in cultures from 58 livers by conversion of [^{14}C]proline to the [^{14}C]hydroxyproline of C; that of GAG was estimated in cultures from 57 livers by the incorporation of [^{3}H]acetate and $^{35}SO_4$ into the GAG. Pro-C synthesis was increased only in the alcoholic hepatitis cultures, both in the pulse ($p< 0.05$) and chase ($p<0.02$) media. Insoluble C synthesis (in disintegrations/min x 10^4/mg cell protein) was increased in cultures from chronic active hepatitis (28.0, $p<0.01$), fibrosis + alcoholic hepatitis (39.8 ± 7, $p<0.001$), and inactive cirrhosis (14.9 ± 4.1, $p<0.05$). The ratios of [^{14}C]hydroxyproline in pro-C:C were approximately 4:1 in alcoholic hepatitis and 2:1 in normal or drug hepatitis cultures, but they were 1:2 in firbosis + alcoholic hepatitis and inactive cirrhosis cultures. Essentially all radioactive GAG were soluble in the culture media. The predominant GAG were chondroitin -4 or -6-SO_4. GAG synthesis was increased only in fibrosis + alcoholic hepatitis (active cirrhosis) cultures, both in the pulse ($p<0.01$) and chase ($p<0.001$) media. There was no significant difference in C or GAG synthesis in paired cultures that contained 300 mg/dl ethanol or 3.75 mg/dl methyl prednisolone, compared to their respective controls. The results indicate an absence of immunologic mechanisms in hepatic fibrosis. It is suggested that hepatic fibrosis depends not only on the rate of hydrolysis of pro-C to C, but also on the composition of the ground substance that affects the rate and types of cross-linking of C.

7743 EVALUATION OF FLUORIMETRICALLY ESTIMATED SERUM BILE ACID IN LIVER DISEASE.

(Eng.) Osuga, T.; Mitamura, K.; Mashige, F.; Imai, K. (Univ. Tsukuba Sch. Medicine, Hongo 7-3-1, Bunkyo-ku, Tokyo 113, Japan). *Clin. Chim. Acta* 75(1):81-90; 1977.

The diagnostic efficacy of a fasting serum bile acid (SBA) assay was studied in 23 healthy subjects, 35 asymptomatic carriers of hepatitis B surface antigen (HBsAg), and 91 patients with various liver diseases (11 acute hepatitis, 37 chronic hepatitis, 33 posthepatitis or cryptogenic cirrhosis, 4 primary liver carcinoma, 4 primary biliary cirrhosis, and 2 constitutional nonconjugated hyperbilirubinemia). The assay consisted of incubating serum with a reagent composed of 0.1 ml 3α-hydroxysteroid dehydrogenase, 0.1 ml 0.5 μM NAD, 0.1 ml diaphorase, and 0.1 ml 200 μM reazurin followed by fluorimetric estimation of the amount of resorfin converted from reazurin. Fasting SBA levels in the 23 healthy controls ranged from 1.5 to 9.2 μM/l; the average SBA level in 35 asymptomatic HBsAg carriers was 7.2 ± 2.1 μM/l and all determinations were within the normal range. In the liver disease patients, SBA level was correlated with serum bilirubin content; LDH, GPT, and GOT levels; alkaline phosphatase content; and zinc sulfate test values. The SBA assay was a more sensitive index of impaired liver function than bilirubin or alkaline phosphatase content in 164 randomly selected liver disease patients. In addition, it permitted evaluation of the resolving phase of chronic liver disease.

7744 DYSFIBRINOGENEMIA ASSOCIATED WITH LIVER DISEASE. (Eng.) Palascak, J. E.; Martinez, J. (Jefferson Medical Coll., Thomas Jefferson Univ., Philadelphia, PA 19107). *J. Clin. Invest.* 60(1): 89-95; 1977.

To test the possibility that a functionally abnormal fibrinogen may exist in some patients with liver disease, the plasma and purified fibrinogens of five patients whose plasma thrombin times were prolonged at least 40% over normal controls were studied. No abnormalities were detected by immunoelectrophoresis of the plasmas of purified fibrinogens. The thrombin and reptilase times of the purified patient fibrinogens were prolonged from a normal value of 23.2 sec to 31.5-75.1 sec for the former and from 45.3 sec to 75.0->240.0 sec for the latter. Calcium ions (0.005 M) improved but did not completely correct these defects. Of the individual coagulation factors tested, the only abnormal findings common to all patients were a decreased level of factor X (0.39-0.56 μ/ml) and an increased level of factor VIII (1.64 to 4.99 U/ml). Increasing amounts of thrombin progressively shortened the clotting times of patient fibrinogens, but not to normal levels. Addition of equal amounts of patient fibrinogen to normal fibrinogen prolonged the thrombin time of normal protein. Thrombin-induced fibrinopeptide release was normal. Fibrin monomers prepared from patient plasmas and purified fibrinogens demonstrated impaired aggregation at low (0.12) and high (0.24) ionic strength. It is concluded that some patients with liver disease and prolonged plasma thrombin times have a dysfibrinogenemia functionally characterized by an abnormality of fibrin monomer polymerization.

7745 LIVER NEOPLASMS AND THE ORAL CONTRACEPTIVES. (Eng.) Keifer, W. S., Jr.; Scott, J. C. (1145 Broadway, Seattle, WA 98122). *Am. J. Obstet. Gynecol.* 128(4)448-454; 1977.

The relation between oral contraceptives and liver neoplasms was evaluated by reviewing the records of five Seattle hospitals during a 6.5-yr period and by reviewing the literature. Hospital records revealed nine cases of liver neoplasms (age range of patients, 15-50 yr); six of the nine women had used oral contraceptives. One unusual case is presented, and the remaining cases are summarized together with 87 cases found in the literature. A 28-yr-old woman who had used a combination of mestranol and ethynodiol diacetate for 11 months presented with infertility and the absence of menses for 6 months after the contraceptive was discontinued. Because of a palpable abdominal mass, abnormal liver enzyme studies, and radiographic findings, a laparotomy was carried out. A vascular tumor was found that was intimately adherent to the gallbladder and that arose from the undersurface of the anterior edge of the right lobe of the liver. Microscopically, it was diagnosed as a benign hepatic adenoma. The ovarian biopsies were normal, and the patient conceived 4 months after the tumor was excised. In the Seattle series and in the literature, the women with liver neoplasms and a history of oral contraceptive use were found to outnumber the women with liver neoplasms and no oral contraceptive use by more than two to one. In 44 cases associated with oral contraceptives where the parity was given, there were only 4 nulliparas. Mestranol was the most frequent estrogen used by nearly four to one. At least eight different progestins were encountered, and the most common compounds were norethindrone and norethynodrel. The duration of exposure to the contraceptives varied from 3-132 months in the literature and from 4-72 months in the Seattle group. All 96 patients underwent exploratory operations. Twelve patients died as a result of the tumor or complications of the operation. Close clinical surveillance with an awareness of this potentially fatal pathologic entity is essential in women who have ingested oral contraceptives.

7746 IMPAIRMENT OF DRUG METABOLISM IN PATIENTS WITH LIVER CANCER. (Eng.) Sotaniemi, E. A.; Pelkonen, R. O.; Mokka, R. E.; Huttunen, R.; Viljakainen, E. (Dept. Internal Medicine, Univ. Oulu, SF-90220 Oulu 22, Finland). *Eur. J. Clin. Invest.* 7(4):269-274; 1977.

Drug metabolizing capacity was investigated in six patients with primary hepatoma, three with primary hepatoma plus liver cirrhosis, and seven with metastatic liver disease by comparing *in vivo* (antipyrine disappearance rate from plasma) and *in vitro* (cytochrome P-450, benzpyrene hydroxylase, and 7-ethoxycoumarin O-deethylase activities in liver biospies) indices with those for tumor-free liver parenchyma and with biochemical liver function tests. Impairment of antipyrine metabolism was related to pathological changes in the liver. Significant differences in plasma antipyrine half-life ($p<0.001$) were seen between control subjects (8.9 ± 2.2 hr) and all cancer patients (18.6 ± 2.2 hr), patients with metastatic liver cancer (26.9 ± 10.1 hr), and patients with primary hepatoma plus cirrhosis (25.5 ± 2.7 hr). Patients with primary hepatoma only (occupying 20-80% of the liver volume) had normal antipyrine metabolism. A significant correlation between antipyrine half-life and serum albumin concentration was observed in patients with primary hepatoma only ($p<0.05$) and in all cancer patients ($p<0.001$), but not in patients with metastatic liver disease ($p>0.05$). The antipyrine half-life was not related to other liver function tests (bilirubin, aspartate, transferase, alkaline phosphatase, or thrombotest). Cytochrome P-450 content and benzpyrene hydroxylase and 7-ethoxycoumarin O-deethylase activities were low in and around the tumor of liver biopsies (ranges, 0.50-6.37 nmol/g, 8.6-383.3 pmol/g/min, and 50-1,100 fl/g/min, resp.) and high in the healthy liver parenchyma (ranges, 13.19-13.30 nmol/g, 566.7-1,158.2 pmol/g/min, and 2,930-6,400 fl/g/min, resp.). The dependence of the *in vitro* results on sampling site makes a comparison of these studies with plasma antipyrine half-life in the liver cancer patients impossible. The results demonstrate that in liver cancer patients, drug hydroxylating capacity depends on the ability of the tumor-free liver parenchyma to metabolize drugs. Hence, quantitative evaluation of liver changes together with tests measuring the synthesis capacity of the liver might be of significance when predicting drug metabolism in patients with hepatic malignancy.

7747 ANGIOGRAPHIC ASSESSMENT OF GROSS ANATOMY OF HEPATOCELLULAR CARCINOMA: COMPARISON OF CELIAC ANGIOGRAMS AND LIVER PATHOLOGY IN 100 CASES. (Eng.) Okuda, K.; Obata, H.; Jinnouchi, S.; Kubo, Y.; Nagasaki, Y.; Shimokawa, Y.; *et al.* Chiba Univ. Sch. Medicine, Chiba 280, Japan). *Radiology* 123(1):21-29; 1977.

The value of selective celiac and hepatic angiography in the diagnosis of liver tumors was studied in 100 patients with hepatocellular carcinoma (HCC). Since the clinical course and mode of treatment of HCC depend on the gross pathology, location, and spread of the tumor, the angiographic findings (hypervascularity, displacement of large arteries, arterioportal shunts, portal regurgitation) were recorded, and their frequency was correlated with the gross anatomical type. Anatomically, 8 patients had diffuse, 15 multinodular, 11 cirrhotic oligonodular, 15 encapsulated, 26 solitary expanding, 11 confluent, and 14 nodular massive tumors. A correct preoperative angiographic diagnosis was made in approximately 80% of the cases.

7748 ORAL FLUOROURACIL THERAPY OF HEPATOMA. (Eng.) Kennedy, P. S.; Lehane, D. E.; Smith, F. E.; Lane, M. (Baylor Coll. Medicine, Houston, TX 77030). *Cancer* 39(5):1930-1935; 1977.

5-Fluorouracil (5-FU, 15 mg/kg/week p.o.) was given to 12 consecutive patients with unresectable hepatoma, and the results were compared with those in 35 similar patients who were given other forms of chemotherapy (7) or symptomatic treatment only (28). Abdominal pain, weight loss, and an abdominal mass were the predominant presenting symptoms in all patients. Alkaline phosphatase, SGOT, bilirubin, albumin, and globulin levels were frequently abnormal. Six of the 12 p.o. 5-FU-treated patients showed an objective response. All six had at least 30% decrease in the subcostal liver span. One patient had normalization of liver function tests and a marked reduction of abdominal pain. Serial liver scans showed a 65% decrease in the size of a right lobe lesion in one patient. Four of the six responders had at least a 50% reduction in SGOT or alkaline phosphatase values, and a fifth had relief from recurrent hypoglycemia. Leukopenia, which required withholding 5-FU or reduction in dose, occurred in only two patients. The median survival time for the control and the p.o. 5-FU-treated nonresponder patients was 4 and 6 weeks, resp. The median survival for the six responders was 44 weeks ($p<0.001$).

7749 ABSORPTION OF INORGANIC IRON-($^{59}Fe^{2+}$) IN RELATION TO IRON STORES IN PANCREATIC EXOCRINE INSUFFICIENCY DUE TO CYSTIC FIBROSIS. (Eng.) Heinrich, H. C.; Bender-Gotze, Ch.; Gabbe, E. E.; Bartels, H.; Oppitz, K. H. (Univ. Hosp. Eppendorf, Univ. Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Klin. Wochenschr.* 55(12):587-593; 1977.

Inorganic Fe (^{59}Fe) absorption was studied in 22 children with pancreatic exocrine insufficiency due to cystic fibrosis, and it was related to the amount of stainable diffuse cytoplasmic nonheme storage Fe in the bone marrow macrophages of these children. When Fe storage was within the normal range, the children absorbed 21 ± 9.3% (range, 9.6-38%) of a diagnostic $^{59}Fe^{2+}$ dose (0.56 mg) administered p.o.; this absorption was similar to that observed in control children with normal Fe stores (23 ± 8.7%; range 9-45%). Depletion of Fe stores increased ^{59}Fe absorption to 62 ± 19% (range, 43-95%) in children with cystic fibrosis and to 73 ± 18% (range, 45-100%) in control children. The interruption or continuation of pancreatin maintenance therapy and the simultaneous administration of 1-1.5 g pancreatin did not influence $^{59}Fe^{2+}$ absorption in cystic fibrosis. Since children with cystic fibrosis absorb inorganic and food Fe like normal children (according to the amount of available storage Fe) and since pancreatin does not influence Fe absorption, it is highly improbable that children with cystic fibrosis will develop hemosiderosis, even without pancreatin maintenance therapy.

7750 REDUCED MICROBIAL TRANSFORMATION OF BILE ACIDS IN CYSTIC FIBROSIS. (Eng.) Lefebvre, D.; Ratelle, S.; Chartrand, L.; Roy, C. C. (Hopital Sainte-Justine, Univ. Montreal, 3175, chemin Sainte-Catherine, Montreal H3T 1C5, Quebec, Canada). *Experientia* 33(5):616-618; 1977.

The capacity of fecal flora from 13 patients with cystic fibrosis (CF) to transform bile acids was compared with that from 9 normal children. Chromatography revealed that the microbial transformation of bile acids by incubates of stool homogenates from the CF patients were decreased. A larger percentage of radioactivity was recovered from the spot corresponding to taurocholic acid in the nine CF patients with pancreatic insufficiency (3.1 ± 1.1%) than in controls (0.5 ± 0.07%, $p<0.025$) or in the four CF patients with normal pancreatic function (1.0 ± 0.5%, $p<0.05$). In experiments carried out with labeled glycocholic acid, there was no difference between the three groups. The taurine amide bond was much more vulnerable to hydrolysis than the glycine bond for the three groups. The results of incubations carried out with the cholic and chenodeoxycholic acids showed a significant decrease of dehydroxylation to deoxycholic acid and lithocholic acid in the CF patients with pancreatic dysfunction in comparison with controls ($p<0.005$ for both deoxycholic and lithocholic acids). In addition, the capacity of the stools of the four CF patients with normal pancreatic function for the dehydroxylation of chenodeoxycholic acid to lithocholic acid was lower than that of control stools ($p<0.025$).

7751 PLASMA SHORT-CHAIN FATTY ACIDS IN FULMINANT HEPATIC FAILURE.

(Eng.) Lai, J. C. K.; Silk, D. B. A.; Williams, R. (King's Coll. Hosp., Denmark Hill, London SE5, England). *Clin. Chim. Acta* 78(2):305-310; 1977.

Blood levels of short-chain fatty acids (SCFA) were measured by gas-liquid chromatography in six patients with fulminate hepatic failure (FHF). The patients were all in a grade IV coma when they were admitted (5 had taken an overdose of acetaminophen, 1 had a presumed hepatitis A viral infection), and four patients had evidence of renal failure during the course of their illness. Blood samples were taken from the time of admission to death or when conscious levels improved to grade II or III coma. Patients were treated with full supportive measures, including lactulose, magnesium, vitamins, blood transfusions, and hemodialysis. The initial SCFA levels were similar in patients who subsequently died and in those who survived. Furthermore, the SCFA levels in patients in a deep coma just before death were normal and did not differ from levels in survivors with improved conscious grades. It is concluded that a primary role for SCFA in the pathogenesis of coma in FHF patients appears unlikely.

7752 DISPOSITION KINETICS OF SPIRONOLACTONE IN HEPATIC FAILURE AFTER SINGLE DOSES AND PROLONGED TREATMENT.

(Eng.) Abshagen, U.; Rennekamp, H.; Luszpinski, G. (Med. Klinik und Poliklinik, Klinikum Steglitz, Hindenburgdamm 30, D-1000 Berlin 45, W. Germany). *Eur. J. Clin. Pharmacol.* 11(3): 169-176; 1977.

Spironolactone (SL) pharmacokinetics was studied in six men with histologically verified liver lesions (3 cirrhosis with ascites, 1 cirrhosis without ascites, and 2 acute alcoholic hepatitis with ascites). The treatment schedule was divided in two parts: the first consisted of Aldactone (Ald, 7 mg/kg p.o.) plus ^{3}H-SL (100 μCi p.o.), followed by a 6-day examination of the drug kinetics in the plasma and urine. The second part consisted of Ald (7 mg/kg/day for 12 consecutive days) plus varying doses of saliuretics (furosemide), followed by a second dose of ^{3}H-SL, and the kinetics of the drug were reassessed during the next 6 days. A single dose of Ald did not alter the pattern of fluorigenic metabolites in the plasma; urinary excretion of total radioactivity (47.5%) was also similar to that in healthy controls (52.9%). The 12-day treatment with Ald accelerated the elimination of radioactivity from the plasma markedly and increased urinary excretion of labeled metabolites in four of six patients. The relative decrease in the elimination of radioactivity from the two other patients was probably due to iatrogenic dehydration caused by an overdose of diuretics.

7753 TREATMENT OF PORPHYRIA CUTANEA TARDA BY PHLEBOTOMY.

(Eng.) Ippen, H. (Kliniken der Universitat Gottingen, Hautklinik und Poliklinik, 34 Gottingen, W. Germany). *Semin. Hematol.* 14(2):254-259; 1977.

Three hundred fifty-one patients with porphyria cutanea tarda (PCT) were treated by phlebotomy (weekly withdrawal of 500 ml blood) and then observed for 10-17 yr. Most of the patients (97%) tolerated the phlebotomies and achieved improvement of the cutaneous symptoms and normalization of the urinary porphyrin content (but not of its pathological distribution pattern). One-third of the patients had no relapse for at least 6 yr. Even patients who continued to consume large amounts of alcohol stayed in remission for this period. Another one-third of the patients experienced biochemical relapses of varying severity within 2-4 yr after treatment. The last third consisted of (1) patients in whom therapy was stopped by the patient because of disappearance of cutaneous symptoms or completion of treatment and (2) patients lost to follow-up. Some were reexamined later and assigned to one of the other two groups. In all patients, the liver profile (transaminase level and BSP retention) and hypergammaglobulinemia generally returned to normal. Hemoglobin values rose above 16 g/100 ml 3 months prior to elevation of the urinary porphyrin values. Serum iron levels, which normalized 2-3 months after phlebotomy, rose to pathologic values 3-6 months after completion of treatment. Diabetes mellitus, which occurred in approximately one-fifth of the patients, persisted. The hypertrichosis in some female patients reappeared prior to repeated elevation of urinary porphyrin. Diminished porphyrin content, reduction of siderosis, and decreased fatty degeneration were observed in three patients who died from unrelated causes. In summary, the treatment of PCT with phlebotamies is effective and leads to the disappearance of cutaneous symptoms, amelioration of increased urinary excretion of porphyrins, and improvement of most other abnormalities except diabetes.

7754 PORPHYRIN METABOLISM IN PORPHYRIA CUTANEA TARDA.

(Eng.) Elder, G. H. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XN, Wales). *Semin. Hematol.* 14(2):227-242; 1977.

In this review, the abnormalities of porphyrin storage and excretion that characterize porphyria cutanea tarda (PCT) and their relation to the enzymes of heme biosynthesis in the liver are discussed. The abnormalities of porphyrin metabolism in PCT can be related to a single primary enzyme defect--a decrease in hepatic urogen decarboxylase activity. The situations in which PCT arises are so varied that the cause of the decrease in urogen decarboxylase is not likely to be the same in all cases. It is concluded that increased δ-aminolevulinate formation, resulting from alcohol, iron overload, or estrogens or perhaps from synergism between different causative agents, is the main determinant of the ability of these agents to produce PCT in susceptible individuals.

7755 HEPATIC SIDEROSIS AND PORPHYRIA CUTANEA TARDA: RELATION OF IRON EXCESS TO THE METABOLIC DEFECT. (Eng.) Felsher, B. F.; Kushner, J. P. (Veterans Admin. Hosp., 5901 E. 7th St., Long Beach, CA 90822). *Semin. Hematol.* 14(2):243-251; 1977.

Clinical evidence in support of a role for Fe in the pathogenesis of porphyria cutanea tarda (PCT) and the biochemical alterations that result from excess Fe are reviewed. Hepatocellular and Kupffer cell siderosis with significant uroporphyrinuria is the most common (≥80%) abnormality of Fe metabolism in PCT patients. Although reduction of the Fe stores causes a biochemical remission, the pathogenetic significance of the hepatic Fe content in PCT has not been clearly defined. Fe might play only a permissive role in porphyrin metabolism. Fe augments the induction of hepatic δ-aminolevulinic acid synthetase (ALA-S) activity and increases porphyrin synthesis in animals. Any consideration of the role of Fe in the pathogenesis of PCT must take into account the clinical observation than an Fe overload alone does not induce the disease. This suggests that there is an underlying biochemical defect in PCT patients resulting in an unusual sensitivity of these patients to the effects of Fe and perhaps other agents, e.g., alcohol and estrogens. That such a defect may be genetically determined is supported by the finding of decreased urogen decarboxylase activity in the RBC and liver of PCT patients. It is concluded that two primary factors are essential for the full biochemical expression of PCT: an inherited enzyme defect, decreased urogen decarboxylase activity, and an acquired factor, hepatic siderosis.

7756 CLINICAL IMPLICATIONS OF BILE ACIDS IN PEDIATRICS. (Eng.) Roy, C. C.; Weber, A. M. (No affiliation given). *Clin. Gastroenterol.* 6(2):377-395; 1977.

7757 HEPATIC NECROBACILLOSIS: REPORT OF A CASE RESEMBLING METASTATIC TUMOR. (Eng.) Young, E. J.; Harper, W. K.; Taylor, R. L. (Veterans Admin. Hosp., 2002 Holcombe Blvd., Houston, TX 77211). *Arch. Intern. Med.* 137(6):804-807; 1977.

7758 ABNORMAL RED CELL METABOLISM IN PATIENTS WITH HEPATO-BILIARY DISORDERS: INCREASED SUSCEPTIBILITY TO THE OXIDATIVE STRESS. (Eng.) Yawata, Y.; Kitajima, K.; Koresawa, S.; Yamada, O.; Shibata, S. (Kawasaki Medical Sch., Kurashiki, Okayama, Japan). *Acta Haematol. Jpn.* 40(1):9-15; 1977.

7759 POLYCYSTIC DISEASE OF THE LIVER: ANGIOGRAPHIC DIAGNOSIS. (Eng.) Brun, B.; Palbol, J. (Central Hosp., Hillerod, Denmark). *Acta Radiol. Diagn.* 18(2):241-247; 1977.

7760 REYE'S SYNDROME: A REVIEW OF SIX CASES. (Eng.) Holmes, G. L. (Univ. Virginia Sch. Medicine, Charlottesville, VA 22901). *Va. Med.* 104(7):466-468; 1977.

7761 THE VALUE OF LAPAROSCOPY IN THE DIAGNOSIS OF PRIMARY CANCER OF THE LIVER. (Eng.) Vilardell, F. (Hospital Santa Cruz y San Pablo, Barcelona 13, Spain). *Endoscopy* 9(1):20-22; 1977.

7762 A CASE REPORT OF PRIMARY HEPATIC CARCINOMA WITH PROLONGED HB VIRUS INFECTION AND MONO-CLONAL GAMMOPATHY. (Eng.) Tsuji, T.; Tokuyama, K.; Naito, K.; Okasaki, S.; Shinohara, T.; Araki, K.; *et al.* (Okayama Medical Sch., 5-1, 2-chome, Shikatacho, Okayama 700, Japan). *Gastroenterol. Jpn.* 12(1): 69-75; 1977.

7763 TREATMENT OF ACUTE HEPATIC ENCEPHALOPATHY WITH L-DOPA. (Eng.) Chajek, T.; Berry, E. M.; Friedman, G.; Abramsky, O. (Hadassah Medical Organization, Kiryat Hadassah, Jerusalem, Israel). *Postgrad. Med. J.* 53(619):262-265; 1977.

7764 THE NATURAL HISTORY OF LIVER DISEASE IN FORMER DRUG USERS. (Eng.) Cherubin, C. E.; Schaefer, R. A.; Rosenthal, W. S.; McGinn, T.; Forte, F.; Purcell, R.; Walmsley, P. (Jewish Hosp. and Medical Center of Brooklyn, 555 Prospect Place, Brooklyn, NY 11238). *Am. J. Med. Sci.* 272(3):244-253; 1976.

7765 CHOLESTYRAMINE THERAPY AND INTESTINAL OBSTRUCTION IN INFANTS. (Eng.) Lloyd-Still, J. D. (Children's Memorial Hosp., 2300 Children's Plaza, Chicago, IL 60614). *Pediatrics* 59(4):626-627; 1977.

7766 ROENTGENOLOGICALLY VISIBLE FATTY LIVER IN CYSTIC FIBROSIS. (Eng.) Gibson, B.; Levin, D.; Currarino, G.; Weinberg, A. (Univ. Texas Health Sciences Center, 5323 Harry Hines Blvd., Dallas, TX 75235). *Pediatrics* 59(5):778-780; 1977.

7767 PROPER MANAGEMENT OF HEPATIC ADENOMA ASSOCIATED WITH ORAL CONTRACEPTIVES. (Eng.) Chan, C. K.; Detmer, D. E. (Univ. Wisconsin Center for Health Sciences, Madison, WI). *Surg. Gynecol. Obstet.* 144(5):703-706; 1977.

7768 HEPATOCELLULAR CARCINOMA IN THE RHODESIAN AFRICAN. (Eng.) Thomas, G. E.; Wicks, A. C. B.; Clain, D. J.; Loon, N.; Seggie, J.; Bramstom, B. (Middlesex Hosp., Mortimer St., London W1N 8AA, England). *Am. J. Dig. Dis.* 22(7):573-581; 1977.

7769 CHRONIC ACTIVE HEPATITIS AND CIRRHOSIS IN WILSON'S DISEASE. (Eng.) Johnson, R. C.; DeFord, J. W.; Gebhart, R. J. (Wilford Hall U.S. Air Force Medical Center/SGHMG, Lackland Air Force Base, TX 78236). *South. Med. J.* 70(6):753-754; 1977.

7770 ANGIOMATOUS HAMARTOMA AND UNSUSPECTED WILM'S TUMOR IN A CHILD WITH IDIOPATHIC CONGENITAL HEMIHYPERTROPHY. (Eng.) Trazo, L. G.; Baehner, R. L.; Gonzales-Crussi, F.; Fitzgerald, J.; Grosfeld, J. L. (James Whitcombe Riley Hosp. Children, 1100 W. Michigan St., Indianapolis, IN 46202). *J. Clin. Hematol. Oncol.* 7(3):833-838; 1977.

See also, 7293, 7402, 7404, 7442, 7528, 7529, 7531, 7542, 7558, 7571, 7625, 7637, 7654, 7655, 7658, 7667, 7779, 7811, 7827, 7855, 7858, 7859, 7860, 7866, 7869, 7880, 7886, 7895.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

7771 BREAST MILK JAUNDICE: AN IN VITRO STUDY OF THE EFFECT OF FREE FATTY ACIDS ON THE BILIRUBIN-SERUM ALBUMIN COMPLEX. (Eng.) Yong, F. C.; Cheah, S. S. (Dept. Chemistry, State Univ. New York, 1400 Washington Ave., Albany, NY 12222). *Res. Commun. Chem. Pathol. Pharmacol.* 17(4):679-688; 1977.

The quantity of fatty acids required to displace bilirubin from its bovine serum albumin (fraction V) binding sites was studied to ascertain the possible effect played by free fatty acids on the development of the breast milk jaundice syndrome. The concentrations of bilirubin and bovine serum albumin were measured spectrophotometrically. Bilirubin binding to albumin was followed by measuring the shift in absorption maximum, 437 nm to 468 nm, as well as by thin-layer chromatography (TLC). Oleic acid concentrations <1.2 mg%, when added to the bilirubin-albumin conjugate, increased the absorption maximum at 468 nm with a concomitant decrease in absorbance close to 410 nm. Oleic acid concentrations >1.1 mg% decreased the absorption maximum at 468 nm and shifted the maximum toward shorter wavelengths while increasing the absorbance at 410 nm. Binding constants calculated for the bilirubin-albumin complex were $K_1=4.6 \times 10^5$ M^{-1} and $K_2=1.3 \times 10^4$ M^{-1}, which are similar to values reported in the literature. A concentration of oleic acid of greater than 1.1 mg% was required to initiate bilirubin displacement from the bovine-albumin complex, and a similar result was obtained with stearic, palmitic, and linoleic acids. TLC experiments showed that oleic acid (9.9 mg%) released about 50% of the bilirubin from the complex of bilirubin-albumin (1:2 molar ratio). A decreased quantity of oleic acid (4.9 mg%) also released a large amount of bilirubin when added to a solution containing a lower bilirubin-albumin molar ratio (1:1). Since oleic and palmitic acid concentrations are high in breast milk, an infant may ingest enough fatty acid to influence bilirubin binding; this effect coupled with the rate of heme breakdown and the activation of liver glucuronyl transferase may accentuate breast milk jaundice.

7772 A MULTIFACTORIAL SURVEY OF NEONATAL JAUNDICE. (Eng.) Jeffares, M. J. (British Military Hosp., Rinteln, BFPO 29, England). *Br. J. Obstet. Gynaecol.* 84(6):452-455; 1977.

The importance of the induction of labor using oxytocin and of other factors in the development of neonatal jaundice was analyzed in a retrospective survey of 981 deliveries. Of these infants, 84 developed hyperbilirubinemia (total serum bilirubin >222 μM). There were no statistically significant differences between the normal and the hyperbilirubinemic infants with regard to maternal age, parity, length of gestation, or birth weight. In 22 hyperbilirubinemic infants, labor was spontaneous, without the administration of oxytocin. Low, medium, or high doses of oxytocin (i.e., 2-16, 16-64, and >64 mU/min) were administered for the augmentation or induction of labor in 18, 31, and 31 of the remaining cases, resp. The incidence of jaundice was significantly higher ($p<0.001$) in association with the use of medium or high doses of oxytocin. When augmented spontaneous labors and induced labors were compared separately with nonaugmented spontaneous labor, only induced labors showed a significant excess of jaundiced babies, which suggests that induction itself might be a contributory factor in the development of neonatal jaundice. Cigarette smoking, Apgar score, vitamin K analogues, and intrauterine growth retardation were not significantly related to neonatal jaundice. The results suggest that high doses of oxytocin should be used with caution.

7773 THERAPEUTIC EFFICACY OF URIDINE DIPHOSPHOGLUCOSE (UDPG) IN NONHEMOLYTIC FAMILIAL JAUNDICE: METABOLIC STUDY IN A PATIENT WITH DUBIN-JOHNSON SYNDROME. PART II.

(Ita.) Cortellazzo, S.; Orlando, R.; Ortolani, C.; Dal Brun, G.; Okolicsanyi, L. (Istituto di Clinica Medica Generale I, Universita di Padova, Padua, Italy). *Clin. Ter.* 77(5):459-472; 1976.

The pathophysiology of chronic idiopathic jaundice (Dubin-Johnson syndrome) was analyzed in a 25-yr-old man presenting with this disease. Liver function studies included bilirubin turnover and transport, BSP excretion, indocyanine green clearance, cholecystography, and percutaneous cholangiography. Total functional liver mass was evaluated by galactose excretion and drug metabolizing capacity by antipyrine clearance. The patient was given 80 mg/day of parenteral uridine diphosphoglucose (UDGP) for 14 days, followed by a second course 7 days later of 50 mg/day for 30 days. To investigate the combined therapeutic effect of UDPG and sodium phenobarbital, therapy was extended 30 additional days with 50 mg/day of UDPG i.m. and 150 mg/day of sodium phenobarbital p.o. UDPG had a favorable effect upon bilirubin metabolism, with a reduction of bilirubinemia and a net improvement in pigment kinetics. There was also a net increase in antipyrine clearance, and it was possible to visualize the gallbladder, which could not be seen in pretreatment radiographs. Combined UDPG-phenobarbital treatment produced a further reduction in bilirubinemina and an amelioration of other clinical findings.

7774 THE DUBIN JOHNSON SYNDROME AND PREGNANCY.

(Eng.) Seligsohn, U.; Shani, M. (Chaim Sheba Medical Center, Tel Aviv Univ., Tel Hashomer, Israel). *Acta Hepatogastroenterol.* 24(3):167-169; 1977.

Fetal mortality was studied in 18 patients with the Dubin-Johnson Syndrome (DJS). A fetal mortality of 16% was observed in 75 pregnancies in the 18 DJS patients. This value was not significantly different from the 10% mortality observed in 81 pregnancies in 15 matched controls. Jaundice was accentuated in 54% of pregnancies in the DJS patients and its time of onset was variable. In six instances, jaundice was observed only following delivery. These data do not support previous studies that have suggested that the frequency of fetal mortality in DJS is high.

7775 PRESENT STATUS OF THE CLINICAL, NOSOGRAPHICAL, PHYSIOPATHOLOGICAL, AND THERAPEUTIC FEATURES OF GILBERT'S ICTERUS. THERAPEUTIC ACTION OF ENZYMIC INDUCTORS WITH RESPECT TO UNCONJUGATED BILIRUBIN ICTERUS.

(Ita.) Lovisetto, P.; Giorcelli, W.; Actis, G. C.; Biarese, V. (Medical Clinic, Univ. Turin, Turin, Italy). *Minerva Med.* 68(2):73-81; 1977.

7776 RECENT AND CHANGING CONCEPTS OF HYPERBILIRUBINEMIA AND ITS MANAGEMENT IN THE NEWBORN.

(Eng.) Seligman, J. W. (Univ. Louisville Sch. Medicine, 500 S. Preston, Louisville, KY 40201). *Pediatr. Clin. North Am.* 24(3):509-527; 1977.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

7777 CLINICAL AND EXPERIMENTAL ASPECTS OF PARACETAMOL HEPATOTOXICITY.

(Eng.) Williams, R.; Davis, M. (King's Coll. Hosp. Medical Sch., London, England). *Acta Pharmacol. Toxicol.* 41(Suppl. 2):282-298; 1977.

The pattern of urinary conjugates of paracetamol in normal volunteers after therapeutic doses of the drug and patients admitted to hospital early after suicidal attempts was studied because the number of deaths due to self-poisoning with this drug has increased. In normal volunteers, 90% of a therapeutic dose of paracetamol was metabolized by hepatic enzymes and excreted into urine as glucuronide and sulfate conjugates, with small amounts of cysteine and mercapturic acid conjugates, within 12 to 24 hr of ingestion. As the administered dose of paracetamol was increased, marked changes were observed in the ratios of the conjugates, with less of the drug appearing as the glucuronide and sulfate conjugates and a higher proportion as the cysteine and mercapturic acid conjugates in the urine. The quantity of paracetamol ($[^{14}C]$ring-labeled) metabolite bound within the liver of rats (54 ± 5.4-358 ± 37.0 nmol/g wet liver), which correlates with the degree of hepatic necroses (1.3 ± 1.5-39.3 ± 4.4%), increases in proportion to the rate of urinary excretion of cysteine and mercapturic acid conjugates (0.08 ± 0.02-0.60 ± 0.05 nmol/24 hr) following varying doses of the drug (0.82-5.80 nmol/rat). Alpha mercapto propionyl glycine (α MPG) appeared to prevent the deleterious effects of the bound reactive metabolite of paracetamol, although the quantity of covalently bound paracetamol metabolite in the livers of rats receiving α MPG was not significantly less than that observed in animals not receiving this compound. It is suggested that this protective action would normally be exerted by hepatic reduced glutathione and that α MPG substitutes for the reduced glutathione in this function. It is concluded that neither depletion of hepatocellular glutathione nor covalent binding of the reactive paracetamol metabolite produce hepatocellular necrosis if present singly, but if they coexist, then hepatic damage ensues.

7778 FATAL HEPATIC NECROSIS AFTER HALOTHANE ANESTHESIA IN A BOY WITH JUVENILE RHEUMATOID ARTHRITIS: A CASE REPORT. (Eng.) Campbell, R. L.; Small, E. W.; Lesesne, H. R.; Levin, K. J.; Moore, W. H. (North Carolina Memorial Hosp., NC). *Anesth. Analg. (Cleve.)* 56(4):589-593; 1977.

7779 ABNORMAL LIVER FUNCTION IN CHRONIC HYPERVITAMINOSIS A. (Eng.) Farrell, G. C.; Bhathal, P. S.; Powell, L. W. (Royal Brisbane Hosp., Herston 4029, Queensland, Australia). *Am. J. Dig. Dis.* 22(8):724-728; 1977.

7780 POSSIBLE ISONIAZID-INDUCED HEPATOTOXICITY IN A TWO-YEAR-OLD CHILD [Letter to Editor]. (Eng.) Walker, S. H.; Park-Hah, J. O. (Dept. Pediatrics, Univ. Maryland, MD). *J. Pediatr.* 91(2): 344-345; 1977.

See also, 7451, 7530, 7742, 7764, 7767.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

7781 HEPATITIS A IN MILITARY FAMILIES: ANATOMY OF AN EPIDEMIC. (Eng.) Nowosiwsky, T.; Irwin, G. R., Jr.; Ferguson, J. A.; Randall, D. H. (Walter Reed Army Inst. Res., Washington, DC 20012). *Milit. Med.* 142(9):693-695; 1977.

The transmission and control of an outbreak of hepatitis A infection in a group of military families were studied. The outbreak involved 14 persons. It was shown that the outbreak was person-propagated, and that it occurred by the oral route. The index case was a woman who visited friends almost daily and had given two parties that the patients had attended. The report includes a case of aplastic anemia that occurred following the outbreak.

7782 VIRAL HEPATITIS AMONG PRACTISING DENTISTS. (Eng.) Nicholas, N. K. (Sch. Dental Nurses, Auckland, New Zealand). *N.Z. Med. J.* 85(588):413-416; 1977.

The incidence of viral hepatitis was assessed among a group of 242 Auckland dentists. A questionnaire survey revealed 47 episodes of viral hepatitis in 45 dentists; 7 were reported before the commencement of treating patients as dental students, 5 while treating patients as dental students, and 34 after graduation and while engaged in clinical practice. Twenty-two episodes were diagnosed as infectious hepatitis, 5 were diagnosed as serum hepatitis, and the remaining 13 were not differentiated. A literature review reveals that Auckland practicing dentists show a markedly higher hepatitis infection rate than similar groups of American dentists. The incidence of viral hepatitis among practicing dentists in Auckland appears to be rising. This study supports the view that dentists are at higher risk of contracting viral hepatitis than the general population because of the nature of their occupation.

7783 ROLE OF SEXUAL AND NON-SEXUAL PRACTICES IN THE TRANSMISSION OF HEPATITIS B. (Eng.) Lim, K. S.; Wong, V. T.; Fulford, K. W. M.; Catterall, R. D.; Briggs, M.; Dane, D. S. (Middlesex Hosp., London W1N 8AA, England). *Br. J. Vener. Dis.* 53(3):190-192; 1977.

Medical, social, and sexual histories were taken from 198 men attending a department for sexually transmitted diseases. Their blood was tested for hepatitis B surface antigen (HBsAg) and its antibody (anti-HBs) and also for syphilis and liver function. Of the 30 homosexual and 46 bisexual patients, 10 and 17, resp., were HBsAg- or anti-HBs-positive; in contrast, only 6 of 117 heterosexual patients were anti-HBs-positive. Hepatitis B appeared to be transmitted sexually rather than by other means, but it was not possible to link its transmission with any particular homosexual practice. However, risk of infection increased considerably with the number of sexual partners and nearly half of those with more than 40 sexual partners had been infected.

7784 AUSTRALIA ANTIGEN AND THE BIOLOGY OF HEPATITIS B.

(Eng.) Blumberg, B. S. (Inst. Cancer Res., Fox Chase Center, Philadelphia, PA 19111). *Science* 197(4298):17-25; 1977.

Events leading to the discovery of the Australia antigen, or the hepatitis B surface antigen (HBsAg), are described. HBsAg is very stable and can be removed from Dane particles by the action of detergents to reveal the core, which has its own antigen (HBcAg). Antibodies to both these antigens (anti-HBs and anti-HBc) can be detected in human blood by immunological techniques. Efforts to produce an effective vaccine against viral hepatitis are in progress. The variations in response to infection with hepatitis B, familial distributions of responses to this infection, sex of the offspring and the fertility of infected parents, primary hepatic carcinoma, transmission by insects, hepatitis B as a polymorphism, and bioethics and the carrier state of hepatitis are the other topics discussed. With the availability of serologic and environmental tests for hepatitis B, it is now possible to begin the design of control measures for this disease. If hepatitis B vaccine is found to be effective, it may also be of value in preventing the development of the carrier state of the disease.

7785 FREQUENCY OF HEPATITIS B SURFACE ANTIBODY (ANTI-HBs) IN VARIOUS CANADIAN POPULATIONS AS MEASURED BY MODIFIED SOLID-PHASE RADIOIMMUNOASSAY.

(Eng.) Bishai, F. R.; MacMillan, S.; Dempster, G.; Rhodes, A. J.; Spence, L.; Wrobel, D. M. (Ontario Ministry Health, Box 9000, Terminal A, Toronto, Ontario, Canada M5W IR5). *Can. J. Microbiol.* 23(1): 92-99; 1977.

A sensitive, short-incubation, solid-phase radioimmunoassay (RIA) for detecting antibody to hepatitis B surface antigen (anti-HBs) is described. The technique consists of coating polystyrene tubes with sera positive for HBsAg, labeling HBsAg with ^{125}I, 4-hr incubation of the test sample with ^{125}I-HBsAg, and assessing the remaining radioactivity by a gamma counter or a liquid scintillation spectrometer. Positive sera were confirmed by a passive hemagglutination (PHA) and counterelectrophoresis (CEP) assay. There was 97.7% agreement between the RIA and PHA assays. From 1973 to 1975, this RIA was used to detect anti-HBs in HBsAg-negative specimens from suspected hepatitis patients and laboratory staff members. Of 5,869 specimens tested, 647 contained anti-HBs. The incidence of anti-HBs showed significant variability in different populations. According to a statistical analysis, the populations could be classified into three categories: (1) students and administrative staff, in whom the incidence of anti-HBs was 0% (low-risk group); (2) microbiology, pathology, and histology technologists, and the staff from a renal dialysis unit in a general hospital, in whom the incidence of anti-HBs ranged from 9% to 16% (overall frequency, 12.8%; intermediate-risk group); and (3) a group consisting of biochemistry and hematology technologists and pathologists, in whom the incidence of anti-HBs ranged from 26.6% to 44.3% (overall frequency, 39.5%; high-risk group).

7786 HEPATITIS B IN SUBJECTS TREATED WITH A DRUG CONTAINING IMMUNOGLOBULINS.

(Eng.) Petrilli, F. L.; Crovari, P.; De Flora, S. (Inst. Hygiene, Univ. Genoa, Via Pastore 1, 16132 Genoa, Italy). *J. Infect. Dis.* 135(2):252-257; 1977.

In late 1974 and early 1975, >100 cases of viral hepatitis occurred in Italians who had received s.c. injections of the drug Trilergan, which was prescribed for the treatment of allergies. The drug contains, in one 1-ml dose, 12 mg human immunoglobulins, 0.15 μg histamine hydrochloride, 0.15 μg serotonin, 0.1 mg sodium merthiolate, 9 mg NaCl, and 20 mg mannitol. Epidemiologic and laboratory investigations provided evidence that the original immunoglobulins, all drug lots in the series containing these immunoglobulins, and sera from 28/30 patients were all positive for hepatitis B surface antigen (HBsAg) subtype *adw*, which is relatively rare in Italy. Sera collected 8.0 and 5.5 months, resp., after the onset of symptoms from the two patients who were not HBsAg-positive were positive for anti-HBs (*adw* specificity). The sera of three healthy, viral hepatitis-free subjects who had received the HBsAg-positive series drug had circulating anti-HBs. The clinical course of the disease was consistent with typical forms of icteric hepatitis in all patients examined. The average incubation period was 111-143 days, and there was an inverse relationship between the number of doses administered and the length of the incubation period. The possibility that immunoglobulins can transmit hepatitis B raises a number of problems concerning the control and use of these blood products.

7787 ABO BLOOD GROUPS AND HBsAG SUBTYPES AND TITERS IN HEALTHY CARRIERS.

(Eng.) Babes, V. T.; Steiner, N.; Lenkei, R.; Buzernescu, G. (Stefan S. Nicolau Inst. Virology, Bucharest 4, Sos. Mihai Bravu 283, Rumania R-74339). *Vox Sang.* 33(4):252-256; 1977.

The distribution of ABO blood groups in 457 healthy hepatitis B surface antigen (HBsAg) carriers was investigated. HBsAg was detected by counterelectrophoresis; the HBsAg subtype was identified by immunodiffusion in 317 cases. The *ay* subtype was the most common subtype, with an *ay/ad* ratio of 82/18. The percentages of blood groups, O, A, B, and AB among the 457 antigen carriers were 31.9, 43.9, 13.9, and 10.3, resp., while those of a normal population were 42, 43, 11, and 4, resp., There were significant differences in the incidence of HBsAg/*ad* according to blood group; the *ad* subtype was detected in only 17% of the type O sera, while this incidence in type AB sera was 33%. The results suggest the possibility that susceptibility to HBsAg is regulated by a genetic mechanism.

7788 HBeAg AND ANTI-HBe IN ACUTE HEPATITIS PATIENTS AND HBsAg CARRIERS.

(Ita.) Zanetti, A. R. (Istituto di Virologia, Universita di Milano, Via Pascal 38, 20133 Milan, Italy). *Boll. Ist. Sieroter. Milan.* 56(1):76-78; 1977.

Serial samples of serum from 44 patients with acute hepatitis B were examined by immunodiffusion and radioimmunoassay to identify hepatitis B antigen (HBeAg) and its antibody (anti-HBe). HBeAg was detected in the serum of 5 patients, anti-HBe in 12. Two patterns of events emerged: (1) HBeAg was found only in samples collected during the early acute phase of the illness, but anti-HBe could not be detected at any time; (2) HBeAg was not found during the acute phase, but anti-HBe was detected 4 to 6 weeks after the onset of clinical jaundice, when hepatitis B surface antigen (HBsAg) was still present but before the appearance of anti-HBs. HBeAg was persistently found in the sera of 12/16 chronic renal failure patients that were long-term carriers of HBsAg and anti-HBe was found in 2. Anti-HBe was detected in 33/50 asymptomatic HBsAg carriers, HBeAg in only 1. HBeAg and anti-HBe were not detected in any of the 15 patients with HBsAg-negative acute or fulminating hepatitis or in any of 20 healthy individuals that had no serological evidence of past or current hepatitis B virus (HBV) infection (negative controls). The data confirm a specific association between the determinant and HBV, and they imply a correlation of HBeAg persistence with HBV infectivity and of anti-HBe with asymptomatic carriage of surface antigen.

7789 EARLY DIAGNOSIS OF HEPATITIS B BY DANE PARTICLE ASSOCIATED DNA POLYMERASE ASSAY.

(Eng.) Cappel, R.; de Cuyper, F.; van Beers, D.; Toppet, M.; Cadranel, S. (Dept. Virology, Inst. Pasteur du Brabant, Brussels, Belgium). *J. Gen. Virol.* 36(1):217-220; 1977.

One hundred and seventy-eight subjects exposed to hepatitis B and 120 hemodialyzed patients were investigated for the presence of hepatitis B surface antigen (HBsAg), e antigen, and DNA polymerase as well as for antibody to HBsAg (anti-HBs). A positive correlation between the presence of e antigen and of DNA polymerase was observed in 83% of the patients on hemodialysis who developed hepatitis B but in only 9% of the 178 other patients who developed the same disease. The results suggest that the DNA polymerase assay may enable an earlier diagnosis of hepatitis B than does radioimmunoassay for HBsAg; in addition, DNA polymerase might be present in the blood in the absence of HBsAg in cases of confirmed hepatitis B.

7790 SERUM GLYCOPROTEINS IN THE LIVER DISEASES. III. DESIALYLATED GLYCOPROTEINS IN THE ACUTE HEPATITIS.

(Eng.) Arima, T.; Motoyama, Y.; Yamamoto, T.; Nagata, K.; Kondo, T. (Okayama Univ. Medical Sch., Okayama, 700, Japan). *Gastroenterol. Jpn.* 12(2):39-42; 1977.

Circulated desialylated glycoprotein (DGP) levels were determined in 20 normal subjects, 7 patients with acute hepatitis (during the peak of illness), 11 patients recovering from acute hepatitis, and in 4 patients with fulminating hepatitis. The levels were followed throughout the course of acute hepatitis in one patient and during fulminant hepatitis in another patient. In the former patient, the serum DGP level was elevated on the first observation; it increased thereafter, reaching a peak on the eighth day of hospitalization. The DGP level returned to normal before the SGPT and serum bilirubin levels did. In the patient with fulminating hepatitis, the DGP level was increased on the initial observation; it increased thereafter, and the patient died on the fourth hospital day. The mean DGP levels in the normal subjects, the patients with acute hepatitis, and the patients with fulminating hepatitis were 3.24 ± 0.91, 5.81 ± 0.99, and 12.6 ± 2.92 ng/10 μl, resp.; the levels were increased significantly ($p<0.001$) in acute and fulminating hepatitis, in comparison with controls. A significant difference ($p<0.001$) in the level between acute hepatitis at the peak of illness and fulminating hepatitis at the peak SGPT activity was also observed. The mean DGP level in 58 sera obtained from 11 patients recovering from acute hepatitis was within the normal range. The results suggest that DGP elevation during the course of fulminant hepatitis represents irreversible parenchymal cell damage.

7791 SERUM ISOENZYMES IN PATIENTS WITH SUBSIDING VIRAL HEPATITIS FOLLOWING BICYCLE ERGOMETER LOAD.

(Ger.) Sieber, H.; Weigl, E.; Bach, H. (Zentrallaboratorium der Kreispoliklinik, Friedrich-Engels-Strasse 39, DDR-122 Eisenhuttenstadt, E. Germany). *Dtsch. Gesundheitsw.* 32(30):1419-1423; 1977.

The isozyme patterns of total, mitochondrial, and cytoplasmic SGOT (SGOT-T, SGOT-M, and SGOT-C, resp.) and total, muscle, and liver serum aldolase (ALD-T, ALD-M, and ALD-L) were studied in 40 patients with subsiding viral hepatitis 45 min and 22 hr after a bicycle ergometer load test. The values obtained were compared to pretest values (100%). The patients were subdivided into three groups: (1) 15 were tested

5-9 weeks after the onset of hepatitis, (2) 15 were tested 10-14 weeks after onset, and (3) 10 were tested 15-24 weeks after onset. The load test (2 x 10 min, 50-100 W or 6,000-12,000 kilopond-meters/20 min) was well-tolerated by all patients. Some enzyme activities showed significant changes 45 min after loading. In group 1, ALD-M was 64% of the pretest level; ALD-L 142%, SGOT-T 111%, and SGOT-M 123%; in group 2, SGOT-T was 118%, SGOT-M 122%; in group 3, SGOT-M was 140%. By 22 hr, though, all enzyme activities had returned to normal, and they were not significantly different from pretest values. The short-term increase of ALD-L, SGOT-M, and SGOT-T indicates the involvement of liver cells in the loading test. However, these enzyme assays are insufficient for determining the rehabilitation date of an individual patient in terms of ability to work.

7792 HBsAg AND ANTI-HBs IN STAFF AND PATIENTS OF A PSYCHOPAEDIC HOSPITAL. (Eng.) Faoagali, J. L.; Young, S. A. (Christchurch Hosp., Christchurch, New Zealand). *N.Z. Med. J.* 588(85): 416-420; 1977.

7793 DISTURBANCES OF FAT, CARBOHYDRATE, MAGNESIUM AND PROTEIN BALANCE IN LIVER DISEASES. (Eng.) Bojanowicz, K.; Skarbek-Galamon, C. (Medical Acad. in Lodz, u. Rewolucji 1905 r. 76 m. 1, Lodz, Poland). *Acta Hepatogastroenterol.* 24(3):155-161; 1977.

7794 CLINICAL ASPECTS OF VIRAL HEPATITIS. (Eng.) Trowell, J. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):3-12; 1976.

7795 VIROLOGICAL ASPECTS. (Eng.) Almeida, J. D.; Zuckerman, A. J. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):13-28; 1976.

7796 PATHOLOGICAL ASPECTS. (Eng.) Millward-Sadler, G. H. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):29-54; 1976.

7797 FUTURE POSSIBILITIES. (Eng.) Zuckerman, A. J.; Almeida, J. D. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):55-64; 1976.

See also, 7472, 7528, 7762, 7764, 7878.

LIVER AND BILIARY TRACT

Chronic Hepatitis

7798 ANTIMITOCHONDRIAL ANTIBODIES IN CHRONIC PERSISTANT HEPATITIS. (Ita.) Di Marco, G.; Vandelli, C. (Istituto di Clinica Medica Generale e Terapia Medica dell'Universita di Modena, Modena, Italy). *Minerva Gastroenterol.* 22(3):199-206; 1976.

Circulating antinuclear (ANA), antimitochondrial (AMA), and anti-smooth muscle (SMA) antibodies were determined by immunofluorescence in 114 patients with chronic active hepatitis (CAH), 13 patients with primary biliary cirrhosis (PBC), and twenty-five normal subjects. The serum levels of SGOT, SGPT, bilirubin, cholesterol, IgA, IgG, and IgM, and the presence or absence of hepatitis B surface antigen (HBsAg) were determined. Based upon the presence of AMA, CAH patients were divided into two groups: group A was AMA-negative but ANA-, SMA-, and HBsAg-positive; group B, which consisted almost entirely of HBsAg-negative women, was AMA-positive with evidence of cholestasis. Group B was also hypercholesterolemic and had high IgM levels and high levels of biliary secretion. Differences in SGPT and SGOT levels between CAH group A patients and PBC patients were statistically significant; this difference was not so apparent between CAH group B patients and PBC patients. These patients had been classified histologically as CAH rather than PBC patients. PBC patients were also AMA-negative. AMA is useful in distinguishing between cases of CAH and PBC, especially when the CAH patients have characteristics in common with PBC.

7799 IMMUNOPATHOGENESIS OF CHRONIC HEPATITIS. (Ger.) Storch, W. (Neurologischen Klinik der Karl-Marx-Universitat, Leipzig, E. Germany). *Z. Gesamte Inn. Med.* 32(3):65-69; 1977.

7800 POSSIBILITIES OF HISTOLOGICAL DIAGNOSIS OF THE DEVELOPMENT AND PROGRESS OF CHRONIC

HEPATITIS. (Cze.) Cerny, E. (656 91 Brno, Pekarska 53, Czechoslovakia). *Cas. Lek. Cesk.* 115(48):1479-1482; 1976.

7801 STUDIES OF SOME INDICES OF PIGMENT METABOLISM IN PATIENTS WITH CHRONIC VIRAL HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Bochkova, L. M.; Voronova, G. V. (Leningrad Inst. Pediatric Medicine, Leningrad, USSR). *Ter. Arkh.* 48(12):35-39; 1976.

See also, 7570, 7742, 7769, 7793, 7794, 7795, 7796, 7813.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

7802 CHANGING PATTERN OF ALCOHOLIC LIVER DISEASE IN GREAT BRITAIN: RELATION TO SEX AND SIGNS OF AUTOIMMUNITY. (Eng.) Krasner, N.; Davis, M.; Portmann, B.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5, England). *Br. Med. J.* 1(6075):1497-1500; 1977.

The frequency and prognosis of alcoholic liver disease and the presence or absence of autoantibodies in patients with this disease were compared in 78 women and 215 men. The male:female ratio decreased over the period of the survey due to a significant increase in the proportion of women referred (4.88:1 in 1967-71, compared with 2.11:1 in 1972-75; $p< 0.01$). The incidence of fatty infiltration was significantly higher in men than in women (46/54, $p<0.05$), whereas the incidence of central sclerosing hyaline necrosis was greater in women than in men (9/16, $p<0.025$). When the pattern of liver damage was analyzed according to age, the preponderance of central sclerosing hyaline necrosis was confined to women under 55 yr (30.8%), particularly those aged under 45. There was also a significantly higher incidence among women of both alcoholic hepatitis, with or without cirrhosis ($p< 0.001$), and alcoholic hyaline (60.2% of women versus 34.8% of men, $p< 0.0005$). However, 13 of the 14 patients with hepatoma were men; if patients with cirrhosis only were considered, hepatoma occurred nearly five times more often in men than in women (9.63% and 2.04%, resp.). There was a significant increase in the incidence of smooth muscle antibodies in women with cirrhosis and alcoholic hepatitis (45.4%) compared with the incidence in men (23.4%, $p<0.05$), and this difference was also the case for antinuclear antibodies (31.8% and 8.5%, resp., $p<0.05$). Among patients with histological abnormalities, the mean serum IgG and IgM levels were higher in women than in men (2.076 ± 0.227 versus 1.523 ± 0.192 g/l, $p< 0.05$, and 5.087 ± 1.077 versus 2.616 ± 0.338 g/l, $p< 0.02$, resp. Only 41% of patients who continued to drink were alive at the 5-yr follow-up in contrast to 60% of those who abstained ($p< 0.05$). Overall, men derived significantly greater benefit from abstaining than women; all but one of the 16 men who died had continued to drink, while 9 of the 20 women who died claimed to have stopped drinking ($p<0.05$). These studies suggest that immune mechanisms may play a part in the pathogenesis and progression of alcoholic liver disease in women.

7803 HISTOLOGICAL CHANGES IN THE LIVER AND INDICES OF DRUG METABOLISM IN ALCOHOLICS. (Eng.) Sotaniemi, E. A.; Ahlqvist, J.; Pelkonen, R. O.; Pirttiaho, H.; Luoma, P. V. (Dept. Internal Medicine, Univ. Oulu, SF-90220 Oulu 22, Finland). *Eur. J. Clin. Pharmacol.* 11(4):295-303; 1977.

To test the hypothesis that the ability of alcoholics to metabolize drugs might be related to parenchymal alterations in the liver, 27 chronic alcoholics underwent liver biopsy and, 1 day later, received antipyrine (20 mg/kg, p.o.). Venous blood samples were taken at zero time and 1, 3, 6, 9, 12, 24, 48, and 72 hr later, and the plasma antipyrine level was assessed by gas-liquid chromatography. Histologically, the patients could be divided into four groups: patients with a normal or fatty liver and patients with alcoholic hepatitis or cirrhosis. Patients with a normal liver had a significantly higher amount of hepatic cytochrome P-450 than those with a fatty liver, hepatitis, or cirrhosis. Alcoholics with a normal or fatty liver metabolized antipyrine significantly faster than alcoholics with hepatitis or cirrhosis.

7804 SERUM IMMUNOGLOBULIN A CHANGES IN ALCOHOLIC PATIENTS. (Eng.) Iturriaga, H.; Pereda, T.; Estevez, A.; Ugarte, G. (Instituto de Nutricion y Tecnologia de los Alimentos, Casilla 15138, Santiago 11, Chile). *Ann. Clin. Res.* 9(1):39-43; 1977.

To assess the diagnostic value of determining the serum IgA concentration in alcoholics, IgA and IgG concentrations were determined in 8 alcoholics with normal liver, 7 alcoholics with fatty liver, 8 alcoholics with acute alcoholic hepatitis, 8 alcoholics with fibrosis or cirrhosis, 36 alcoholics with liver failure, 22 nonalcoholic patients with varying degrees of liver failure, and 100 controls. Serum IgA concentrations in the alcoholics with normal liver histology (377.2 ± 37.5 mg%), alcoholics with fatty liver (396.6 ± 54.6 mg%), alcoholics with alcoholic hepatitis (524.4 ± 42.0 mg%), alcoholics with cirrhosis (525.4 ± 98.7 mg%), alcoholics with liver failure (926.6 ± 77.4 mg%), and nonalcoholics with liver damage (357.6 ± 24.0 mg%) were significantly increased in comparison with the controls (248.8 ± 9.3 mg%; $p<0.05$, $p<0.01$, $p<0.001$, $p<0.01$, $p<0.001$, and $p<0.001$ for each group, resp.). IgG concentrations were also raised, but a significantly increased level was only observed in groups with liver damage. There was a clear correlation between IgA concentration and the degree of liver abnormality ($r=1$, $p<0.01$). Using the ratio of IgA/IgG, alcoholics with liver damage could be differentiated from nonalcoholic patients with liver damage. In the alcoholics with liver failure, the IgA and IgG values were similar for patients with short or long abstinence periods. Alcoholic patients with severe liver failure (i.e., two or more of the following: encephalopathy, prothrombin time <30%, total bilirubin >5.0 mg%, serum albumin <1.5 g%) had significantly higher IgA levels than did those with moderate liver failure. The results confirm a remarkable increase in serum IgA concentration in alcoholic patients. The increase in alcoholics without liver damage has not been reported previously.

7805 ALTERATIONS OF LIPID METABOLISM IN HEALTHY VOLUNTEERS DURING LONG-TERM ETHANOL INTAKE.

(Eng.) Belfrage, P.; Berg, B.; Hagerstrand, I.; Nilsson-Ehle, P.; Tornqvist, H.; Wiebe, T. (Dept. Physiol. Chem. 4, Box 750, S-220 07 Lund 7, Sweden). *Eur. J. Clin. Invest.* 7(2):127-131; 1977.

Lipid metabolism was studied in nine healthy men during long-term ethanol intake. The men received ethanol (75 g/day) for 5 weeks. The ethanol was divided into five daily doses and taken so that blood ethanol levels never exceeded 0.04% (weight/volume). During the latter part of the ethanol intake period, there was a significant, transient increase of plasma triglyceride (TG) concentrations followed by reduction to normal levels. A threefold increase in lipoprotein lipase activity (LLA) occurred in biopsy specimens of adipose tissue. An increase of α-lipoprotein concentrations, which correlated significantly with the decrease in plasma TG levels and the increase in adipose LLA, was also observed during the ethanol intake period. No changes were observed in plasma cholesterol and β-lipoprotein levels. A transient, threefold increase of TG concentrations occurred in liver biopsy specimens. Ultrastructural and cytochemical examinations of the biopsy specimens showed hyperplasia of the smooth endoplasmic reticulum, and increased canalicular activity of γ-glutamyl transferase (γ-GT) activity in most subjects towards the end of and after the ethanol intake period. Serum γ-GT levels also increased significantly.

7806 PROTEIN SYNTHESIS AND RELEASE BY LIVER BIOPSY SPECIMENS FROM PATIENTS WITH CHRONIC ALCOHOLIC LIVER DISEASE.

(Eng.) Agostini, C.; Mortara, G.; Curti, M. T.; Pace, G.; Saraceno, G. (Istituto di Patologia Generale, Universita di Milano, Via Mangiagalli, 31, 20133 Milan, Italy). *Rend. Gastroenterol.* 9(1):18-23; 1977.

The effect of alcohol on the synthesis and release of liver proteins was studied in 48 chronic alcoholic patients. The patients underwent liver biopsy, and the specimens were incubated with Ringer's solution containing 2 µCi of ^{14}C-leucine for 4 hr and then homogenized for conventional protein assay. Histomorphologically, 5 liver specimens were found to be normal, 14 showed symptoms of steatosis, 14 of chronic hepatitis, and 15 of cirrhosis. Incorporation of leucine into the hepatic proteins was increased significantly ($0.06>p>0.05$) only in the cirrhosis patients (30,757 counts/min/mg protein, compared to 26,036 in the chronic hepatitis patients, 21,515 in the steatosis patients, and 19,760 in the patients with a morphologically normal liver). Although the amount of released protein was somewhat greater in the patients with steatosis, chronic hepatitis, or cirrhosis, the difference was not statistically significant.

7807 ALCOHOLIC LIVER INJURY.

(Eng.) Williams, R.; Davis, M. (King's Coll. Hosp. and Medical Sch., London SE5, England). *Proc. R. Soc. Med.* 70(5):333-337; 1977.

Patterns of alcoholic liver injury, factors determining the development of alcoholic liver disease, and the role of sex in determining susceptibility to alcoholic liver injury are reviewed. Fatty infiltration of the liver is the earliest lesion detected, and uncomplicated infiltration is generally considered to be benign and readily reversible when alcohol is withdrawn. Alcoholic hepatitis is characterized by necrosis with inflammatory cell infiltration, and the mortality from this condition is 10-30%. Alcoholic cirrhosis is classically micronodular with bands of fibrosis linking adjacent portal tracts and centrilobular areas to produce nodules of lobular size or smaller. It has been estimated that only 30% of heavy drinkers will develop alcoholic hepatitis, and 10% cirrhosis. Although the majority of alcoholics have fatty changes on liver biopsy, up to one-third have no demonstrable abnormality. The mechanism of liver cell necrosis in acute alcoholic hepatitis is not well understood, but possibilities include direct toxicity of alcohol or one of its metabolites, and immune factors. Some studies have suggested that women, particularly those under 45 yr, are more susceptible to cirrhosis and superimposed alcoholic hepatitis. The average age of death for women with cirrhosis was found to be almost 11 yr less than that for men, and women had a higher mortality when they continued to drink.

7808 ADRENOCORTICOSTEROID THERAPY IN ALCOHOLIC HEPATITIS. A PROSPECTIVE, DOUBLE-BLIND

RANDOMIZED STUDY. (Eng.) Blitzer, B. L.; Mutchnick, M. G.; Joshi, P. H.; Phillips, M. M.; Fessel, J. M.; Conn, H. O. (Section Diseases Liver, NIAMDD, NIH, Bethesda, MD 20014). *Am. J. Dig. Dis.* 22(6):477-485; 1977.

The efficacy of adrenocorticosteroid therapy for acute alcoholic hepatitis was evaluated in 33 patients with acute active alcoholic liver disease. These patients were culled from a group of 80 patients who did not meet the admission criteria of a recent history of heavy alcohol consumption, hepatomegaly, total serum bilirubin >5 mg/100 ml, and at least two of the following: SGOT >100 Reitman-Frankel U/ml, serum albumin concentration <3 g/100 ml, or prothrombin time >2 sec over control value. The patients were randomized into two groups: 17 patients were assigned to receive prednisolone, p.o. (10 mg q.i.d. for 14 days, 5 mg q.i.d. for 4 days, 2.5 mg q.i.d. for 4 days, and 2.5 mg b.i.d. for 4 days), and 17 patients were assigned to receive a placebo according to the same schedule. Subsequently, five steroid group patients left the study and were excluded from the analysis. Of the 28 remaining patients, 11 died during hospitalization (6/12 in the steroid group, 5/16 in the placebo group). Gastrointestinal hemorrhage, the hepatorenal syndrome, spontaneous peritonitis, and fungal infections accounted for most of the deaths. There was no significant difference between the two groups in the percentage decrease of serum bilirubin levels during therapy; SGOT and prothrombin time were also similar in the two groups. After 14 days of treatment, mean WBC count and serum albumin concentration were significantly higher in the steroid group. Since the overall mortality and cumulative survival of the patients were not significantly different in the placebo- and prednisolone-treated groups, it was concluded that continuation of treatment would be fruitless.

7809 ALCOHOL AND HYPERTENSION. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8029):122; 1977.

7810 ALCOHOL AND THE LUNG: A BRIEF REVIEW. (Eng.) Heinemann, H. O. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *Am. J. Med.* 63(1):81-85; 1977.

See also, 7411, 7439, 7515, 7742.

LIVER AND BILIARY TRACT

Cirrhosis

7811 HUMAN HEPATIC δ-AMINOLAEVULINATE SYNTHASE: REQUIREMENT OF AN EXOGENOUS SYSTEM FOR SUCCINYL-COENZYME A GENERATION TO DEMONSTRATE INCREASED ACTIVITY IN CIRRHOTIC AND ANTICONVULSANT-TREATED SUBJECTS. (Eng.) Bonkowsky, H. L.; Pomeroy, J. S. (Hepatology Res. Lab., Veterans Admin. Center, White River Junction, VT 05001). *Clin. Sci. Mol. Med.* 52(5):509-521; 1977.

δ-Aminolevulinate (ALA) synthase activity was assessed in liver biopsy specimens from 12 patients with cirrhosis, 5 noncirrhotic patients with seizure disorders treated with anticonvulsants, and 16 healthy controls. Within 1 or 2 days of the biopsy, the patients underwent 24-hr urine collection, and the excretion of porphyrins and their precursors was determined. In the liver homogenates, ALA synthase activity was measured in the presence and absence of an exogenous system for the generation of succinyl-coenzyme A (CoA) that included succinic thiokinase (STK). In the absence of exogenously added STK plus other reagents for the optimum generation of succinyl-CoA, the mean rate of ALA formation was practically identical in homogenates of control subjects (217 U) and both the cirrhotic (193 U) and anticonvulsant-treated (220 U) patients. However, when STK was added, the mean rate of ALA formation in the cirrhotic (1,297 U) and anticonvulsant-treated (1,128 U) patients was significantly greater than that in controls (548 U). Cirrhotic patients excreted more uroporphyrin, but the anticonvulsant-treated patients showed a slightly elevated excretion of porphobilinogen.

7812 CARBOHYDRATE CONTENT OF HUMAN RED CELL MEMBRANE IN PATIENTS WITH CIRRHOSIS OF THE LIVER. (Eng.) Gattegno, L.; Fabia, F.; Cornillot, P. (Laboratoire de Biochime, U.E.R. Experimentale de Medecine et de Biologie Humaine, 74, rue Marcel Cachin, 93000 Bobigny, France). *Clin. Chim. Acta* 77(3):317-321; 1977.

The protein and carbohydrate contents of RBC membranes from 12 patients with liver cirrhosis were compared with those from 12 normal donors, and the effects of RBC aging on these factors were investigated in both groups. The neutral hexoses, sialic acid, fucose, and hexosamine levels were significantly lower in RBC ghosts from cirrhotic patients (40 ± 4, 12.5 ± 1.0, 12.0 ± 1.5, and 12.2 ± 1.2 μg/mg membrane protein, resp.) than those in the healthy subjects (55 ± 5, 17.5 ± 1.0, 21.0 ± 1.8, and 25.0 ± 5.0 μg/mg, resp.; $p<0.001$), and the protein level in the cirrhotic patients (5.51 ± 0.34 mg/ml membrane protein) was significantly higher than that in the normal subjects (4.08 ± 0.60 mg/ml, $p<0.001$). The carbohydrate and protein levels were lower in old RBC membranes than in young membranes of the normal subjects. The carbohydrate levels in membranes from the cirrhotic patients were even lower than the levels in old membranes from the normal subjects. These data suggest that the molecular arrangement of the cirrhotic patients' RBC membrane carbohydrates may differ from that observed in normal subjects. The fact that surface membrane carbohydrates of normal human RBC are significantly decreased with *in vivo* aging suggests the possibility that surface membrane carbohydrates of human RBC might be implicated in the clearance of these RBC.

7813 ABNORMAL FIBRINOGEN HETEROGENEITY AND FIBRINOLYTIC ACTIVITY IN ADVANCED LIVER DISEASE. (Eng.) Lipinski, B.; Lipinska, I.; Nowak, A.; Gurewich, V. (St. Elizabeth's Hosp., 736 Cambridge St., Boston MA 02135). *J. Lab. Clin. Med.* 90(1):187-194; 1977.

Fibrinogen heterogeneity and fibrinolytic activity were studied in the blood of 11 patients with Laennec's cirrhosis, 11 patients with chronic aggressive hepatitis, and 25 healthy controls. The findings in the cirrhotic and active hepatitis patients were similar and are thus presented together. The fibrinolytic activity of the euglobulin fractions was significantly greater ($p<0.01$) in the 22 patients (105 mm^2; range, 80-221 mm^2) than in the controls (72 mm^2; range, 38-175 mm^2). The plasminogen antiactivator content of the patients was only 40% ± 30% of the control level ($p<0.001$), but their total fibrinogen concentration (336 ± 125 mg/100 ml) was not significantly different from that of controls (305 ± 91 mg/100 ml). Plasma electrophoresis studies showed that the concentration of high molecular weight (HMW) fibrinogen was significantly lower ($p<0.001$) in patients (130 ± 82 mg/100 ml) than in controls (203 ± 71 mg/100 ml) and that concentrations of two low molecular weight fractions (LMW and LMW^1) were significantly higher ($p<0.001$) in patients (162 ± 75 and 45 ± 44 mg/100 ml, resp.) than in controls (96 ± 34 and 6 ± 12 mg/100 ml, resp.). In 2/22 patients, the HMW fraction was virtually absent. *In vitro* incubation (37 C for 48 hr) of diluted (1:10) plasma from a patient resulted in almost 50% degradation of a low solubility fibrinogen fraction (HMW) previously added to the sample as well as the appearance of the LMW and LMW^1 fractions. No HMW degradation was observed in an undiluted plasma sample from the same patient. Also, none of the plasma samples from normal subjects after venous occlusion (diluted or undiluted) showed any fibrinogen degradation after 48 hr of incubation. It is concluded that the increased concentration of LMW forms of fibrinogen in the blood of patients with liver disease is probably related to increased *in vitro* degradation rather than to abnormal synthesis.

7814 PLATELET MONOAMINE OXIDASE, PLASMA BENZYLAMINE OXIDASE AND LIVER MIXED FUNCTION OXIDASE IN CIRRHOTIC PATIENTS. (Eng.) Buffoni, F.; Ignesti, G.; Pirisino, R.; Cortesini, C. (Dept. Pharmacology, Univ. Florence, Viale G.B. Morgagni 65, 50134 Florence, Italy). *Med. Biol.* 55(2):109-111; 1977.

The level of monoamine oxidase (MAO) was studied in the liver and platelets of 23 cirrhotic patients, because a decrease in MAO might explain the increase in false neurotransmitters observed in cirrhotic patients. Plasma benzylamine oxidase (BAO) activity and liver mixed function oxidases (MFO) were also investigated. The plasma BAO activity was higher in the cirrhotic patients, but the difference in comparison with 17 controls with cholelithiasis was not statistically significant. The platelet and liver MAO activities in the 13 patients with severe liver cirrhosis (3.54 ± 1.10 and 134 ± 28 nmol substrate oxidized/mg protein/30 min, resp.) were significantly lower than those in controls (8.86 ± 1.45 and 225 ± 29 nmol of substrate oxidized/mg protein/30 min, resp.). Both plasma and platelet oxidases significantly increased in the cirrhotic patients after portacaval shunt. The decrease in MAO activity in both liver and platelets in the cirrhotic patients may support the suggestion that an accumulation of false neurotransmitters occurs, since their precursors are normally degraded by these enzymes.

7815 FAMILIAL HEMOCHROMATOSIS: CHARACTERISTICS OF THE PRECIRRHOTIC STAGE IN A LARGE KINDRED. (Eng.) Rowe, J. W.; Wands, J. R.; Mezey, E.; Waterbury, L. A.; Wright, J. R.; Tobin, J.; Andres, R. (Beth Israel Hosp., Boston, MA 02215). *Medicine (Baltimore)* 56(3):197-211; 1977.

A large family with idiopathic hemochromatosis, in which most of the affected members were in the precirrhotic stage, was studied. The proband, a 54-yr-old man, had clinical manifestations of hemochromatosis. Diagnosis was confirmed upon liver biopsy, which showed macronodular cirrhosis with marked iron deposition in the hepatocytes and Kupffer cells. His family was studied systematically in an attempt to identify members with iron overload; 50 asymptomatic members over the age of 13 yr, spanning three generations, were examined. Liver biopsy specimens were obtained from 31 of these subjects. Increased hepatic parenchymal iron deposition, selected as a marker for the hemochromatosis gene, was present in all 3 generations and in 20/31 specimens. These findings are consistent with an autosomal dominant mode of inheritance with incomplete expressivity. Hepatic fibrosis was seen in six biopsies, but the presence and extent of fibrosis did not correlate with the severity of iron deposition but rather with a history of significant alcohol intake. Serum iron was significantly higher in family members with iron overload (135 ± 11.27 mg/100 ml, compared to 103.2 ± 7.03 mg/100 ml in unaffected members). Transferrin saturation was also greater in the affected members (43.4 ± 3.99% versus 29.9 ± 3.26%). The results of a p.o. glucose tolerance test and an i.v. insulin tolerance test showed that carbohydrate tolerance was impaired in the precirrhotic stage of hemochromatosis, the degree of impairment being related to the severity of iron deposition.

7816 LIVER CIRRHOSIS AND DIABETES MELLITUS. (Ger.) Verlohren, H. J.; Lohmann, D. (Stadtkrankenhaus, Friesenstrasse 8, 7033 Leipzig, E. Germany). *Z. Gesamte Inn. Med.* 32(1):34-37; 1977.

7817 LIVER CIRRHOSIS: CLASSIFICATION, ETIOLOGY, PATHOGENESIS, PROGRESSION, REGRESSION. (Ger.) Holle, G. (Pathologischen Institut der Karl-Marx Univ., Liebigstrasse 26, 701 Leipzig, E. Germany). *Z. Gesamte Inn. Med.* 32(1):1-10; 1977.

7818 POSTHEPATIC LIVER CIRRHOSIS WITHOUT SYMPTOMS: OBSERVATION OVER A 22-YEAR PERIOD. (Ger.) Franken, F. H.; Dietel, J. (Krankenhaus St. Josef, Bergstrasse 6-12, D-5600 Wuppertal-Elberfeld, W. Germany). *Med. Klin.* 72(2):64-66; 1977.

7819 KNOWN FACTORS IN THE PATHOGENESIS OF ASCITES IN LIVER CIRRHOSIS. (Ita.) Sandri, R.; Conte, L. (Ospedale Generale Provinciale, Montebelluna, Treviso, Italy). *Minerva Gastroenterol.* 22(4):283-289; 1976.

7820 RESULTS WITH CITIOLONE IN THE MANAGEMENT OF LIVER CIRRHOSIS. (Ita.) Poletti, T.; Bertola, D. (Ospedale Mauriziano, "Umberto 1," Torino, Italy). *Minerva Gastroenterol.* 23(1):11-19; 1977.

7821 DEPLETIVE TREATMENT OF UNCOMPENSATED LIVER CIRRHOSIS WITH HIGH DOSES OF SPIROLACTONE ONLY. (Ita.) Zotti, S.; Dagnini, G.; Abrahamsohn, C.; De Nadai Frank, A.; Sandri, R. (Via Sografi 31/4, Padova, Italy). *Minerva Med.* 68(7):431-437; 1977.

7822 INVESTIGATION OF THE ACTIVITY OF SERUM AP, LDH, GOT, GAMMA-GT, AND LAP ENZYME ACTIVITIES IN PORPHYRIA CUTANEA TARDA. (Ger.) Simon, N.; Sohar, I.; Berko, G.; Varga, L. (Univ. Dermatology Clinic, Koranyi fasor 8-10, Szeged, Hungary). *Dermatol. Monatschr.* 163(1):36-40; 1977.

See also, 7293, 7529, 7742, 7752, 7754, 7761, 7769, 7779, 7793, 7801, 7809.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

7823 ULTRASOUND: A NEW DIAGNOSTIC APPROACH TO THE JAUNDICED PATIENT. (Eng.) Tsikoff, M. B.; Diaconis, J. N. (Jackson Memorial Hosp., Miami, FL 33141). *JAMA* 238(3):221-223; 1977.

The accuracy of ultrasound in differentiating between intra- and extrahepatic biliary obstruction was studied in 40 patients. Of the 24 patients in whom ultrasound suggested that jaundice was caused by extrahepatic obstruction, this was subsequently verified by surgery or liver biopsy in 23. Of the 16 cases showing no evidence of obstruction, six were confirmed as hepatocellular disease by liver biopsy specimens, and an additional nine were followed medically for periods of 3-9 months, their clinical course being consistent with a diagnosis of intrahepatic cholestasis. Thus, there was one false-positive and one false-negative in this series. Ultrasound can be used routinely to differentiate extrahepatic biliary obstruction from intrahepatic cholestasis. It is noninvasive, has no associated morbidity or mortality, and is considerably less expensive than endoscopic retrograde cholangiopancreatography or transhepatic cholangiography.

7824 CHENODEOXYCHOLIC ACID IN THE MANAGEMENT OF GALL STONES. (Eng.) Batey, R. G. (Royal Free Hosp., Pond St., Hampstead, London NW3 2QG, England). *Drugs* 14(2):116-119; 1977.

The efficacy, toxicity, and mechanisms of action of chenodeoxycholic acid (CDCA) in the treatment of gallstones are reviewed. Possible mechanisms in the production of lithogenic bile and the indications for the use of CDCA in the treatment of cholelithiasis are also discussed. Excessive bile salt loss, oversensitive bile acid feedback, excessive cholesterol secretion, and primary disorders of the gallbladder, bile ducts, or sphincter mechanisms are among the possible mechanisms in the production of lithogenic bile. The ways in which CDCA decreases biliary cholesterol secretion include a drug-induced increase in the bile acid pool, an impairment of enzymes within the cholesterol/bile acid pathway, and a reduction in intestinal cholesterol absorption. Several trials have confirmed the original finding that CDCA, administered in sufficient dosage, leads to the dissolution of cholesterol gallstones in more than 50% of patients. The effectiveness of CDCA therapy depends on the dose used (usually 13-15 mg/kg, but sometimes 18-20 mg/kg), the duration of therapy (usually 6-24 months), and the timing of administration (in the evening as opposed to the morning). The only significant side-effect of CDCA therapy to date has been mild diarrhea, which usually responds to the administration of small doses of cholestyramine. CDCA therapy is usually instituted in poor surgical risks (old or sick patients), patients with anatomical abnormalities of the biliary tree associated with cholelithiasis, and other patients refusing surgery on medical or personal grounds; however, recent work suggests that such therapy may be of value in a wider group of patients. Apparent drug failure should lead to the following steps before the drug is abandoned: an increase in the dosage and a change from morning to nocturnal dosage schedule.

7825 HILAR HEPATOJEJUNOSTOMY IN RESECTION OF CARCINOMA OF THE MAIN HEPATIC DUCT JUNCTION.

(Eng.) Karakousis, C. P.; Douglass, H. O., Jr. (General Surgery Dept. Roswell Park Memorial Inst., Buffalo, NY). *Surg. Gynecol. Obstet.* 145(2):245-248; 1977.

The cases of two male patients, 65 and 52 yr old, with carcinoma of the main hepatic junction in whom reconstruction of the biliary outflow was carried out by hepatojejunostomy are described. Resection followed by reconstruction between a Roux-en-Y loop of jejunum and the hepatic tissue surrounding the bile ducts at the hilum of the liver was carried out in both cases. At 18 and 11 months after surgery, resp., both patients are free from known tumor recurrence and both have normal serum bilirubin levels. Hepatojejunostomy appears to be a safe alternative reconstruction following resection of carcinomas of the proximal hepatic duct.

7826 ON THE CHEMISTRY OF HUMAN PIGMENT GALLSTONES.

(Eng.) Wosiewitz, U.; Schroebler, S. (Institut fur Medizinische Physik der Universitat, D-4400 Munster, W. Germany). *Naturwissenschaften* 64(6):340; 1977.

The chemistry of human pigment gallstones was studied by thin-layer chromatography. Samples submitted to chromic acid degradation for 1 hr (25 C) gave a positive reaction with benzidine when treated beforehand with chlorine. The degradation products of bilirubin, biliverdin, and urobilin reacted in the same way, but not those of melanin. The same material submitted to chromate degradation gave a characteristic reaction with 2,4-dinitrophenylhydrazine. Degradation products of natural melanin did not react spontaneously but gave uncharacteristic colored spots when heated (110 C) for about 30 min. Undefined, barely soluble material from extracted pigment stones and natural melanin, both submitted to the same oxidative degradation conditions, yielded very different degradation products. Thus, pigment stone material and melanin are not identical. The thin-layer chromatograms suggested that pigment stone material turns into maleimides and pyrroledialdehydes during the chromic acid and chromate oxidation; this is also known to be the case for bile pigments. It is thus postulated that residues of pigment stone extractions are derived from bile pigments.

7827 SIGNIFICANCE OF LOW-DENSITY LIPOPROTEIN (LP-X) TEST IN THE DIAGNOSIS OF CHOLESTASIS.

(Ger.) Michel, B.; Ritter, U. (I. Medizinische Klinik, Med. Hochschule Lubeck, Kronsforder Allee 71/73, D-2400 Lubeck, W. Germany). *Z. Gastroenterol.* 14(5):556-569; 1976.

The value of the low-density lipoprotein test (LP-X test) in the diagnosis of cholestasis was determined in 73 patients with hepatobiliary diseases. These diseases were diagnosed morphologically in 53 patients, 27 of whom had cholestasis (6 with obstructive jaundice due to tumor, 7 with cholelithiasis, 4 with hepatitis, 7 with cirrhosis, and 3 with nutritive and toxic liver damage). The LP-X test was positive in 25/27 patients and falsely negative in 2 (1 with cholelithiasis and 1 with diabetes plus advanced cirrhosis). Twenty-six patients did not have cholestasis; the LP-X test was negative in 23/26 patients, falsely positive in 3 (1 with suppurative cholangitis against a background of liver cirrhosis and fatty degeneration, 1 with hepatitis and fatty degeneration following alcohol abuse, and 1 with chronic esophagitis and fibrosing fatty degeneration). Hepatobiliary diseases were diagnosed clinically in 20 patients, 12 of whom had cholestasis (7 with cholelithiasis, 4 with hepatitis, and 1 with nutritive and toxic liver damage). The LP-X test was positive in all cases. The eight patients without cholestasis had negative LP-X tests. The findings indicate that the LP-X test is a reliable and simple tool for the diagnosis of cholestasis, but that it is unsuitable for differentiating between intrahepatic and extrahepatic cholestasis. The etiology of jaundice cannot be established from a positive test. However, it permits the diagnosis of cholestasis with clinically normal alkaline phosphatase activity. The LP-X test is highly sensitive and specific for diagnosing borderline cases of cholestasis when it is combined with the γ-glutamyltranspeptidase alkaline phosphatase test.

7828 EXTERNAL BILIARY-PANCREATIC FISTULAS. (Eng.) Zer, M.; Dintsman, M. (Beilinson Hosp., Petah Tiqva, Israel). *Int. Surg.* 62(3):175-178; 1977.

7829 MECHANISM OF CHOLESTEROL GALLSTONE FORMATION. (Eng.) Coyne, M. J.; Marks, J.; Schoenfield, L. J. (No affiliation given). *Clin. Gastroenterol.* 6(1):129-139; 1977.

7830 GALLBLADDER SURGERY: A REVIEW. (Eng.) Simso, L. A. (Univ. Minnesota Medical Sch., Minneapolis, MN). *Minn. Med.* 60(5):329-334; 1977.

7831 SULPHATION OF BILE ACIDS: LIVER OR KIDNEY [Letter to Editor]? (Eng.) Van Berge Henegouwen, G. P.; Brandt, K. H.; Ruben, A. T.; Van Leusen, R. (Municipal Hosp., Arnhem, Netherlands). *Lancet* 1(8007):374; 1977.

7832 FAULTY T TUBE SIMULATING RETAINED COMMON BILE-DUCT STONE. (Eng.) Simpson, J. S.; Saxton, H. M. (King's Coll. Hosp. Medical Sch., London SE5 9RS, England). *Br. Med. J.* 2(6085):498-499; 1977.

7833 IN DEFENSE OF ROUTINE DRAINAGE AFTER CHOLECYSTECTOMY--AN ANALYSIS OF 246 CASES. (Eng.) McKittrick, J. E.; Yonehiro, L.; Latimer, R. G.; Doane, W. A. (Santa Barbara Medical Foundation Clinic, Santa Barbara, CA). *Chir. Gastroenterol.* 10(4):429-431; 1976.

7834 BACTERIOLOGY OF THE HUMAN BILIARY TRACT AND THE DUODENUM. (Eng.) Lou, M. A.; Mandal, A. K.; Alexander, J. L.; Thadepalli, H. (Martin Luther King, Jr., General Hosp., 12021 S. Wilmington Ave., Los Angeles, CA 90059). *Arch. Surg.* 112(8):965-967; 1977.

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7838 TWENTY-THREE YEARS OF EXPERIENCE WITH SPHINCTEROTOMY AND SPHINCTEROPLASTY FOR STENOSIS OF THE SPHINCTER OF ODDI. (Eng.) Partington, P. F. (Western Reserve Univ. Medical Sch., Cleveland, OH). *Surg. Gynecol. Obstet.* 145(2):161-168; 1977.

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7840 PERCUTANEOUS FORCEPS EXTRACTION OF RETAINED BILIARY TRACT CALCULI. (Eng.) Fotopoulos, J. P.; Caprini, J. A. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201). *Gastrointest. Radiol.* 1(4):319-324; 1977.

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7842 GALLSTONES PREVENTING ULTRASONOGRAPHIC VISUALIZATION OF THE GALLBLADDER. (Eng.) Laing, F. C.; Gooding, G. A. W.; Herzog, K. A. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Gactrointest. Radiol.* 1(4):301-303; 1977.

7843 A MALFORMATION OF THE PANCREATICO-BILIARY SYSTEM AS A CAUSE OF PERFORATION OF THE BILIARY TRACT IN CHILDHOOD. (Eng.) Ohkawa, H.; Takahashi, H.; Maie, M. (Chiba Univ. Sch. Medicine, 1-8-1 Inohana, Chiba, Japan). *J. Pediatr. Surg.* 12(4):541-546; 1977.

7844 BILIARY SCANNING WITH Tc-99m PYRIDOXYLIDENE GLUTAMATE--THE EFFECT OF FOOD IN NORMAL SUBJECTS: CONCISE COMMUNICATION. (Eng.) Baker, R. J.; Marion, M. A. (Inst. Medical and Veterinary Science, Frome Rd., Adelaide 5000, South Australia). *J. Nucl. Med.* 18(8):793-795; 1977.

7845 ULTRASOUND EVALUATION OF THE NONVISUALIZED GALLBLADDER. (Eng.) Azimi, F.; Marangola, J. P.; Bryan, P. J. (St. Joseph's Hosp., 301 Prospect Ave., Syracuse, NY 13201). *Gastrointest. Radiol.* 1(4):293-299; 1977.

7846 LIVER BIOPSY IN "DIFFICULT" JAUNDICE. (Eng.) Lance, P.; Bevan, P. G.; Hoult, J. G.; Paton, A. (Dudley Rd. Hosp., Birmingham B18 7QH, England). *Br. Med. J.* 2(6081):236; 1977.

7847 REOPERATIONS IN EVOLUTIVE INFLAMMATORY STENOSIS (NON TRAUMATIC) AFTER TREATMENT OF BILIARY LITHIASIS. (Eng.) Salembier, Y. (Cite Hospitaliere, Lille, France). *Chir. Gastroenterol.* 11(1):137-140; 1977.

7848 BILIARY EXCRETION STUDIES WITH DIGOXIN IN MAN. (Eng.) Klotz, U.; Antonin, K. H. (Dr.-Margarete-Fischer-Bosch-Institut fur Klinische Pharmakologie, Auerbachstrasse 112, 7000 Stuttgart, W. Germany). *Int. J. Clin. Pharmacol.* 15(7):332-334; 1977.

7849 CONGENITAL BILE DUCT CYSTS: CLASSIFICATION, OPERATIVE PROCEDURES, AND REVIEW OF THIRTY-SEVEN CASES INCLUDING CANCER ARISING FROM CHOLEDOCHAL CYST. (Eng.) Todani, T.; Watanabe, Y.; Narusue, M.; Tabuchi, K.; Okajima, K. (Okayama Univ. Medical Sch., 2-5 Shikatacho, Okayama City 700, Japan). *Am. J. Surg.* 134(2):263-269; 1977.

7850 RADICAL CHOLECYSTECTOMY FOR EARLY CARCINOMA OF THE GALLBLADDER. (Eng.) Tsuchiya, R.; Akashi, M. (Nagasaki Univ. Medical Sch., Nagasaki, Japan). *Chir. Gastroenterol.* 10(4):421-423; 1976.

7851 DRUGS AND GALLSTONES. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8030): 177-178; 1977.

7852 CHOLANGIOGRAPHIC FINDINGS IN AGENESIS OF THE GALLBLADDER. (Eng.) Martinez, L. O.; Mejia, J. (Mt. Sinai Medical Center, 4300 Alton Rd., Miami Beach, FL 33140). *South. Med. J.* 70(7):881-882; 1977.

See also, 7403, 7437, 7459, 7466, 7531, 7539, 7542, 7543, 7545, 7583, 7589, 7741, 7801, 7855, 7857, 7859, 7862, 7880, 7894.

GENERAL

7853 TOTAL PARENTERAL NUTRITION IN MALNOURISHED INFANTS WITH INTRACTABLE DIARRHEA. (Eng.) Gunn, T.; Brown, R. S.; Pencharz, P.; Colle, E. (Montreal Children's Hosp., 2300 Tupper St., Montreal, Quebec H3H 1P3, Canada). *Can. Med. Assoc. J.* 117(4): 357-360; 1977.

Experience with total parenteral nutrition (TPN) in the treatment of 34 infants with protein-energy malnutrition and intractable diarrhea is presented. TPN consisted of casein hydrolysate, a soybean emulsion, and dextrose. Initially, peripheral veins were used in all infants, and 22 were treated successfully without the necessity of resorting to a central venous catheter. The mean duration of treatment by the peripheral route was 29 days. Although the mean energy intake and protein intake were high, weight gain was poor, and growth continued at the prehospitalization percentiles. There were two deaths, due to complications resulting from the use of the central venous catheter. Specific diagnoses were established for 7 of the 9 Caucasian infants but only 2 of the 25 Inuit infants. SGOT concentrations were elevated in 80% of the patients at the time of admission, increased further in 82% when TPN was begun, but decreased towards normal before discharge in all patients. Eosinophilia was common during TPN. Liver biopsy in seven patients with elevated SGOT values showed eosinophilia, increased pigment in the Kupffer cells, and slight lymphocytosis in the portal tract. Intercurrent infections occurred frequently and were often preceded by a short period of lipid intolerance or neutropenia, or both. Tolerance to lipids returned after the infections resolved. Peripheral TPN is a safe and relatively simple method of providing adequate nutrition during episodes of diarrhea in malnourished infants.

7854 DOUBLE-BLIND TRIAL OF CHOLESTYRAMINE IN POSTVAGOTOMY DIARRHOEA. (Eng.) Duncombe, V. M.; Bolin, T. D.; Davis, A. E. (Prince of Wales Hosp., Randwick, Sydney, New South Wales, Australia). *Gut* 18(7):531-535; 1977.

The effect of cholestyramine in postvagotomy diarrhea was assessed in a double-blind study of 20 patients who had undergone truncal vagotomy 1-15 yr earlier. Cholestyramine (4 g x 4/day, p.o.) produced a significant improvement in frequency, urgency, and consistency of stool as well as episodic diarrhea. Fecal bile acid excretion was significantly higher in the postvagotomy group (1,024 mg/day) when compared with normal controls (473 mg/day, $p<0.0025$). These findings confirm the effectiveness of cholestyramine and support the concept of a bile acid-mediated etiology in postvagotomy diarrhea.

7855 THE CHICAGO VARIANT OF CLINICAL GALACTOSEMIA. (Eng.) Chacko, C. M.; Wappner, R. S.; Brandt, I. K.; Nadler, H. L. (Northwestern Univ. Medical Sch., 2300 Children's Plaza, Chicago, IL 60614). *Hum. Genet.* 37(3):261-270; 1977.

A new variant of clinical galactosemia with two hitherto unidentified alleles at the transferase locus in one family is described. The patient developed symptoms (anorexia, light-colored stools, mild jaundice, and a slightly enlarged liver) by 8 weeks of age. The patient became asymptomatic on a galactose-free diet. At 2 yr of age, he was challenged with galactose. After 1 week of normal galactose intake, the galactose-1-phosphate level in the RBC had risen to 7.9 mg/100 ml. The patient was thus restarted on a galactose-restricted diet. The new clinical variant of transferase was found to have 25% of normal control activity in blood and in skin fibroblasts. Using starch gel electrophoresis on hemolysates of the patient's family members, a fast-moving transferase with mobility in between those of the normal control and of the Duarte variant was identified. This new allele was designated GALT^{C1} (fast-moving Chicago variant). In addition, a second new allele was documented in this family by studying the instability of the transferase enzyme in hemolysates of family members at 50 C for various time intervals. This new allele was designated GALT^{C2} (heat-labile Chicago variant). The transferase genotype of this patient is thought to be a double heterozygote compound, GALT^{C1}/GALT^{G}.

7856 SERUM PROTEINASE INHIBITORS AND OTHER SERUM PROTEINS IN PROTEIN-ENERGY MALNUTRITION. (Eng.) Schelp, F. P.; Migasena, P.; Pongpaew, P.; Schreurs, W. H. P.; Supawan, V. (Dept. Tropical Nutrition, Mahidol Univ., Bankok 4, Thailand). *Br. J. Nutr.* 38(1):31-38; 1977.

The concentrations of serum protein albumin, prealbumin, and transferrin were determined in 28 patients with protein-energy malnutrition (PEM) with infection, together with the levels of serum proteinase inhibitors (PI), α_1-antitrypsin (AT), α_1-antichymotrypsin (Ach), α_2-macroglobulin (α_2M), and inter-α-trypsin inhibitor (IαI). Albumin, prealbumin, transferrin, IαI, and α_2M concentrations in Thai and Indonesian children (21 ± 1.8 and 29 ± 2.0 g/l, 40 ± 10.8 and 53 ± 11.5 mg/l, 1,005 ± 189 and 1,196 ± 241 mg/l, 795 ± 86 and 1,092 ± 90 U/l, and 3,192 ± 370 and 3,336 ± 299 mg/l, resp.) were lower in cases of PEM associated with infection than the corresponding values for 28 healthy Thai preschool children (48 ± 2.0 g/l, 160 ± 11.1 mg/l, 3,034 ± 121 mg/l, 1,106 ± 31 U/l, and 4,588 ± 184 mg/l, resp.) and a group of newborn Thai children. Despite starvation, AT and Ach values were generally increased. The results support the hypothesis that PI, especially AT and Ach might limit the synthesis of albumin, prealbumin, and transferrin in PEM associated with infection, via the inhibition of the mobilization of the body's own protein.

7857 EPITHELIAL LESIONS IN LOW FLOW STATES: A UNIFYING CONCEPT. (Eng.) Chiu, C. J. (McGill Univ. Surgical Clinic, Montreal, Quebec, Canada). *Med. Hypotheses* 3(4):159-161; 1977.

7858 CHEMOTHERAPY OF GASTROINTESTINAL CANCER. (Eng.) Moertel, C. G. (No affiliation given). *Clin. Gastroenterol.* 5(3):777-793; 1976.

7859 RADIATION THERAPY: RESULTS AND FUTURE POSSIBILITIES. (Eng.) Gunderson, L. L. (No affiliation given). *Clin. Gastroenterol.* 5(3): 743-776; 1976.

7860 SURGICAL MANAGEMENT OF GASTROINTESTINAL CANCER. (Eng.) Lawrence, W., Jr. (No affiliation given). *Clin. Gastroenterol.* 5(3): 703-742; 1976.

7861 TUMOUR MARKERS, ENZYMES AND HORMONAL MARKERS. (Eng.) Schwartz, M. K. (No affiliation given). *Clin. Gastroenterol.* 5(3): 653-663; 1976.

7862 SIMULTANEOUS MEASUREMENTS OF TUMOUR-ASSOCIATED ANTIGENS IN GASTROINTESTINAL CANCER. (Eng.) Go, V. L. W. (No affiliation given). *Clin. Gastroenterol.* 5(3):645-652; 1976.

7863 ENZYME-LINKED IMMUNOSORBENT ASSAY (ELISA) FOR DETECTION OF HUMAN REOVIRUS-LIKE AGENT OF INFANTILE GASTROENTERITIS. (Eng.) Yolken, R. H.; Kim, H. W.; Clem, T.; Wyatt, R. G.; Chanock, R. M.; Kalica, A. R.; Kapikian, A. Z. (Natl. Inst. Allergy and Infectious Diseases, Bethesda, MD 20014). *Lancet* 2(8032):263-266; 1977.

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7865 SALMONELLOSIS IN INDONESIA: PHAGE TYPE DISTRIBUTION OF Salmonella paratyphi A. (Eng.) Sanborn, W. R.; Hablas, R.; Komalarini, S.; Sinta; Trenggonowati, R.; Sadjimin, T.; *et al.* (U.S. Naval Medical Res. Unit No. 2, Jakarta Detachment, APO San Francisco, CA 96356). *J. Hyg. (Camb.)* 79(1):1-4; 1977.

7866 DIETARY TREATMENT OF MALNUTRITION BALANCE-SHEETS OF THE MAIN NUTRIENTS: PART II. (Eng.) Antener, I.; Verwilghen, A. M.; Van Geert, C.; Mauron, J. (Res. Lab., Nestle, 1800 Vevey, Switzerland). *Int. J. Vitam. Nutr. Res.* 47(2):167-199; 1977.

7867 METHODS FOR THE STUDY OF ANTIDIARRHEAL AGENTS. STUDY OF COMMONLY USED PROTECTIVE AND ADSORBENT AGENTS. (Eng.) Beck, I. T.; Jenkins, N.; Thurber, L.; Ambrus, J. L. (Dept. Internal Medicine, Queens Univ., Kingston, Ontario, Canada). *J. Med.* 8(2):135-158; 1977.

7868 STARCH EATER'S ANEMIA. (Eng.) Reddy, C. M.; Wright, D.; Crump, E. P. (Meharry Medical Coll., Nashville, TN 37208). *Am. J. Dis. Child.* 131(8):926-927; 1977.

7869 PRIMARY GASTROINTESTINAL LYMPHOMAS. (Eng.) Anonymous. (No affiliation given). *Lancet* 1(8023):1191; 1977.

7870 HYDROXYPROLINE EXCRETION IN INFANTILE GASTROENTERITIS. (Eng.) Begent, R. H. J.; Lambert, H. P. (Charing Cross Hosp., London W6, England). *J. Clin. Pathol.* 30(7):630-634; 1977.

7871 AETIOLOGY OF ACUTE GASTROENTERITIS IN INFANCY AND EARLY CHILDHOOD IN SOUTHERN INDIA. (Eng.) Maiya, P. P.; Pereira, S. M.; Mathan, M.; Bhat, P.; Albert, M. J.; Baker, S. J. (Christian Medical Coll. and Hosp., Ida Scudder Rd., P.O. Box No. 3, Vellore 630024, Tamil Nadu, India). *Arch. Dis. Child.* 52(6):482-485; 1977.

7872 VIRUSES ASSOCIATED WITH ACUTE GASTROENTERITIS IN YOUNG CHILDREN. (Eng.) Middleton, P. J.; Szymanski, M. T.; Petric, M. (Hosp. Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *Am. J. Dis. Child.* 131(7):733-737; 1977.

7873 THE STOMACH IN MALNUTRITION. (Eng.) Gracey, M.; Cullity, G. J.; Suharjono; Sunoto (Princess Margaret Children's Medical Res. Foundation, GPO Box D. 184, Perth, Western Australia). *Arch. Dis. Child.* 52(4):325-327; 1977.

7874 GASTROINTESTINAL HORMONES AND APUDOMAS. (Eng.) Cooperman, A. M. (Cleveland Clinic Foundation, Cleveland, OH). *Cleve. Clin. Q.* 44(2):83-93; 1977.

7875 A MICROBIOLOGICAL STUDY OF GASTRO-ENTERITIS IN BLACK INFANTS. (Eng.) Freiman, I.; Hartman, E.; Kassel, H.; Robins-Browne, R. M.; Schoub, B. D.; Koornhof, H. J.; *et al.* (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 52(7):261-265; 1977.

7876 PHASE I TRIAL OF FTORAFUR COMBINED WITH MITOMYCIN C OR METHYL-CCNU IN GASTROINTESTINAL CANCERS. (Eng.) Buroker, T.; Baker, L.; Correa, J.; Schwartz, L. A.; Vaitkevicius, V. K. (Wayne State Univ. Sch. Medicine, 540 E. Canfield Ave., Detroit, MI 48201). *Cancer Treat. Rep.* 61(3): 463-467; 1977.

7877 RECOVERY OF PARAMYXOVIRUS FROM THE JEJUNUM OF PATIENTS WITH MULTIPLE SCLEROSIS. (Eng.) Prasad, I.; Pertschuk, L. P.; Broome, J. D.; Gupta, J.; Cook, A. W. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203). *Lancet* 1(8022):1117-1119; 1977.

7878 VOMITING AND REGURGITATION. (Eng.) Toccalino, H.; Licastro, R.; Guastavino, E.; Ortiz, J.; Carpaneto, E.; Schiavi, J.; *et al.* (No affiliation given). *Clin. Gastroenterol.* 6(2): 267-282; 1977.

7879 DIFFICULTIES WITH DEFAECATION AND ELIMINATION IN CHILDREN. (Eng.) Fitzgerald, J. F. (No affiliation given). *Clin. Gastroenterol.* 6 (2):283-297; 1977.

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7881 PSYCHOSOMATIC ASPECTS OF GASTROINTESTINAL PROBLEMS IN CHILDREN. (Eng.) Apley, J. (No affiliation given). *Clin. Gastroenterol.* 6(2): 311-320; 1977.

7882 NON-NEOPLASTIC SALIVARY GLAND DISEASES IN CHILDREN. (Eng.) Strome, M. (Harvard Medical Sch., Boston, MA). *Otolaryngol. Clin. North Am.* 10(2):391-398; 1977.

7883 NUTRITIONAL PRINCIPLES IN MANAGEMENT OF INFANTS AND SMALL CHILDREN WITH GASTROINTESTINAL DISORDERS. (Eng.) Younoszai, M. K.; Ziegler, E. E.; Fomon, S. J. (No affiliation given). *Clin. Gastroenterol.* 6(2):321-340; 1977.

7884 PARANEOPLASTIC SYNDROMES ASSOCIATED WITH GASTROINTESTINAL CANCER. (Eng.) Schutt, A. J. (No affiliation given). *Clin. Gastroenterol.* 5(3):681-699; 1976.

7885 RENAL EFFECTS ON SERUM GASTRIC INHIBITORY POLYPEPTIDE (GIP). (Eng.) O'Dorisio, T. M.; Sirinek, K. R.; Mazzaferri, E. L.; Cataland, S. (Ohio State Univ. Hosp., Rm. N-1111, 410 W. 10th Ave., Columbus, OH 43210). *Metabolism* 26(6):651-656; 1977.

7886 A CASE OF SEVERE COMPRESSION OF THE COELIAC ARTERY. (Eng.) Edhag, O.; Hogstedt, C.; Kovamees, A.; Werner, B. (Medical and Surgical Dept., Serafimerlasarettet, Stockholm, Sweden). *Acta Med. Scand.* 201(6):589-591; 1977.

7887 THE EARLY DETECTION OF CHILDHOOD MALNUTRITION IN THE SOUTH PACIFIC. (Eng.) Jansen,

A. A. J.; Bailey, K. V. (Medical Res. Center, P.O. Box 20752, Nairobi, Kenya). *J. Trop. Pediatr. Environ. Child Health* 23(3):125-135; 1977.

7888 DIGESTIVE MANIFESTATIONS OF PRIMARY HYPERPARATHYROIDISM (20 OBSERVATIONS). (Eng.) Proye, C. (Centre Hospitalo-Universitaire, Lille, France). *Chir. Gastroenterol.* 11(1):121-127; 1977.

7889 TRAVELLERS' DIARRHOEA: DOES IT OCCUR IN THE UNITED KINGDOM? (Eng.) Freedman, B. J. (King's Coll. Hosp., Denmark Hill, London SE5, England). *J. Hyg. (Camb.)* 79(1):73-75; 1977.

7890 GASTROINTESTINAL NEOPLASIA: AN INVESTIGATIVE APPROACH. (Eng.) Lipkin, M.; Deschner, E. E. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Progr. Cancer Res. Ther.* 3:369-375; 1977.

7891 JEJUNAL IMMUNOPATHOLOGY IN AMYOTROPHIC LATERAL SCLEROSIS AND MULTIPLE SCLEROSIS: IDENIFICATION OF VIRAL ANTIGENS BY IMMUNOFLUORESCENCE. (Eng.) Pertschuk, L. P.; Broome, J. D.; Brigati, D. J.; Cook, A. W.; Vuletin, J. C.; Rainford, E. A.; *et al.* (Downstate Medical Center, State Univ. New York, Box 25, Brooklyn, NY 11203). *Lancet* 1(8022):1119-1123; 1977.

See also, 7323, 7378, 7401, 7459, 7522, 7524, 7525, 7540, 7541, 7557, 7591, 7617, 7622, 7642, 7643, 7644, 7648, 7653, 7686, 7697, 7699, 7700, 7714, 7720, 7757.

GENERAL

Parasitology

7892 GIARDIASIS: CLINICAL AND THERAPEUTIC ASPECTS. (Eng.) Wright, S. G.; Tomkins, A. M.; Ridley, D. S. (Hosp. Tropical Diseases, London, England). *Gut* 18(5):343-350; 1977.

The clinical and therapeutic aspects of 40 cases of symptomatic giardiasis in which malabsorption was common and vitamin B_{12} malabsorption was particularly frequent are reported. Malabsorption was present in 29 of the 40 patients. Twenty-three had impaired D-xylose absorption; in 20, vitamin B_{12} absorption was low, and 15 patients had steatorrhea. More severe malabsorption was associated with more marked histological abnormalities. Metronidazole (2.0 g/day) on 3 successive days, produced a parasitological cure rate of 91%. In contrast, the standard course of mepacrine (100 mg t.i.d.) for 10 days eradicated the parasite in only 63% of patients. Improvements in absorption and jejunal morphology followed anti-giardial treatment. Tetracycline (250 mg q.i.d.) for 4 weeks failed to eradicate the parasite in seven of eight patients; intestinal absorption was unaltered, and histological appearances of the jejunal mucosa often deteriorated. The satisfactory therapeutic response to the eradication of *G. lamblia* with improvement of mucosal function and morphology suggests a pathogenic role for the parasite.

7893 CYTOCHEMICAL LABELING OF PROTEOLYTIC ENZYMES IN E. histolytica. (Spa.) Gonzalez-Garza, M. T.; Arellano-Blanco, J.; Gomez-Estrada, H. (Instituto Mexicano del Seguro Social. Apdo. Postal 73-032, Mexico 12, D. F.). *Arch. Invest. Med. (Mex.)* 8(2):139-144; 1977.

7894 ASCARIS INFESTATION OF THE BILIARY TRACT: REPORT OF ONE CASE. (Ita.) De Bernardis, F.; Tosto, S.; Silvestre, G.; Binda, R. (Ospedale Generale Provinciale di Cittadella, Padova, Italy). *Acta Chir. Ital.* 33(1):125-135; 1977.

7895 ASCARIS HEPATIC GRANULOMA. (Fre.) Pelissier, E.; Quilici, M.; Marquet, G.; Pages, C. (Service de Chirurgie III, C.H.U. 25000 Besancon, France). *Chirurgie* 103(5):343-347; 1977.

See also, 7467.

GENERAL

Regional Enteritis

7896 HL-A B27 ANTIGEN IN CROHN'S DISEASE ASSOCIATED WITH RHEUMATOID SPONDYLARTHRITIS AND IN A NORMAL POPULATION. (Fre.) de Bruyere, M.; Nagant De Deuxchaisnes, Ch.; Fiasse, R.; Huaux, J. P.; De Vogelaer, J. P. (Services d'Hematologie, Cliniques Universitaires Saint-Pierre, Louvain, Belgium). *Rev. Fr. Transfus. Immunohematol.* 20(1):31-34; 1977.

The incidence of the histocompatibility antigen (HL-A) B27, previously found to be associated with ankylosing spondylarthritis (AK), was compared in blood samples from 26 patients with AK + Crohn's disease (CD), 47 with Crohn's disease, 108 with AK, and 250 normal blood donors. The 26 AK+CD patients were screened from a group of 122 CD patients; 15/26 had symptoms of chronic low back pain and x-ray evidence of changes in the sacroiliac vertebrate, 7 had asymptomatic radiological changes in the spine, and 4 were diagnosed as probable AK. HL-A B27 was found in 8.4% of the normal subjects, 81% of the AK patients, none of the CD patients, 5/15 patients with classic AK + CD, and 0/11 patients with asymptomatic AK + CD.

7897 DOUBLE-BLIND PLACEBO-CONTROLLED STUDY OF LOPERAMIDE (IMODIUM) IN CHRONIC DIARRHOEA CAUSED BY ILEOCOLIC DISEASE OR RESECTION. (Eng.) Mainguet, P.; Fiasse, R. (Cliniques Universitaires St. Pierre, B-3000 Louvain, Belgium). *Gut* 18(7): 575-579; 1977.

Loperamide (R 18 553) was compared with a placebo in a double-blind crossover study of 18 patients with chronic diarrhea caused by ileocolic disease or resection. At a median daily dose of 6 mg, the new antidiarrheal preparation was superior to the placebo in controlling chronic diarrhea. The frequency and weight of stools significantly decreased ($p<0.001$ in both cases), the stools became more solid ($p<0.001$), and carmine transit time was prolonged (2.25 versus 4.6 hr, $p<0.001$) during loperamide therapy. Loperamide was consistently preferred to the placebo by the patients. Gastrointestinal side-effects (nausea, vomiting, abdominal pain, and distention) were few and comparable during both treatment periods. The ability of loperamide to prolong transit time indicates that it should prove to be particularly useful in patients with intestinal resections or with regional enteritis.

7898 THE DILEMMA OF CROHN'S DISEASE: ILEOSIGMOIDAL FISTULA COMPLICATING CROHN'S DISEASE. (Eng.) Fazio, V. W.; Wilk, P.; Turnbull, R. B., Jr.; Jagelman, D. G. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Dis. Colon Rectum* 20(5):381-386; 1977.

7899 THE DILEMMA OF CROHN'S DISEASE: MANAGEMENT OF THE POSTERIOR WOUND AFTER COLOPROCTECTOMY. (Eng.) Anderson, R. (Cleveland Clinic, 9500 Euclid Ave., Cleveland, OH 44106). *Dis. Colon Rectum* 20(5):393-395; 1977.

7900 LYMPHOCYTE SENSITISATION MEASURED BY ELECTROPHORETIC-MOBILITY TEST IN CHILDREN WITH CROHN'S AND COELIAC DISEASE [Letter to Editor]. (Eng.) Lampert, F.; Nitzschke, U.; Zwergel, T.; Abiodun, P. (Kinderpoliklinik, Univ. Giessen, D-6300 Giessen, W. Germany). *Lancet* 2(8029):141-142; 1977.

See also, 7526, 7527, 7551, 7635, 7656, 7707, 7718, 7719, 7756.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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7458
ABRAHAMSOHN, C.
7821
ABRAMSKY, O.
7763
ABSHAGEN, U.
7752*
ACTIS, G.C.
7775
AGOSTINI, C.
7806*
AHLMAN, H.
7513*
AHLQVIST, J.
7803*
AIBARA, S.
7342*
AIUCHI, M.
7469
AKAO, M.
7516
AKASHI, M.
7850
AKOVBIANTZ, A.
7556
AL-DEWACHI, H.S.
7500*
ALAVI, S.M.
7350*
ALBERT, M.J.
7871
ALBINUS, M.
7375*
ALEXANDER, J.L.
7834
ALMEIDA, J.D.
7795, 7797
ALNOR, P.C.
7622
AMATRUDA, J.M.
7637*
AMBERG, J.R.
7544
AMBRUS, J.L.
7867
AMMANN, R.
7727
AMMON, H.V.
7317
ANANA, A.
7489*
ANDERSEN, D.
7581, 7610, 7619
ANDERSON, R.
7899
ANDERSSON, A.
7678
ANDERSSON, S.
7364
ANDO, M.
7348*
ANDRES, R.
7815*
ANGORN, I.B.
7574*
ANNESE, C.
7356
ANNIS, J.A.D.
7548
ANTENER, I.
7866
ANTONIN, K.H.
7848
ANTONIOLI, D.A.
7606*
APLEY, J.
7881
APPLETON, D.R.
7500*
APPLEYARD, A.
7490*
ARAKI, K.
7762
ARELLANO-BLANCO, J.
7893
ARIMA, T.
7790*
ARIMURA, K.
7528*
ARMSTRONG-JAMES, M.
7320*
ARNDORFER, R.C.
7335
ARNOLD, R.
7464
ARUIN, L.I.
7595
ATHANASOULIS, C.A.
7549
ATTOCK, B.
7640
AUFRERE, J.
7339*
AUFSES, A.H., JR.
7670
AZARNOFF, D.L.
7454
AZHIGALIEV, N.A.
7564
AZIMI, F.
7845
BAARS, H.G.
7617
BABES, V.T.
7787*
BACARINI, L.
7741*
BACH, F.
7791*
BAEHNER, R.L.
7770
BAETEN, Y.
7737
BAGGIO, G.
7397*
BAGNALL, R.D.
7548
BAILEY, E.
7452
BAILEY, K.V.
7867
BAKER, L.
7876
BAKER, R.J.
7844
BAKER, S.J.
7871
BAKHDA, R.K.
7666
BAKHTIAR, L.
7657*
BAKSHI, S.
7667
BALASHOV, V.I.
7597
BALFOUR, T.W.
7689
BALL, S.A.
7476
BALTHAZAR, E.J.
7690, 7691
BANK, S.
7380
BARAK, A.J.
7412*
BARAONA, E.
7439*
BARBEZAT, G.O.
7380
BARNES, S.
7520
BARNES, W.G.
7553
BARNETT, T.
7320*
BARTELS, H.
7749*
BARTLETT, J.G.
7662*
BARTNIK, W.
7719
BASS, L.
7385*
BATAILLE, R.
7697
BATEY, R.G.
7824*
BATILLAS, J.
7864
BATTIFORA, H.
7631
BAUER, H.
7364
BAUER, R.F.
7332
BAUMELOU, H.
7697
BAYLESS, T.M.
7645
BAZZOCCHI, M.
7741*
BEAL, J.
7631
BEAUDOIN, A.R.
7371*
BEAVEN, M.A.
7512*
BECK, E.
7530*
BECK, I.T.
7867

BECKER, M.
7379
BEDFORD, A.F.
7660*
BEER, B.
7836
BEERS, P.C.
7481
BEGENT, R.H.J.
7870
BEHER, W.T.
7394*, 7448*
BELFRAGE, P.
7805*
BELOUSOV, A.S.
7587, 7596
BENDER-GOTZE, C.
7749*
BERENGO, M.
7714
BERG, B.
7805*
BERGDAHL, L.
7678
BERGMAN, F.
7437*
BERGMANN, K.E.
7633*
BERK, J.E.
7550
BERK, R.N.
7544
BERKO, G.
7822
BERMAN, D.A.
7511*
BERNER, J.
7712
BERNOULLI, R.
7591
BERRY, E.M.
7763
BERTOLA, D.
7820
BESSOT, M.
7715
BEVAN, P.G.
7846
BHAT, P.
7871
BHATHAL, P.S.
7779
BIARESE, V.
7775
BINDA, R.
7894
BINDER, H.J.
7837
BISCHOFF, F.
7474
BISHAI, F.R.
7785*
BISS, K.
7388*
BITAR, K.
7307*
BLACK, B.L.
7288*
BLAIR, E.L.
7375*
BLEICHER, M.
7670
BLITZER, B.L.
7808*
BLOCH, P.
7721
BLUTMAN, F.
7697
BLUM, A.L.
7340, 7560, 7561
BLUMBERG, B.S.
7784*
BLUMGART, L.H.
7462, 7475
BOCHKOVA, L.M.
7801
BOCKMAN, D.E.
7514*
BODEN, G.
7372*, 7390*
BOESBY, S.
7358
BOITNOTT, J.K.
7637*
BOJANOWICZ, K.
7586, 7712, 7793
BOLIN, T.D.
7854*
BOLKENIUS, M.
7611
BOLME, P.
7636*
BOLTON, J.E.
7303*
BOLZANO, K.
7623
BOMBECK, C.T.
7350*, 7521
BONE, J.
7322*
BONKOWSKY, H.L.
7811*
BOOKSTEIN, J.J.
7734*
BOOYENS, J.
7345*
BORDALO, O.
7730
BORGSTROM, A.
7378
BORKAR, G.
7315, 7333, 7334
BOROWSKY, S.A.
7439*
BORTHISTLE, B.K.
7318
BOSS, J.H.
7518
BOUCHIER, I.A.D.
7391*
BOUHOURS, J.F.
7496*
BOURDEAUX, L.
7708
BOURKE, J.B.
7689
BRACKEN, A.J.
7385*
BRADLEY, E.L., III
7638*
BRAMSTOM, B.
7768
BRANDBORG, L.L.
7643, 7644, 7650, 7651,
7652, 7653, 7654, 7655,
7656
BRANDEN, C.I.
7405*
BRANDLI, H.
7560, 7561
BRANDT, I.K.
7855*
BRANDT, K.H.
7831
BRATT, P.M.
7635*
BRAUN, O.H.
7633*
BRAY, R.S.
7471
BREIMAN, R.S.
7531*
BREINER, S.J.
7628
BRETHOLZ, A.
7368*
BRIGATI, D.J.
7891
BRIGGS, M.
7783*
BRISOTTO, P.
7710
BROCCHI, A.
7575
BROOKS, A.P.
7639
BROOKS, F.P.
7332
BROOME, J.D.
7877, 7891
BROOR, S.L.
7317
BROUWER, A.
7418*
BROWN, B.D.
7317
BROWN, R.S.
7853*
BROWN, W.R.
7318
BRUN, B.
7759
BRYAN, P.J.
7845
BRYER, J.V.
7345*
BRYSON, G.
7474
BUBEL, M.
7490*
BUFFONI, F.
7814*
BULASH, V.A.
7593

BULGAKOV, S.A.
7598
BURHENNE, H.J.
7544
BURICCHI, L.
7575
BURNETT, W.
7836
BUROKER, T.
7876
BURWOOD, R.J.
7538
BUSSINK, G.P.
7464
BUYNITZKY, S.J.
7477
BUZERNESCU, G.
7787*
CADRANEL, S.
7789*
CAGNONI, M.
7575
CALKINS, W.G.
7553
CAMPBELL, R.L.
7778
CAMPIONE, O.
7589, 7613
CAMPRODON, R.
7692
CAPERS, T.H.
7673
CAPPEL, R.
7789*
CAPPELLI, G.
7575
CAPRINI, J.A.
7840
CAPRON, J.P.
7414*
CARLSTEDT-DUKE, B.
7389*
CARPANETO, E.
7878
CASE, R.M.
7375*
CASPARY, W.F.
7346*
CASTELLI, W.P.
7515*
CASTRO, J.E.
7465
CATALANO, S.
7885
CATTERALL, R.D.
7783*
CAULET, T.
7704
CEDERMARK, B.J.
7667
CELENER, D.
7367*
CERNY, E.
7800
CHACKO, C.M.
7855*
CHADWICK, V.S.
7483*
CHAJEK, T.
7763
CHALUT, J.
7590
CHAN, C.K.
7767
CHANOCK, R.M.
7863
CHARTRAND, L.
7750*
CHAUDHRY, A.
7296
CHEAH, S.S.
7771*
CHERUBIN, C.E.
7764
CHESTERMAN, H.
7476
CHEVALLIER, F.
7413*
CHEY, W.Y.
7638*
CHIAO, H.F.
7473
CHITRANUKROH, A.
7520
CHIU, C.J.
7857
CHO, C.H.
7517
CHO, K.J.
7734*
CHRISTIANSEN, R.Z.
7444*
CHRISTIE, J.P.
7679
CHRISTOPHER, J.P.
7425*
CHUANG, V.P.
7734*, 7841
CHUNG, R.S.K.
7301*
CHUPRYNA, V.V.
7601
CLAIN, D.J.
7768
CLAIN, J.
7380
CLARK, C.G.
7663*
CLARK, D.G.
7470
CLARK, E.E.
7658*
CLARK, S.B.
7493*
CLARKE, J.S.
7662*
CLARKE, S.D.
7441*
CLASSEN, M.
7535
CLAYMAN, C.B.
7357
CLEM, T.
7863
CLEMETT, A.R.
7544
CLOUSE, M.E.
7725*
COHEN, M.
7330
COLEMAN, R.
7392*
COLLE, E.
7853*
COMPSTON, J.E.
7609*, 7641
CONDON, R.E.
7662*
CONN, H.O.
7808*
CONTE, L.
7819
COOK, A.W.
7877, 7891
COOKE, W.T.
7635*
COOPERMAN, A.M.
7874
CORCIA, A.
7308*
CORNILLOT, P.
7812*
CORRALES BUENO, J.I.
7565
CORREA, J.
7876
CORTELLAZZO, S.
7773*
CORTESINI, C.
7814*
COSTA, A.
7575
COSTELLO, L.C.
7450
COTTON, P.B.
7539
COWARD, W.A.
7524
COY, D.H.
7375*
COYNE, M.J.
7829
COZZOLINO, A.
7584
CREAMER, B.
7609*
CRESPO, C.
7692
CREUTZFELDT, W.
7364
CROVARI, P.
7786*
CRUMP, E.P.
7868
CRUZ, I.
7453
CSAKY, T.Z.
7305*
CUESTA CASELLES, G.
7565
CULLITY, G.J.
7873
CURRARINO, G.
7766

CURTI, M.T.
7806*
CUTLER, L.S.
7296
DAEMS, W.T.
7455
DAGNINI, G.
7821
DAGORN, J.C.
7373*
DAHLQVIST, A.
7647
DAL BRUN, G.
7773*
DALLA PALMA, L.
7741*
DAMGAARD, S.E.
7429*
DAMMANN, H.G.
7420*
DANE, D.S.
7783*
DANOWSKI, R.
7626
DARENSKY, D.I.
7621
DAUM, R.
7611
DAVIS, A.E.
7654*
DAVIS, J.N.
7336*, 7337*
DAVIS, L.
7645
DAVIS, M.
7777*, 7802*, 7807*
DAVIS, R.A.
7399*
DE BERNARDIS, F.
7701, 7710, 7894
DE BRUYERE, M.
7696*
DE CUYPER, F.
7789*
DE DA PORTE, P.L.
7367*
DE DONATO, A.
7584
DE FLORA, S.
7786*
DE LA FUENTE CHAOS, A.
7565
DE LA FUENTE PERUCHO, A.
7565
DE MELLO, M.C.F.
7512*
DE NADAI FRANK, A.
7621
DE OLIVEIRA, J.P.M.
7368*
DE OLIVEIRA VALENSA, A.
7571, 7602
DE VOGELAER, J.P.
7896*
DEAN, A.C.B.
7677
DEBONGNIE, J.C.
7483*
DEFILIPPI, C.
7329
DEFORD, J.W.
7769
DEL LLANO DE DIAZ, A.
7467
DEL MAZO, J.
7638*
DEMBINSKI, A.
7347*
DEMENTIEVA, N.I.
7564
DEMIGNE, C.
7339*
DEMPSTER, G.
7785*
DENBESTEN, L.
7301*
DESCHNER, E.E.
7890
DETMER, D.E.
7767
DEYHLE, P.
7727
DI MARCO, G.
7798*
DIACONIS, J.N.
7823*
DIETEL, J.
7818
DIMOPOULOS, G.
7574*
DINH, D.M.
7396*
DINNO, F.H.
7348*
DINNO, M.A.
7348*
DINTSMAN, M.
7828
DION, R.
7737, 7739
DIOT, J.
7704
DIVE, C.
7737
DOANE, W.A.
7833
DODDS, W.J.
7335, 7544
DOCI, G.
7714
DOLBAEVA, G.M.
7596
DOMSCHKE, S.
7325
DOMSCHKE, W.
7325
DONAHUE, P.E.
7521
DOUGLAS, M.
7665
DOUGLASS, H.C., JR.
7825*
DOWLA, M.U.
7313
DOYLE, J.T.
7515*
DREILING, D.A.
7730, 7736*
DRUMMOND, G.B.
7583
DUMOLARD, P.
7557
DUMONT, M.
7414*
DUNCAN, A.M.
7657*
DUNCOMBE, V.M.
7854*
DUPREZ, A.
7715
DUROVICOVA, J.
7365
DUTHIE, H.L.
7328
DVUZHILNAYA, E.D.
7592
EDHAG, O.
7886
EIDE, J.
7680
EIGENMANN, J.E.
7379
ELDER, G.H.
7754*
ELL, P.J.
7530*
ELLIOTT, K.R.
7383*
ELOY, R.
7489*
ENGELBRECHT, C.
7447*
ENGELHOLM, L.
7738
ERIKSEN, P.C.
7322*
ERIKSSON, M.
7636*
ERLINGER, S.
7414*
ESPERER, H.D.
7415*
ESPOSITO, G.
7305*
ESSA-KOUMAR, N.
7372*
ESTEVEZ, A.
7804*
EVANDER, A.
7722*
EVANS, J.T.
7667
FABIA, F.
7812*
FADIKA, G.
7450
FAHRENKRUG, J.
7374*
FALEK, A.
7742*

FAOAGALI, J.L.
7792
FARRELL, G.C.
7779
FAUSA, O.
7393*
FAYS, J.
7715
FAZIO, V.W.
7898
FEIFEL, G.
7355
FELDMANN, G.
7414*
FELSHER, B.F.
7755*
FENWICK, D.E.
7479
FENYO, G.
7290*
FERGUSON, J.A.
7781*
FERNANDEZ-HERLIHY, L.
7629
FERRARI, A.
7527*
FESSEL, J.M.
7808*
FIASSE, R.
7896*, 7897*
FILIPPINI, L.
7563
FILLY, R.A.
7684
FISCHER, P.W.F.
7435*
FISHER, J.R.
7460
FISHER, R.L.
7837
FISHMAN, W.H.
7486*, 7487*
FITZGERALD, J.
7770
FITZGERALD, J.F.
7311, 7879
FLABEAU, F.
7595
FLASHNER, Y.
7341
FLEMSTROM, G.
7360
FOMON, S.J.
7883
FORGACS, A.
7585
FORNASIRI, R.
7705
FORTE, F.
7764
FORTMAN, D.L.
7381
FOSSDAL, J.E.
7680
FOSTER, P.C.
7452
FOSTER, S.C.
7543
FOTOPOULOS, J.P.
7840
FRAME, M.H.
7363
FRANKEN, F.H.
7818
FREEDMAN, B.J.
7889
FREIMAN, I.
7875
FRENCH, G.L.
7522
FRIDHANDLER, L.
7550
FRIEDLAND, G.W.
7544
FRIEDMAN, G.
7763
FRIGERIO, G.
7671
FRITSCH, W.P.
7603
FROESCH, E.R.
7379
FROSLIE, A.
7434*
FRUHMORGEN, P.
7535
FRY, R.J.M.
7425*
FUJIWARA, K.
7469
FUJIWARA, M.
7342*
FUKUDA, M.
7480
FUKUTA, S.
7292
FUKUTOMI, H.
7669
FULFORD, K.W.M.
7783*
FURNIVAL, C.
7836
GABBE, E.E.
7749*
GABELLA, G.
7468*
GABRYS-POMYKALA, B.F.
7350*
GAGINELLA, T.S.
7436*, 7483*, 7484*
GAILLARD, J.
7557
GALAMBOS, J.T.
7742*
GALARDY, R.E.
7366*
GALEAZZI, R.
7430*
GALEAZZI, R.L.
7508*
GALLEGO HERNANDEZ, A.
7565
GALLOWAY, R.W.
7548
GANATRA, R.D.
7386*
GANGULY, J.
7398*
GARCIA-CALVO OLIVERA, M.
7565
GARCIA-DIAZ, J.F.
7308*
GARZA-GARZA, R.
7726*
GATTEGNO, L.
7812*
GEBHART, R.J.
7769
GEENEN, J.E.
7335
GEIGER, R.
7355
GEIR, W.
7353*
GELLER, L.I.
7570, 7731
GELMAN-MALACHI, E.
7835
GENELL, S.
7378
GERMAIN, M.
7585
GEUZE, J.J.
7352*
GHAHREMANI, G.G.
7841
GHETIE, V.
7291*
GHOOS, Y.
7323
GIBBS, D.D.
7532
GIBSON, B.
7766
GILAT, T.
7835
GIORCELLI, W.
7775
GIRARD-GLOBA, A.
7377
GIUDICELLI, Y.
7433*
GLASS, G.B.J.
7351*
GLICKMAN, M.G.
7608*
GLICKMAN, R.M.
7496*, 7497*
GLINSKAYA, T.P.
7570, 7731
GO, V.L.W.
7484*, 7862
GOEBELL, H.
7724*
GOLDMAN, H.
7606*
GOLIGHER, J.C.
7664*
GOLIMBU, M.
7688
GOLINKO, C.N.
7361
GOMEZ-ESTRADA, H.
7893

GOMEZ-PAN, A.
7375*
GONZALES-CRUSSI, F.
7770
GONZALEZ-GARZA, M.T.
7893
GOODALL, M.C.
7354
GOODING, G.A.W.
7642
GORAL, R.
7624
GORBACH, S.L.
7662*
GORDON, T.
7515*
GOURNET, C.I.
7704
GOVAERTS, J.P.
7739
GRACEY, M.
7873
GRAMM, H.F.
7725*
GRANGER, D.N.
7498*
GRANT, D.A.W.
7490*, 7506
GRASBECK, R.
7495*
GRASSIGLI, A.
7589
GRAVGAARD, E.
7581, 7610, 7619
GRAY, G.M.
7499*
GRAY, R.K.
7657*
GREEN, M.
7836
GREEN, P.H.R.
7497*
GREEN, R.
7320*
GREENE, H.G.
7627
GREENE, H.L.
7632
GREENGARD, O.
7402*
GREGG, J.A.
7725*
GREIM, H.
7443*
GREMILLET, C.
7585
GRENIER, J.F.
7489*
GREY, H.
7318
GRIGORIEV, P.Y.
7588
GROITL, H.
7698
GROSFELD, J.L.
7770
GROSSMAN, M.I.
7331
GRUNER, M.
7618
GRUNNET, N.
7429*
GUASTAVINO, E.
7878
GUERRERO, J.A.
7692
GUIVARC'H, M.
7732
GUNDERSON, L.L.
7859
GUNN, T.
7853*
GUPTA, J.
7877
GUREWICH, V.
7813*
GUSTAFSSON, B.E.
7389*
GUSTAFSSON, J.A.
7389*
GUSTAVSSON, S.
7324
GUTIERREZ, O.H.
7529*
HABERLAND, G.L.
7355
HABLAS, R.
7865
HADDAD, A.C.
7484*
HAGEN-ANSERT, S.L.
7547
HAGERSTRAND, I.
7805*
HAGGIE, S.J.
7663*
HAGUENAUER, J.P.
7557
HAJJAR, J.J.
7307*
HALL, J.
7665
HALTER, F.
7554*
HALVORSEN, J.F.
7680
HAMES, C.G.
7515*
HAMZA, H.
7693
HANEVELD, G.T.
7464
HANSON, W.R.
7501*
HAOT, J.
7738
HARDISON, W.G.M.
7424*
HARE, J.
7665
HARELL, G.S.
7531*
HARPER, A.M.
7462, 7475
HARPER, W.K.
7757
HARRINGTON, C.J.
7639
HARRIS, W.G.
7471
HARTMAN, E.
7875
HARTUNG, W.A.
7553
HASEBE, M.
7482
HASUMURA, Y.
7428*
HAUSAMEN, T.U.
7603
HAUSSWALD, H.R.
7700
HAVEMANN, C.
7700
HAYASHI, N.
7294
HEFFERNON, J.J.
7550
HEGARTY, M.M.
7574*
HEIDBREDER, E.
7369*
HEIDLAND, A.
7369*
HEILMANN, K.
7633*
HEIMANN, R.
7379
HEINEMANN, H.O.
7810
HEINKEL, K.
7694
HEINRICH, H.C.
7749*
HEIRD, W.C.
7504
HEITMANN, C.
7523
HELIAS, H.
7693
HELL, E.
7623
HELLEMANS, J.
7323
HERFARTH, C.
7724*
HERMON-TAYLOR, J.
7490*, 7506
HERSH, T.
7638*
HERZOG, K.A.
7842
HEUCK, C.C.
7397*
HEYWOOD, R.
7476
HIAL, V.
7512*
HIGH, J.A.
7460
HILLEMAN, M.R.
7472
HILLYER, G.V.
7467

HINTON, R.H.
7407*
HIRAYAMA, C.
7528*
HIROTA, T.
7669
HIRST, B.H.
7375*
HISAKI, H.
7482
HITCH, D.C.
7880
HJORTLAND, M.C.
7515*
HO, C.S.
7526*
HO, K.J.
7388*
HOFFBRAND, A.V.
7640
HOFFMAN, J.L.
7446*
HOFFMANN, R.
7620
HOFMANN, A.F.
7436*
HOGAN, W.J.
7335
HOGSTEDT, C.
7886
HOJO, K.
7669
HOLDSWORTH, G.
7392*
HOLLAND, P.
7836
HOLLANDER, D.
7314
HOLLE, F.
7364
HOLLE, G.
7711, 7817
HOLLENDER, L.F.
7600
HOLLINGSWORTH, M.A.
7742*
HOLMES, G.K.T.
7635*
HOLMES, G.L.
7760
HOLST, J.J.
7374*
HOLT, P.R.
7493*
HOLTZAPPLE, P.G.
7505
HOLZBACH, R.T.
7395*
HORAKOVA, Z.
7512*
HORECZKY, G.
7708
HORIUCHI, Y.
7525*
HORTON, L.W.L.
7641
HOTZ, J.
7724*
HOULT, J.G.
7846
HUANG, K.C.
7348*
HUAUX, J.P.
7896*
HUBAULT, A.
7626
HUGUET, C.
7721
HURWITZ, A.
7359
HUSEBY, N.E.
7409*
HUSEMANN, G.
7630
HUTTUNEN, R.
7746*
ICHII, S.
7416*
IGNESTI, G.
7814*
IHSE, I.
7722*, 7723*
IMAI, K.
7743*
INNES, D.J., JR.
7296
INSHAKOV, L.N.
7564
IPPEN, H.
7753*
IRISA, T.
7528*
IRNIUS, A.
7706
IRWIN, G.R., JR.
7781*
ISAACS, J.T.
7638*
ISAEV, V.R.
7668
ISRAEL, L.
7703
ISSA, F.S.
7407*
ITO, K.
7525*
ITOSHIMA, T.
7294
ITURRIAGA, H.
7804*
ITZCHAK, Y.
7608*
IWEZE, F.I.
7607*
JACOBS, D.
7466
JACOBS, G.
7603
JAEGER, M.
7556
JAGELMAN, D.G.
7898
JAKIMOWICZ, J.J.
7615
JAMIESON, A.M.
7395*
JAMIESON, J.D.
7366*
JANSEN, A.A.J.
7837
JANSSEN, F.G.J.
7509*
JANSSENS, J.
7323
JARBOE, G.E.
7299*
JARRETT, F.
7674
JARRETT, L.N.
7689
JAVITT, N.B.
7430*, 7880
JAWORSKI, E.
7713
JEFFARES, M.J.
7772*
JENKINS, N.
7867
JENSEN, R.T.
7399*
JINNOUCHI, S.
7747*
JOFFE, N.
7606*
JOHANSEN, T.S.
7661*
JOHANSSON, S.V.
7648
JOHNSON, G.M.
7301*
JOHNSON, R.C.
7769
JONES, A.L.
7382*
JONES, P.D.E.
7465
JONES, R.E.
7304*
JOSHI, P.H.
7808*
JOYEUX, A.
7566
JUNG, B.
7324
KADIAN, R.S.
7315, 7333, 7334
KAGAN, A.
7515*
KALICA, A.R.
7863
KAMMERMANN, B.
7379
KANAI, Y.
7449
KAPIKIAN, A.Z.
7863
KAPLAN, M.H.
7736*
KARAKOUSIS, C.P.
7825*
KASSEL, H.
7875
KASZUBA, Z.
7559

KATORKIN, E.N.
7668
KATZ, J.
7421*
KAUFMANN, H.
7622
KAUSCH, H.
7346*
KAWAI, K.
7298*
KAWANISHI, N.
7525*
KAWARADA, Y.
7463
KAZIMIRCHIK, A.P.
7570
KEIFER, W.S., JR.
7745*
KELLAWAY, I.W.
7445*
KELVIN, F.M.
7735*
KENNEDY, P.S.
7748*
KERN, F., JR.
7399*
KERR, A.I.G.
7686
KESTENS, P.J.
7738, 7737, 7739
KHAIRALLAH, P.A.
7327
KHOMENKO, A.M.
7593
KIEKENS, R.
7739
KIHL, B.O.
7390*
KIM, H.W.
7863
KIM, Y.
7503
KIMMIG, J.M.
7694
KING, S.D.
7522
KIRK, D.
7328
KIRK, R.M.
7579
KISSANE, J.M.
7726*
KITAJIMA, K.
7758
KLEEN, U.
7694
KLEIN, P.D.
7552
KLITGAARD, N.A.
7718*
KLOTZ, U.
7848
KNOOK, D.L.
7418*
KOCH, G.
7709
KOCH, H.
7535
KOCISOVA, M.
7365
KODAIRA, S.
7669
KOELZ, H.R.
7340, 7560, 7561
KOJECKY, Z.
7696
KOLDKJAER, O.
7718*
KOLMORGEN, K.
7700
KOLODZIEJCZYK, Z.
7604
KOMAI, T.
7298*
KOMALARINI, S.
7865
KONDE, W.L.
7394*
KONDE, W.N.
7448*
KONDO, S.
7340
KONDO, T.
7362, 7790*
KONONUCHENKO, V.P.
7569
KONTUREK, S.J.
7347*
KOOPMAN, J.P.
7509*
KOORNHOF, H.J.
7875
KORESAWA, S.
7758
KOROLENKO, T.A.
7468
KOUROUNAKIS, P.
7457
KOVACS, J.
7614
KOVALCIK, P.J.
7672
KOVAMEES, A.
7866
KOYAMA, Y.
7669
KRAMAR, V.S.
7668
KRAMER, M.F.
7352*
KRASNA, I.H.
7670
KRASNER, N.
7802*
KRAUSS, J.
7617
KRETCHMER, N.
7646
KRIKSTOPAITIS, A.
7706
KRIKSTOPAITIS, M.
7706
KRISTENSEN, P.
7661*
KROL, R.
7347*
KRONBERG, C.
7576
KRUDY, A.G.
7549
KUBO, R.
7318
KUBO, Y.
7747*
KULCSAR, A.
7426*
KULCSAR-GERGELY, J.
7426*
KUMAGAI, M.
7525*
KUNZ, G.L.
7446*
KURODA, K.
7516
KURTZ, W.
7401*
KUSHCH, N.L.
7569
KUSHNER, J.P.
7755*
LACK, L.
7400*
LAGE, G.L.
7306*
LAGHI, A.
7584
LAI, J.C.K.
7751*
LAING, F.C.
7842
LAMBERT, H.P.
7870
LAMPERT, F.
7900
LAMPERT, I.A.
7465
LAMY, J.
7730
LANCE, P.
7846
LANDOR, J.H.
7372*, 7390*
LANE, M.
7748*
LATIMER, R.G.
7833
LAWRENCE, W., JR.
7860
LE BODIC, L.
7693
LE BODIC, M.F.
7693
LECHENE DE LA PORTE, P.
7376
LEE, D.
7470
LEE, M.
7370*
LEE, P.W.G.
7664*
LEEMAN, W.
7379
LEFEBVRE, D.
7750*

LEFKOWITZ, R.J.
7336*, 7337*
LEFRANC, G.
7693
LEHANE, D.E.
7748*
LEIBERMAN, D.P.
7462
LENKEI, R.
7291*, 7787*
LEO, M.A.
7439*
LEPRINCE, C.
7440*
LESESNE, H.R.
7778
LEUSCHNER, U.
7401*
LEV, R.
7309
LEVEILLE, G.A.
7441*
LEVESQUE, D.
7368*
LEVEY, G.S.
7338*
LEVIN, D.
7766
LEVIN, K.J.
7778
LEVY, E.
7721
LEWAN, L.
7447*
LEWANDOWSKI, A.
7702
LEWINSKI, A.
7586
LEWIS, J.C.
7483*
LICASTRO, R.
7878
LIEBER, C.S.
7428*, 7439*
LIEBERMAN, D.P.
7475
LIERSCH, M.
7357*
LIGUORI, L.
7589, 7613
LILJA, P.
7722*, 7723*
LILLY, J.R.
7880
LIM, K.S.
7783*
LIN, G.J.
7394*, 7448*
LING, N.R.
7635*
LINSCHEER, W.G.
7486*, 7487*
LINTHORST, J.M.
7493*
LINTOTT, D.J.
7664*
LIPINSKA, I.
7813*
LIPINSKI, B.
7813*
LIPKIN, M.
7890
LITINSKAYA, E.V.
7605
LITWIN, A.
7594
LLOYD-STILL, J.D.
7765
LOCKWOOD, D.H.
7637*
LOHMANN, D.
7816
LOON, N.
7768
LOOS, R.
7401*
LORENZINI, C.I.
7715
LORUP, C.
7423*
LUSOWSKY, M.S.
7634*
LOU, M.A.
7834
LOUGHNAN, P.
7683
LOVISETTO, P.
7775
LOW-BEER, T.S.
7459
LOYGUE, J.
7721
LU, C.T.
7841
LUNDQUIST, F.
7429*
LUNDQUIST, I.
7723*
LUNDQVIST, G.
7324
LUNN, P.G.
7524
LUNZER, M.A.
7417*
LUOMA, P.V.
7803*
LUPOLD, M.
7618
LUSZPINSKI, G.
7752*
LYNEN, F.K.
7466
MACMILLAN, S.
7785*
MADSEN, O.G.
7580
MAEYAMA, R.
7612
MAGEE, A.I.
7490*, 7506
MAGEE, C.F.
7362
MAHN, I.
7431*
MAIE, M.
7843
MAIN, I.H.M.
7363
MAINGUET, P.
7897*
MAIYA, P.P.
7871
MAK, I.T.
7427*
MAKAREVICH, Y.A.
7597
MALAFOSSE, M.
7721
MALAGELADA, J.R.
7486*, 7487*
MALYSHEV, Y.I.
7668
MAMEDOVA, L.D.
7587
MANDAL, A.K.
7834
MANDIOLA, S.
7330
MANICH, B.
7547
MANN, N.S.
7315, 7333, 7334
MANNING, J.A.
7417*
MARAI, L.
7396*
MARANGOLA, J.P.
7845
MARCOULLIS, G.
7495*
MARION, M.A.
7844
MARKS, G.S.
7435*
MARKS, J.
7829
MARQUAND, J.
7732
MARQUET, G.
7895
MARRANO, D.
7589
MARRIE, A.
7600
MARRIOTT, C.
7445*
MARSH, G.W.
7640
MARSHALL, W.H., JR.
7531*
MARTIN, C.W.
7717*
MARTINELLI, R.P.
7453
MARTINEZ, J.
7744*
MARTINEZ, L.C.
7652
MARX, F.W., JR.
7657*
MASHIGE, F.
7743*
MASON, R.W.
7478

MATHAN, M.
7871
MATHE, D.
7413*
MATHIE, R.T.
7462, 7475
MATHY, J.P.
7738
MATZKU, S.
7568*
MAURON, J.
7866
MAUUARY, G.
7715
MAZITOVA, O.P.
7720
MAZZAFERRI, E.L.
7885
MCARTHUR, J.
7545
MCCOLL, I.
7533
MCDEVITT, D.G.
7432*
MCDONALD, G.B.
7316
MCDONNELL, M.E.
7395*
MCGINN, T.
7764
MCGRATH, H.
7458
MCKITTRICK, J.E.
7833
MCLAUGHLIN, S.M.
7543
MCNAIR, M.M.
7666
MCQUEEN, E.G.
7478
MEERSSEMAN, F.
7738
MEIXNER, M.
7530*
MEJEAN, C.
7440*
MEJIA, J.
7852
MELANGE, M.
7737
MELARANGE, R.A.
7363
MELLITS, E.D.
7645
MENDOZA, C.G.
7692
MERKEL, H.
7431*
MEYER, C.
7600
MEYER, J.H.
7330
MEZEY, E.
7815*
MEZZANOTTE, B.
7705
MICHALOWSKI, J.
7297*
MICHEL, B.
7827*
MIDDLETON, P.J.
7872
MIENO, H.
7482
MIGASENA, P.
7856*
MIKKELSEN, K.
7322*
MIKKELSON, B.
7388*
MILEWSKI, B.
7558
MILLWARD-SADLER, G.H.
7796
MINTZER, R.A.
7839
MIRHOM, R.
7489*
MITAMURA, K.
7743*
MITCHELL, E.K.
7451
MITSUOKA, T.
7510*
MITTELMAN, A.
7667
MITZNEGG, P.
7325
MIURA, Y.
7482
MOERTEL, C.G.
7858
MOGHISSI, K.
7566
MOKKA, R.E.
7746*
MOLLER, S.H.
7581, 7610, 7619
MOLYNEUS, G.
7836
MONGEAU, R.
7373*
MOODY, D.E.
7454
MOOG, F.
7288*, 7502
MOONEY, J.S.
7382*
MOORE, A.F.
7327
MOORE, E.W.
7313
MOORE, W.H.
7778
MORALES, P.
7688
MORELL, A.G.
7422*
MORIN, M.
7732
MORISSET, J.
7371*
MORLAND, J.
7408*, 7409*
MORLOCK, G.
7697
MORNET, P.
7732
MORODER, L.
7325
MORONI, M.
7671
MOROZOV, I.A.
7599
MORRISSEY, J.F.
7540
MORSON, B.C.
7551
MORTARA, G.
7806*
MORTILLARO, N.A.
7498*
MOSCHINI, A.
7714
MOSHAL, M.G.
7345*, 7574*
MOSS, D.W.
7403*
MOTOYAMA, Y.
7790*
MOUGENOT, J.F.
7618
MOXLEY, R.T.
7637*
MULLEN, J.T.
7672
MULLER-BERGHAUS, G.
7431*
MULLER, H.P.
7620
MULLINK, J.W.M.A.
7464
MULLINS, G.C.
7683
MULLOCK, B.M.
7407*
MUNDAY, K.A.
7303*
MUNKA, V.
7365
MURAKAMI, N.
7416*
MURAKAMI, T.
7294
MURANISHI, S.
7438*
MUSABAEVA, L.I.
7564
MUSSINI-MONTPELLIER, J.
7693
MUTCHNICK, M.G.
7808*
NACCHIERO, M.
7736*
NADLER, H.L.
7855*
NAGANT DE DEUXCHAISNES, C.
7896*
NAGASAKI, Y.
7747*
NAGATA, K.
7790*
NAITO, K.
7762

NAITO, M.
7461
NAKAE, H.
7438*
NAKAMURA, M.
7528*
NAKAMURA, R.
7525*
NAKASHIMA, T.
7612
NAMBARA, T.
7463
NARENDERAN, K.
7315, 7333, 7334
NARUSUE, M.
7849
NAUER, E.
7563
NAVARRO, J.
7618
NEAL, M.W.
7451
NEALE, G.
7403*
NEELON, V.J.
7400*
NEIMAN, H.L.
7839
NERI, B.
7575
NEZHDANOVA, G.A.
7599
NICHOLAS, N.K.
7782*
NICHOLS, R.L.
7662*
NICKELS, J.S.
7460
NICOLADZE, D.
7618
NICOLO, R.
7584
NIES, A.S.
7432*
NILSSON-EHLE, P.
7805*
NILSSON, F.
7324
NISHI, Y.
7492*
NITZSCHKE, U.
7900
NOGUCHI, T.
7482
NORDMANN, J.
7433*
NORDMANN, R.
7433*
NORHEIM, G.
7434*
NORONHA, M.
7730
NORONHA, O.P.D.
7386*
NOTHIGER, F.
7620
NOVELLINE, R.A.
7549
NOWAK, A.
7813*
NOWOSIWSKY, T.
7781*
NYHUS, L.M.
7350*
O'CONNOR, J.J.
7675
O'DORISIO, T.M.
7885
OAKENFULL, D.
7479
OBATA, H.
7747*
OCHI, S.
7662*
OCKNER, R.K.
7417*
ODAR-CEDERLOF, I.
7648
OESCH, I.
7620
OGLE, C.W.
7517
OH, S.Y.
7395*
OHKAWA, H.
7843
OHLSSON, K.
7378
OHNO, K.
7510*
OKAJIMA, K.
7849
OKASAKI, S.
7762
OKOLICSANYI, L.
7773*
OKON, E.
7518
OKUDA, K.
7747*
OKUKUBO, F.
7364
OLER, A.
7451
OLESCH, K.
7562
ONICA, D.
7291*
OPPITZ, K.H.
7749*
ORLANDO, R.
7773*
ORTIZ, J.
7878
ORTOLANI, C.
7773*
OSBORNE, J.W.
7501*
OSUGA, T.
7743*
OSUMI, Y.
7342*
OTTE, J.B.
7737
OTTO, H.F.
7523
OVIEDO, M.A.
7388*
OWEN, C.A., JR.
7384*
OZHERELIEVA, N.Y.
7570
PACE, G.
7806*
PAGES, C.
7895
PAIGE, D.M.
7645
PALASCAK, J.E.
7744*
PALBOL, J.
7759
PANOV, A.A.
7597
PANOVA, T.N.
7597
PANTOJA, J.L.
7329
PARDRIDGE, W.M.
7387*
PARK-HAH, J.O.
7780
PARSONS, B.J.
7303*
PARTHASARATHY, K.L.
7667
PARTINGTON, P.F.
7838
PASQUIER, P.
7626
PATON, A.
7846
PATRICIO, J.
7585
PAUL, R.
7398*
PAULI, W.
7633*
PAUWELS, E.K.J.
7455
PELISSIER, E.
7895
PELKONEN, R.O.
7746*, 7803*
PELLONI, S.
7560, 7561
PELOV, E.Y.
7597
PENA, H.G.
7421*
PENCHARZ, P.
7853*
PENISTON, R.L.
7672
PENNER, J.W.
7396*
PENNINGTON, C.R.
7391*
PERAINO, C.
7425*
PEREDA, T.
7804*
PEREIRA, S.M.
7871

PERRET, G.
7344*
PERRIN, J.
7490*
PERTSCHUK, L.P.
7877, 7891
PERUCCA, E.
7321*
PETERS, T.J.
7404*
PETRIC, M.
7872
PETRILLI, F.L.
7786*
PHILLIPS, M.M.
7808*
PHILLIPS, S.F.
7483*, 7484*
PICHLMAYR, R.
7740
PICKERING, R.W.
7419*
PILLAY, C.V.
7345*
PINKUS, L.M.
7491*
PIRISINO, R.
7814*
PIROZYNSKI, W.J.
7560, 7561
PIRTTIAHO, H.
7803*
PLANTIN, L.C.
7648
POGSON, C.I.
7383*
POKROVSKY, A.
7411*
POLETTI, T.
7820
POLITOWSKI, M.
7604
POLLET, J.
7685
POLONOVSKI, C.
7618
POLOUS, Y.M.
7592
POMEROY, J.S.
7811*
PONGPAEW, P.
7856*
POPLAVSKY, K.E.
7555
PORTEOUS, J.W.
7300*
PORTMANN, B.
7802*
POSPELOVA, V.V.
7720
POTICHA, S.
7631
POULSEN, J.H.
7370*
POUSSE, A.
7489*
POWELL, L.W.
7779
POZEFSKY, T.
7637*
PRADAL, G.
7693
PRASAD, I.
7877
PRIKAZCHIKOV, Y.A.
7597
PRITCHARD, P.J.
7300*
PROBST, M.
7724*
PROFFITT, J.H.
7424*
PROUT, B.J.
7534, 7536
PROVOST, P.J.
7472
PROYE, C.
7888
PULMANO, C.M.
7734*
PURCELL, R.
7764
PUSCAS, I.
7573*
PYTIEVA, G.P.
7668
PYTKOWSKI, B.
7297*
QUILICI, M.
7895
RABON, E.C.
7343*
RAGLAND, W.L.
7477
RAGUSE, T.
7466
RAINFORD, E.A.
7891
RAJAN, K.S.
7448*
RAKHIMOVA, N.G.
7720
RANDALL, D.H.
7781*
RAO, G.A.
7458
RAPP, W.
7568*
RAPPAPORT, A.M.
7293
RATELLE, S.
7750*
RAUL, F.
7489*
RAWAT, A.K.
7442*
REDDY, B.S.
7659*, 7717*
REDDY, C.M.
7868
REDDY, J.K.
7454
REHM, W.S.
7343*, 7348*
REHNER, M.
7733
REICHMANN, J.
7707
REISINGER, W.
7695
RELLAHAN, W.
7567*
REMESY, C.
7339*
RENDALL, M.
7533
RENNEKAMP, H.
7752*
RENTON, P.
7663*
RESIGA, C.
7573*
REUTER, S.R.
7734*
REY, A.
7595
REYES, C.N.
7467
RHODES, A.J.
7785*
RICE, G.C.
7475
RICE, R.P.
7735*
RICHTER, E.
7415*
RICHTER, K.
7695
RIDDELL, R.H.
7682
RIDLEY, D.S.
7892*
RIEDL, A.
7698
RIM, E.
7314
RIMOIN, D.L.
7578
RIOTTOT, M.
7440*
RITTER, U.
7827*
RIZZO, C.
7701
ROBBINS, P.J.
7381
ROBERMAN, N.A.
7593
ROBINS-BROWNE, R.M.
7875
ROCHA, H.
7453
RODRIGUES, L.E.A.
7453
ROMANET, P.
7557
ROMSOS, D.R.
7441*
ROSCH, J.
7529*
ROSENBERG, I.H.
7642
ROSENMANN, E.
7518

ROSENTHAL, W.S.
7764
ROSNER, W.
7481
ROSS, F.G.M.
7538
ROSS, P.E.
7391*
ROSSETTI, M.
7728
ROSSINI, F.P.
7527*
ROSSITER, M.
7640
ROSSNER, J.A.
7633*
ROTTER, J.I.
7578
ROUGER, P.
7590
ROWE, J.W.
7815*
ROY, C.C.
7750*, 7756
RUBEN, A.T.
7831
RUBIN, C.E.
7316
RUBLE, P.E.
7314
RUDOWSKI, W.
7558
RUITER, D.J.
7455
RUMPF, K.D.
7740
RUMPF, P.
7603
RUSAKOV, V.M.
7668
RUSELER, C.H.
7615
RUSOVA, T.V.
7468
RUSZKOWSKA, J.
7625
RUZYLLO, E.
7719
RYAN, C.J.
7475
RYERSON, T.W.
7687
SABOURAULT, D.
7433*
SACHS, G.
7343*, 7354
SACQUET, E.
7440*
SADJIMIN, T.
7865
SADLER, T.E.
7465
SAKAE, K.
7342*
SALAS, M.
7457
SALEMBIER, Y.
7847
SALMON, P.R.
7539, 7577
SALONEN, E.M.
7495*
SANBORN, W.K.
7865
SANDERS, D.E.
7526*
SANDRI, R.
7819, 7821
SANY, J.
7697
SARACENO, G.
7806*
SARAU, H.M.
7343*
SARLES, H.
7367*, 7368*, 7376
SASSER, L.B.
7299*
SATTLER, E.L.
7431*
SAUNDERS, D.R.
7316
SAXTON, H.M.
7832
SCHACHT, U.
7603
SCHAEFER, R.A.
7764
SCHAFFALITZKY DE MUCKADELL,
O.B. 7374*
SCHEINBERG, I.H.
7422*
SCHELP, F.P.
7856*
SCHEURER, U.
7554*
SCHIAVI, J.
7878
SCHIER, J.
7558
SCHILLER, K.F.R.
7534, 7536
SCHILLING, K.
7733
SCHINELLA, R.
7688
SCHLUMPF, U.
7556
SCHMID, M.
7556
SCHMIDT, K.G.
7718*
SCHMITT, W.
7699
SCHMUCKER, D.L.
7382*
SCHNAARS, P.
7556
SCHNEIDER, J.F.
7552
SCHNEIDER, M.
7401*
SCHNEIDER, R.E.
7642
SCHOELLER, D.A.
7552
SCHOENFIELD, L.J.
7829
SCHOUB, B.D.
7875
SCHRAMM, M.
7341
SCHREURS, W.H.P.
7856*
SCHROEBLER, S.
7826*
SCHULE, A.
7560, 7561
SCHULER, B.
7611
SCHULTZ, S.S.
7667
SCHULZ, I.
7340
SCHULZ, U.
7568*
SCHUTT, A.J.
7884
SCHWAMBERGER, K.
7353*
SCHWARTZ, L.A.
7876
SCHWARTZ, M.K.
7861
SCHWARZ, L.R.
7443*
SCHWEDES, U.
7519
SCHWENK, M.
7443*
SCOTTI, B.B.
7634*
SCOTT, D.G.
7634*
SCOTT, J.C.
7745*
SEGAL, A.
7704
SEGAL, S.
7704
SEGATO, G.
7714
SEGGIE, J.
7768
SEIDEL, D.
7397*
SELIGMAN, J.W.
7776
SELIGSOHN, L.
7774*
SELYE, H.
7457
SEMB, B.K.H.
7680
SEPPI, E.J.
7531*
SERRE, H.
7697
SEWATKAR, A.B.
7386*
SEYMOUR, C.A.
7404*
SHADCHEHR, A.
7330

SHAFFER, R.D.
7335
SHANI, M.
7774*
SHARIF, J.
7695
SHARMA, R.P.
7478
SHAROVA, Y.A.
7596
SHARP, J.G.
7501*
SHCHERBINA, A.P.
7592
SHIBANOVA, A.I.
7564
SHIBATA, A.
7480
SHIBATA, H.
7612
SHIBATA, S.
7758
SHIKATA, J.
7482
SHIMADA, Y.
7294
SHIMAMURA, J.
7550
SHIMOKAWA, Y.
7747*
SHINDO, H.
7298*
SHINOHARA, T.
7762
SHIOMI, Y.
7438*
SHKOLNIK, A.
7542
SHLYGIN, G.K.
7361
SHORE, L.S.
7372*
SIBAL, A.C.
7864
SICARD, J.L.
7595
SIEBER, H.
7791*
SIEBER, P.
7369*
SILBERSTEIN, E.B.
7381
SILK, D.B.A.
7751*
SILVERMAN, L.
7332
SILVESTRE, G.
7710, 7894
SIMMONDS, W.J.
7302*
SIMON, L.
7697
SIMON, N.
7822
SIMOND-COTE, E.
7377
SIMPKINS, K.C.
7664*
SIMPSON, J.S.
7832
SIMSO, L.A.
7830
SINGAYEVSKY, I.K.
7593
SINTA
7865
SIRINEK, K.R.
7885
SJOBLOM, M.
7409*
SKACHKOVA, N.P.
7616
SKALHEGG, B.A.
7393*
SKARBEK-GALAMON, C.
7793
SKUDE, G.
7722*
SLEISINGER, M.H.
7643, 7644, 7650, 7651,
7652, 7653, 7654, 7655,
7656
SLOMIANY, A.
7351*, 7356
SLOMIANY, B.L.
7351*, 7356
SMALL, E.W.
7778
SMITH, F.E.
7748*
SMITH, P.A.
7572*
SMITHSON, K.W.
7499*
SNIDERMAN, K.W.
7549
SOBIESKI, R.J.
7511*
SOBOLEWSKA, M.
7586
SOEHENDRA, N.
7733
SOHAR, I.
7822
SOLI, N.E.
7434*
SOLOMONS, N.
7326
SOLOMONS, N.W.
7552, 7642
SOLOWIEJCZYK, M.
7835
SOLUYANOVA, I.P.
7588
SOMERS, S.
7345*
SOMMER, G.
7684
SOONG, S.J.
7388*
SORRELL, M.F.
7412*
SOTANIEMI, E.A.
7746*, 7803*
SOTO, J.M.
7670
SOTO, R.T.
7670
SPANKNEBEL, H.
7694
SPENCE, L.
7785*
SPRUGEL, W.
7325
SRIVASTAVA, H.C.
7295
ST. LOUIS, P.
7522
STACEY, R.
7450
STADLER, J.
7835
STAFFELDT, E.
7425*
STALPORT, J.
7708
STARLINGER, M.
7600
STAVOROVSKY, M.
7835
STEIGER, M.
7728
STEINBERG, G.B.
7720
STEINER, H.
7623
STEINER, N.
7787*
STEMMERMANN, G.
7567*
STEPHENS, J.K.
7435*
STEVENS, J.S.
7658*
STEVENS, W.
7514*
STEWART, E.T.
7335
STEWART, T.A.
7460
STINTZING, G.
7636*
STOCKERT, R.J.
7422*
STOKSTAD, E.L.R.
7473
STOLBACH, L.L.
7486*
STORCH, W.
7799
STRADNIEKS, S.
7394*, 7448*
STRANDBERG, P.O.
7648
STRITTMATTER, W.J.
7336*, 7337*
STROME, M.
7882
STROMME, J.H.
7409*
STRUNZ, U.T.
7331
STUBY, K.
7727

SUBBIAH, M.T.R.
7396*
SUBBUSWAMY, S.G.
7607*
SUBRAMANIAN, G.
7386*
SUGAWARA, C.
7507
SUGAWARA, N.
7507
SUHARJONO
7873
SULSER, H.
7727
SUNOTO
7873
SUPAWAN, V.
7856*
SVENDSEN, L.B.
7661*
SZABO, S.
7519
SZAFRAN, H.
7594
SZCZEPANIAK, A.
7558
SZONTAGH, E.
7614
SZPAK, E.
7604
SZYMANSKI, M.T.
7872
SZYMANSKI, Z.
7559
TABUCHI, K.
7849
TAGUCHI, F.
7469
TAKAGI, K.
7289*, 7494*
TAKAHASHI, H.
7843
TAKESUE, Y.
7492*
TAKOLANDER, R.J.
7676
TAMURA, R.
7492*
TANAYAMA, S.
7449
TANIMURA, A.
7612
TARASOV, D.I.
7588
TARQUINI, B.
7575
TAYLOR, A.E.
7498*
TAYLOR, C.B.
7388*
TAYLOR, R.L.
7757
TAYLOR, W.
7582
TEGGIA, M.
7321*
TESCHKE, R.
7428*
THADEPALLI, H.
7834
THIEDEN, H.I.D.
7429*
THOMAS, G.E.
7768
THOMPSON, H.
7537
THOMPSON, M.H.
7572*
THOMPSON, W.M.
7735*
THURBER, L.
7867
THURMAN, R.G.
7410*
TIETZ, A.
7835
TIGHE, J.R.
7641
TILNEY, N.L.
7686
TIMAR, M.
7456
TISCORNIA, O.M.
7367*, 7368*, 7376
TOBIN, J.
7815*
TOCCALINO, H.
7878
TODANI, F.
7849
TOKUYAMA, K.
7762
TOMARELLI, R.M.
7454
TOMKINS, A.M.
7892*
TONELLI, A.
7705
TONINI, M.
7321*
TOPPET, M.
7789*
TORNQVIST, H.
7805*
TORUN, B.
7326
TOSTO, S.
7894
TRAZO, L.G.
7770
TREANOR, L.L.
7485*
TRENGGONOWATI, R.
7865
TRIPONIS, V.
7706
TRITZ, G.J.
7477
TROEGER, H.
7699
TROMPETER, G.
7594
TROWELL, J.
7794
TRUELOVE, S.C.
7541
TSCHANG, T.P.
7726*
TSIKOFF, M.B.
7823*
TSILLI, E.I.
7468
TSO, P.
7302*
TSUCHIYA, R.
7850
TSUJI, T.
7762
TSYTSORINA, T.N.
7468
TUBIANA, J.M.
7590
TUCHWEBER, B.
7457
TUMA, D.J.
7412*
TURGANBAEV, A.T.
7564
TURNBULL, R.B., JR.
7898
TUSZEWSKI, M.
7624, 7625
UCHIDA, M.
7289*, 7494*
UEDA, M.
7525*
UETA, N.
7482
UGARTE, G.
7804*
UGLOVA, M.V.
7668
USADEL, K.
7519
USHIO, K.
7669
UVNAS-WALLENSTEN, K.
7349*
VAGNE, M.
7344*
VAITKEVICIUS, V.K.
7876
VALENZUELA, J.E.
7329
VAN BEERS, D.
7789*
VAN BERGE HENEGOUWEN, G.P.
7436*, 7831
VAN BEZOOIJEN, C.F.A.
7418*
VAN DEN NOORTGATE, D.
7708
VAN DER HEIDE, D.
7455
VAN DER LINDEN, W.
7437*
VAN DRUTEN, J.A.M.
7509*
VAN GEERT, C.
7866

VAN LEUSEN, R.
7831
VAN 'T NOORDENDE, J.M.
7455
VANDELLI, C.
7798*
VANDERHOOF, J.A.
7412*
VANTRAPPEN, G.
7323
VARGA, L.
7822
VASILAS, A.
7864
VASQUEZ, L.
7326
VENABLES, C.W.
7572*
VENZA, E.
7701, 7710
VERESS, S.
7573*
VERLOHREN, H.J.
7816
VERTA, M.
7631
VERWILGHEN, A.M.
7866
VESELY, D.L.
7338*
VILARDELL, F.
7761
VILJAKAINEN, E.
7746*
VILLAREJOS, V.M.
7472
VILSHANSKAYA, F.L.
7720
VITERI, F.
7326
VITI, G.
7613
VOIROL, M.
7368*
VOLP, R.F.
7306*
VON GAISBERG, U.
7694
VOROB'EV, L.P.
7616
VORONOVA, G.V.
7801
VOS, L.J.M.
7716
VOS-MAAS, M.
7464
VULETIN, J.C.
7891
VYVODA, O.S.
7392*
WADSWORTH, P.F.
7476
WALKER, S.H.
7780
WALKER, W.
7572*
WALKER, W.A.
7310
WALMSLEY, P.
7764
WALTER, J.F.
7734*
WALTMAN, A.C.
7549
WALZEL, C.
7729
WANDS, J.R.
7815*
WAPPNER, R.S.
7855*
WARREN, W.D.
7742*
WATANABE, A.
7406*
WATANABE, Y.
7849
WATERBURY, L.A.
7815*
WATKINS, J.B.
7312, 7552
WATSON, A.J.
7500*
WATTS, R.S.
7421*
WAYE, J.D.
7681
WEBER, A.M.
7756
WEIDMAN, M.
7316
WEIGAND, K.
7415*
WEIGL, E.
7791*
WEINBERG, A.
7766
WELLS, W.W.
7427*
WERNER, B.
7733, 7886
WHITEHEAD, R.G.
7524
WICKS, A.C.B.
7768
WIEBE, T.
7805*
WILK, P.
7898
WILKINSON, G.R.
7432*
WILLIAMS, C.B.
7682
WILLIAMS, J.A.
7370*
WILLIAMS, R.
7751*, 7777*, 7802*, 7807*
WILLITAL, G.H.
7698
WILSON, F.A.
7485*
WILSON, R.M.
7372*
WINDMUELLER, H.G.
7491*
WINGATE, D.
7320*
WINKLER, R.
7523, 7709
WISSE, E.
7455, 7461
WOHLGEMUTH, B.
7707
WOLF, B.S.
7546
WONG, V.T.
7783*
WOOD, C.A.
7424*
WOODLIEF, R.M.
7841
WOODRUFF, A.
7631
WOOTTON, A.M.
7403*
WORASCHK, H.J.
7617
WOSIEWITZ, U.
7826*
WOSZCYK, J.
7625
WRIGHT, D.
7868
WRIGHT, D.J.
7583
WRIGHT, J.R.
7815*
WRIGHT, N.A.
7500*
WRIGHT, S.G.
7892*
WROBEL, D.M.
7785*
WRONKOWSKI, Z.
7567*
WU, J.M.
7460
WUNSCH, E.
7325, 7347*
WYATT, R.G.
7863
WYLLIE, J.H.
7663*
WYNDER, E.L.
7659*, 7717*
YAKOBSON, G.S.
7468
YAKOVENKO, E.P.
7588
YAMADA, O.
7758
YAMAGATA, J.
7612
YAMAGUCHI, A.
7480
YAMAMOTO, H.
7612
YAMAMOTO, T.
7790*
YAMEY, A.
7488*
YASTREB, N.I.
7587
YAWATA, Y.
7758

YEH, H.C.
7546
YNGNER, T.
7447*
YOLKEN, R.H.
7863
YONEHIRO, L.
7833
YONG, F.C.
7771*
YOSHIDA, K.
7480
YOUNG, E.J.
7757
YOUNG, S.A.
7792
YOUNOSZAI, M.K.
7883
YUMASHKINA, A.G.
7596
ZANETTI, A.R.
7788*
ZAPF, J.
7379
ZEISSER, E.
7698
ZEMAN, R.K.
7687
ZER, M.
7828
ZIEGLER, E.E.
7883
ZOLLER, M.
7568*
ZOTTI, S.
7821
ZUCKERMAN, A.J.
7795, 7797
ZWERGEL, T.
7900

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

- ABDOMEN
  - ARTERIES
    - ANOMALY, 7886
  - PANCREATITIS, CHRONIC
    - HEMORRHAGE, 7734*
  - SURGERY
    - OXYGEN, 7583

- ABSCESS
  - LIVER
    - AMEBIASIS, 7471
    - BACTERIAL INFECTIONS, 7757

- ABSORPTION
  - ANTI-INFLAMMATORY AGENTS
    - ANTACIDS, 7359
  - ANTIBIOTICS
    - ANTACIDS, 7359
  - ANTICOAGULANTS
    - ANTACIDS, 7359
  - CELIAC DISEASE
    - ANTIBIOTICS, 7636*
  - COLON
    - VITAMIN K, 7314
  - CYSTIC FIBROSIS
    - IRON, 7749*
  - DRUGS
    - ANTACIDS, 7359
  - ESOPHAGUS
    - HYDROGEN, 7301*
  - FATS
    - EMBRYOLOGY, 7312
    - FETUS, 7312
    - NEONATE, 7312
  - H2 RECEPTOR ANTAGONISTS
    - ANTACIDS, 7359
  - ILEUM
    - VITAMIN K, 7314
    - WATER, 7305*
  - INTESTINE, LARGE
    - VITAMIN K, 7314
  - INTESTINE, SMALL
    - AMINO ACIDS, 7297*
    - CIRCULATION, 7297*
    - EMBRYOLOGY, 7309, 7310, 7312
    - FATS, 7312
    - FATTY ACIDS, 7316, 7317, 7505
    - FETUS, 7309, 7312
    - MORPHOLOGY, 7309
    - MOTILITY, 7297*
    - NEONATE, 7311, 7312
    - PEPTIDES, 7499*
    - VITAMIN K, 7314
    - WATER, 7305*
  - INTESTINES
    - CHYLOMICRONS, 7302*
    - LIPIDS, 7302*
  - JEJUNUM
    - FATTY ACIDS, 7317
    - FETUS, 7309
    - MORPHOLOGY, 7309
    - PEPTIDES, 7499*
    - WATER, 7305*
  - PROTEINS
    - EMBRYOLOGY, 7309
    - FETUS, 7309
  - STEROIDS
    - ANTACIDS, 7359

- ABSORPTION (continued)
  - STOMACH
    - H2 RECEPTOR ANTAGONISTS, 7357
  - VITAMINS
    - ANTACIDS, 7359

- ACHALASIA
  - ETIOLOGY, 7565

- ACID SECRETION
  - SEE ALSO HYPERCHLORHYDRIA, SECRETION
  - DUODENUM
    - HORMONES, 7344*
  - STOMACH, 7343*, 7360
    - BILE, 7390*
    - DRUG EFFECTS ON, 7345*, 7357, 7362
    - DUODENUM, 7600
    - ESOPHAGEAL REFLUX, 7358
    - FATS, 7390*
    - FEEDING, 7364
    - H2 RECEPTOR ANTAGONISTS, 7357
    - HORMONE CONTROL, 7342*
    - HORMONE EFFECTS ON, 7347*, 7375*
    - MOTILIN, 7347*
    - NERVOUS CONTROL, 7342*
    - NICOTINE, 7349*
    - NOREPINEPHRINE, 7342*
    - NUTRITION DISORDERS, 7873
    - PROSTAGLANDINS, 7363
    - PYLOROPLASTY, 7364
    - SOMATOSTATIN, 7375*
    - VAGOTOMY, 7364, 7603
  - ULCER, PEPTIC
    - REVIEW, 7579
  - VAGOTOMY
    - TECHNIQUES, 7353*

- ACIDITY
  - CECUM
    - BACTERIA, 7509*

- ACIDS
  - COLON
    - NUCLEIC ACIDS, 7483*
    - PERFUSION, 7483*
    - PERMEABILITY, 7483*
    - SECRETION, 7483*
  - STOMACH
    - ULCER, 7516
  - ULCER
    - PREVENTION, 7516

- ACRODERMATITIS
  - ZINC
    - DEFICIENCY, 7633*
    - ULTRASTRUCTURE, 7633*

- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - SECRETION
    - GASTRIN, 7350*

- ADENOSINE TRIPHOSPHATASE
  - SALIVARY GLANDS, 7296
    - NEOPLASMS, BENIGN, 7296

- ADRENERGIC RECEPTOR AGONISTS
  - SALIVARY GLANDS
    - CALCIUM, 7340
  - TRANSPORT
    - CALCIUM, 7340

- ALBUMINS
  - FATTY ACIDS
    - BILIRUBIN, 7771*
    - BINDING, 7771*
  - HEPATITIS, TOXIC
    - GALACTOSAMINE, 7431*
  - HEPATOCYTES, 7291*
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7649
  - NUTRITION DISORDERS, 7524

- ALCOHOL DEHYDROGENASES
  - SEE ALCOHOL OXIDOREDUCTASES

- ALCOHOL OXIDOREDUCTASES
  - LIVER
    - COENZYMES, 7405*

- ALCOHOLIC LIVER DISEASE
  - SEE LIVER DISEASES, ALCOHOLIC

- ALCOHOLISM
  - BIOCHEMISTRY, 7411*
  - DIAGNOSIS
    - IMMUNOGLOBULINS, 7804*
  - DRUG METABOLISM, 7803*
  - FETUS, 7442*
  - HYPERTENSION
    - REVIEW, 7809
  - LIVER
    - NEOPLASMS, MALIGNANT, 7768
    - PROTEINS, 7442*
  - LIVER CIRRHOSIS
    - ETIOLOGY, 7802*
    - IMMUNOLOGY, 7802*
    - PROGNOSIS, 7802*
    - SEX FACTORS, 7802*
  - LIVER DISEASES, ALCOHOLIC
    - REVIEW, 7809
  - LIVER INJURY
    - ALDEHYDES, 7428*
  - MALLORY-WEISS SYNDROME, 7563
  - METABOLISM, 7411*
  - NEONATE, 7442*
  - PANCREAS
    - PARASYMPATHOMIMETICS, 7367*
  - PREGNANCY, 7442*
  - PROTEINS
    - SYNTHESIS, 7442*
  - RESPIRATORY SYSTEM
    - REVIEW, 7810

- ALCOHOLS
  - BIOCHEMISTRY, 7411*
  - BLOOD
    - LIPIDS, 7515*
  - ESOPHAGUS
    - HYDROGEN, 7301*
  - HYDROGEN
    - METABOLISM, 7429*
  - ILEUM
    - GUANYL CYCLASE, 7338*
  - LIPIDS
    - METABOLISM, 7805*

- ALCOHOLS (continued)
  - LIVER
    - ENZYMES, 7408*, 7409*
    - GUANYL CYCLASE, 7338*
    - METABOLISM, 7428*, 7429*
    - OXIDATION, 7410*
    - PROTEINS, 7439*
  - METABOLISM, 7411*
    - REVIEW, 7410*
    - TOXICITY, 7410*
  - PANCREAS
    - BICARBONATE SECRETION, 7368*
    - GUANYL CYCLASE, 7338*
    - SECRETION, 7368*
  - STOMACH
    - GUANYL CYCLASE, 7338*

- ALDEHYDES
  - LIVER
    - METABOLISM, 7428*
  - LIVER DISEASES, ALCOHOLIC
    - ETIOLOGY, 7428*
  - LIVER INJURY
    - ALCOHOLISM, 7428*

- ALKALINE PHOSPHATASE
  - CHOLESTASIS
    - CELLS, 7403*
  - HEPATOCYTES
    - CHOLESTASIS, 7403*
  - INTESTINE, SMALL
    - FATTY ACIDS, 7486*, 7487*
  - LIVER
    - CELLS, 7403*
  - SALIVARY GLANDS, 7296
    - NEOPLASMS, BENIGN, 7296
  - SHUNT, INTESTINAL
    - OBESITY, 7625

- ALKALOIDS
  - PANCREAS
    - DRUG EFFECTS ON, 7371*

- ALLERGY
  - SEE HYPERSENSITIVITY

- ALPHA FETOPROTEIN
  - LIVER
    - NEOPLASMS, MALIGNANT, 7762, 7768
  - SYNTHESIS, 7518

- AMEBIASIS
  - COLON
    - DIAGNOSIS, 7893
    - ENZYMES, 7893
  - DIAGNOSIS
    - ENZYMES, 7893
  - IMMUNOLOGY, 7471
  - LIVER
    - ABSCESS, 7471

- AMINO ACIDS
  - DEFICIENCY
    - FOLIC ACID, 7473
  - GASTROINTESTINAL SYSTEM
    - PARENTERAL ALIMENTATION, 7361
  - INTESTINAL ABSORPTION, 7298*

AMINO ACIDS (continued)
  INTESTINE, SMALL
    ABSORPTION, 7297*
    ENZYMES, 7491*
    KINETICS, 7491*
  LIVER
    METABOLISM, 7387*
    TRANSPORT, 7387*
  SHUNT, INTESTINAL
    LIVER INJURY, 7637*

AMINO PEPTIDASES
  DUODENUM
    CHEMICAL PROPERTIES, 7506
    CHROMATOGRAPHY, 7506

AMPULLA OF VATER
  SEE VATER'S AMPULA

AMYLASES
  PANCREAS
    SECRETION, 7370*
  SALIVARY GLANDS
    SECRETION, 7341
  SECRETION
    DRUG EFFECTS ON, 7370*
  SERUM
    TECHNIQUES, 7550
  URINE
    TECHNIQUES, 7550

ANALGESICS AND ANTIPYRETICS
  STOMACH
    ELECTROPHYSIOLOGY, 7333

ANDROGENS
  DUODENUM
    ULCER, PEPTIC, 7582
  LIVER
    HORMONE EFFECTS ON, 7476
    TOXICITY, 7476
  LIVER INJURY, 7476

ANEMIA
  COLON
    NEOPLASMS, MALIGNANT, 7665
  DIETARY FACTORS
    CARBOHYDRATES, 7868

ANESTHETICS
  HEPATITIS, TOXIC, 7778
  LIVER
    NECROSIS, 7778
  LIVER INJURY
    DRUG-INDUCED, 7778
  PANCREAS
    BICARBONATE SECRETION, 7372*
    SECRETION, 7372*
  SERUM
    SECRETIN, 7372*
  STOMACH
    ELECTROPHYSIOLOGY, 7315
    ION TRANSPORT, 7315

ANEURYSM
  AORTA
    PERFORATION, 7556
  ENTERECTOMY
    COMPLICATIONS, 7686

ANEURYSM (continued)
  INTESTINE, LARGE
    ARTERIES, 7686
    SEPSIS, 7686
  PANCREAS
    HEMORRHAGE, 7734*

ANGIOGRAPHY
  DUODENUM
    INFLAMMATION, 7608*
  GASTROINTESTINAL SYSTEM
    HEMORRHAGE, 7549
    REVIEW, 7549
  LIVER, 7529*
    CYSTS, 7759
    NEOPLASMS, 7747*
  LIVER DISEASES
    DIAGNOSIS, 7529*
  MESENTERY
    DYSPLASIA, 7657*
    HEMORRHAGE, 7657*
  PANCREAS
    DISEASE, 7608*
  PANCREATIC DISEASES
    HEMORRHAGE, 7734*

ANGIOTENSIN
  INTESTINE, SMALL
    TRANSPORT, 7303*
  JEJUNUM
    TRANSPORT, 7303*

ANOMALY
  ABDOMEN
    ARTERIES, 7886
  BILIARY TRACT, 7843
  COLON, 7660*
  DUODENUM
    AGE FACTORS, 7610, 7619
    RADIOLOGY, 7610, 7619
    SEX FACTORS, 7619
    ULCER, PEPTIC, 7581
  GALLBLADDER
    CHOLANGIOGRAPHY, 7852
  INTESTINAL OBSTRUCTION
    VEINS, 7661*
  PANCREAS
    HEMORRHAGE, 7734*

ANOMALY, CONGENITAL
  COLON
    DIAGNOSIS, 7690, 7691
    MALROTATION, 7690
    RADIOLOGY, 7690, 7691

ANORECTUM
  SEE ALSO ANUS, RECTUM
  MANOMETRY
    CHILD, 7698
    NEONATE, 7698
  NEOPLASMS, MALIGNANT
    FISSURE. 7672

ANTACIDS
  ABSORPTION
    ANTI-INFLAMMATORY AGENTS, 7359
    ANTIBIOTICS, 7359
    ANTICOAGULANTS, 7359

ANTACIDS (continued)
  ABSORPTION (continued)
    DRUGS, 7359
    H2 RECEPTOR ANTAGONISTS, 7359
    STEROIDS, 7359
    VITAMINS, 7359
  ANTI-INFLAMMATORY AGENTS
    DRUG EFFECTS ON, 7508*
  STOMACH
    EPITHELIUM, 7346*
  ULCER, PEPTIC
    DRUG THERAPY, 7587

ANTI-INFLAMMATORY AGENTS
  ABSORPTION
    ANTACIDS, 7359
  COLITIS, ULCERATIVE
    DRUG THERAPY, 7719
  CROHN'S DISEASE
    DRUG THERAPY, 7719
  DRUG EFFECTS ON
    ANTACIDS, 7508*
  DRUG METABOLISM, 7508*
  INTESTINES
    INFLAMMATION, 7719
  METABOLISM, 7508*, 7512*
  PYLORUS
    SPHINCTER, 7329
  STOMACH
    MOTILITY, 7329
    REFLUX, 7329

ANTIBIOTICS
  ABSORPTION
    ANTACIDS, 7359
  CELIAC DISEASE
    ABSORPTION, 7636*
    DIAGNOSIS, 7636*
  COLON
    SURGERY, 7662*
  FECES
    PEPTIDASE, 7378
    TRYPSIN, 7378
  INTESTINES
    BILE ACIDS AND SALTS, 7389*
  PANCREAS
    PEPTIDASE, 7378
    TRYPSIN, 7378
  RECTUM
    SURGERY, 7662*

ANTIBODIES
  AUSTRALIA ANTIGEN
    RADIOIMMUNOASSAY, 7785*
  HEPATITIS
    DIAGNOSIS, 7789*
    EPIDEMIOLOGY, 7792
  HEPATITIS, CHRONIC
    DIAGNOSIS, 7798*
  HEPATITIS, INFECTIOUS
    DIAGNOSIS, 7789*
  LIVER CIRRHOSIS, OBSTRUCTIVE
    DIAGNOSIS, 7798*

ANTICHOLINERGIC AGENTS
  SEE PARASYMPATHOLYTICS

ANTICOAGULANTS
  ABSORPTION
    ANTACIDS, 7359

ANTICONVULSANTS
  LIVER CIRRHOSIS
    DRUG METABOLISM, 7811*

ANTIDIARRHEALS
  DIARRHEA
    DRUG-INDUCED, 7867

ANTIGEN, AUSTRALIA
  SEE AUSTRALIA ANTIGEN

ANTIGEN, CARCINOEMBRYONIC
  SEE CARCINOEMBRYONIC ANTIGEN

ANTIGENS
  CROHN'S DISEASE
    ARTHRITIS, 7896*
  GASTROINTESTINAL SYSTEM
    NEOPLASMS, MALIGNANT, 7862
  HEPATITIS
    CARRIER STATE, 7788*
  INTESTINE, SMALL
    SCLEROSIS, 7891
  JEJUNUM
    SCLEROSIS, 7891

ANTINEOPLASTIC AGENTS
  LIVER
    NEOPLASMS, 7746*

ANTIOXIDANTS
  LIVER
    NEOPLASMS, 7425*

ANTISPASMODICS
  SEE ALSO PARASYMPATHOLYTICS

ANTITRYPSIN, ALPHA
  SEE ALPHA 1 ANTITRYPSIN

ANTRECTOMY
  DUODENUM
    ULCER, PEPTIC, 7576

ANTRUM
  SECRETION
    GASTRIN, 7349*, 7350*

ANUS
  SEE ALSO ANORECTUM, RECTUM
  FISSURE, 7672
  NEOPLASMS, MALIGNANT, 7673

AORTA
  ANEURYSM
    PERFORATION, 7556

APPENDECTOMY
  COMPLICATIONS
    HERNIA, 7685

- APPENDICITIS
  - COMPLICATIONS
    - BACTERIAL INFECTIONS, 7699
    - PERFORATION, 7699, 7701
  - DIAGNOSIS, 7701
    - CHILD, 7666
    - LAPAROSCOPY, 7700
  - RADIOLOGY
    - CHILD, 7666
  - SURVIVAL
    - AGE FACTORS, 7699

- APPENDIX
  - CARCINOID TUMOR
    - CHILD, 7678

- ARTERIES
  - ABDOMEN
    - ANOMALY, 7886
  - INTESTINE, LARGE
    - ANEURYSM, 7686
  - LIVER
    - MORPHOLOGY, 7293
    - REVIEW, 7293

- ASCARIASIS
  - BILIARY TRACT, 7894
  - LIVER, 7895
  - VATER'S AMPULLA
    - STENOSIS, 7894

- ASCITES
  - LIVER CIRRHOSIS
    - REVIEW, 7819
  - PANCREAS
    - ETIOLOGY, 7724*
    - NEOPLASMS, 7724*
    - PANCREATOGRAPHY, 7724*

- ASPIRIN
  - METABOLISM, 7512*
  - STOMACH
    - ELECTROPHYSIOLOGY, 7333, 7334

- ATRESIA
  - ESOPHAGUS
    - SURGERY, 7555

- AUSTRALIA ANTIGEN
  - ANTIBODIES
    - RADIOIMMUNOASSAY, 7785*
  - CARRIER STATE
    - BLOOD GROUPS, 7787*
  - EPIDEMIOLOGY, 7792
  - HEPATITIS
    - CARRIER STATE, 7788*
    - DIAGNOSIS, 7789*
  - HEPATITIS, INFECTIOUS
    - DIAGNOSIS, 7789*
  - LIVER
    - NEOPLASMS, MALIGNANT, 7762
  - RADIOIMMUNOASSAY
    - TECHNIQUES, 7785*
  - REVIEW, 7784

- BACTERIA
  - BILE ACIDS AND SALTS
    - CYSTIC FIBROSIS, 7750*
    - INTESTINES, 7440*

- BACTERIA (continued)
  - BILIARY TRACT, 7834
  - CECUM
    - ACIDITY, 7509*
    - OXIDATION, 7509*
  - CHOLIC ACID
    - INTESTINES, 7440*
  - COLITIS
    - DRUG EFFECTS ON, 7720
  - DUODENUM, 7834
  - FECES, 7510*
  - INTESTINE, SMALL
    - DIARRHEA, 7653
    - REVIEW, 7653
  - INTESTINES
    - BILE ACIDS AND SALTS, 7389*
  - JEJUNUM
    - ELECTROPHYSIOLOGY, 7323
  - LIVER
    - NECROSIS, 7465
    - THROMBOSIS, 7465
  - MALABSORPTION SYNDROMES
    - INTESTINE, SMALL, 7653
  - NEOPLASMS, 7465
  - SALMONELLOSIS, 7522

- BACTERIAL INFECTIONS
  - APPENDICITIS
    - COMPLICATIONS, 7699
  - COLONOSCOPY, 7553
  - LIVER
    - ABSCESS, 7757
  - MALABSORPTION SYNDROMES, 7642

- BARIUM
  - INTESTINE, SMALL
    - INFARCTION, 7606*

- BICARBONATE SECRETION
  - SEE ALSO SECRETION
  - PANCREAS
    - ALCOHOLS, 7368*
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7368*, 7372*, 7731
    - HYPERGLYCEMIA, 7380
  - PANCREATITIS, CHRONIC
    - DRUG EFFECTS ON, 7731

- BILE
  - BILIARY TRACT
    - SECRETION, 7390*
  - BLOOD
    - ENZYMES, 7407*
  - CHEMICAL COMPOSITION
    - ETHNIC FACTORS, 7388*
  - CHOLELITHIASIS
    - BILE ACIDS AND SALTS, 7437*
    - CHEMICAL COMPOSITION, 7437*
    - CHOLESTEROL, 7437*
  - CHOLERESIS
    - TRANQUILIZING AGENTS, 7414*
  - CHOLESTEROL
    - PHOSPHOLIPIDS, 7398*
  - ESTROGENS
    - METABOLISM, 7463
  - GALLBLADDER
    - CHEMICAL COMPOSITION, 7388*

- BILE (continued)
  - LIPIDS
    - ETHNIC FACTORS, 7835
  - LIVER
    - SYNTHESIS, 7384*, 7470
  - STOMACH
    - ACID SECRETION, 7390*
  - SYNTHESIS
    - CALCIUM, 7384*
    - CHOLAGOGUES AND CHOLERETICS, 7449
    - ISCHEMIA, 7470
  - TRANQUILIZING AGENTS
    - SECRETION, 7414*
  - TRANSPORT
    - VITAMIN K, 7314

- BILE ACIDS AND SALTS
  - BACTERIA
    - CYSTIC FIBROSIS, 7750*
    - INTESTINES, 7440*
  - BILE DUCTS
    - CHOLECYSTECTOMY, 7394*
    - STARVATION, 7394*
  - CECUM
    - CHOLECYSTECTOMY, 7394*
    - STARVATION, 7394*
  - CHEMICAL PROPERTIES, 7479
  - CHOLECYSTECTOMY
    - STARVATION, 7394*
  - CHOLELITHIASIS
    - BILE, 7437*
    - THERAPY, 7824*
  - CHOLESTASIS
    - ESTROGENS, 7399*
    - ETIOLOGY, 7443*
    - TECHNIQUES, 7393*
  - CHOLESTEROL
    - METABOLISM, 7400*, 7413*
  - CHROMATOGRAPHY
    - TECHNIQUES, 7391*
  - COLITIS, ULCERATIVE
    - FECES, 7717*
    - METABOLISM, 7717*
  - COLON
    - NEOPLASMS, 7659*
  - DIARRHEA
    - ETIOLOGY, 7854*
  - DIETARY FACTORS
    - REVIEW, 7459
  - DRUG THERAPY
    - CHILD, 7765
    - INTESTINAL OBSTRUCTION, 7765
  - ESOPHAGUS
    - HYDROGEN, 7301*
  - EXCRETION
    - KINETICS, 7430*
  - FECES
    - CYSTIC FIBROSIS, 7750*
  - GALLBLADDER
    - FETUS, 7396*
    - METABOLISM, 7396*
    - NEONATE, 7396*
  - GASTROINTESTINAL DISEASES
    - CHILD, 7756
    - DIAGNOSIS, 7756
    - METABOLISM, 7756
  - HEPATECTOMY
    - CECUM, 7448*
    - GALLBLADDER, 7448*

- BILE (continued)
  - HEPATECTOMY (continued)
    - INTESTINE, SMALL, 7448*
    - LIVER, 7448*
  - HEPATOCYTES
    - MEMBRANES, 7392*
    - TRANSPORT, 7443*
  - INTESTINAL OBSTRUCTION
    - DRUG-INDUCED, 7765
  - INTESTINE, SMALL
    - BINDING, 7485*
    - CHOLECYSTECTOMY, 7394*
    - STARVATION, 7394*
  - INTESTINES
    - ANTIBIOTICS, 7389*
    - BACTERIA, 7389*
    - FETUS, 7396*
    - METABOLISM, 7396*
    - NEONATE, 7396*
  - ISOLATION
    - TECHNIQUES, 7520
  - KIDNEYS
    - METABOLISM, 7831
  - LIPIDS
    - DIFFUSION, 7395*
    - SOLUBILITY, 7395*
  - LIVER
    - CHOLECYSTECTOMY, 7394*
    - CHOLESTEROL, 7400*
    - METABOLISM, 7831
    - STARVATION, 7394*
    - SYNTHESIS, 7413*, 7424*
  - LIVER DISEASES
    - ASSAY, 7743*
    - CHROMATOGRAPHY, 7391*
    - DIAGNOSIS, 7528*, 7743*
    - PROGNOSIS, 7528*
    - SERUM, 7528*, 7743*
    - TECHNIQUES, 7393*
  - MALABSORPTION SYNDROMES
    - CHILD, 7756
    - DIAGNOSIS, 7756
    - METABOLISM, 7756
  - METABOLISM, 7399*
    - CHILD, 7756
    - DIETARY FACTORS, 7459
    - OBESITY, 7459
    - REVIEW, 7459
  - MICELLES, 7445*
  - POLYPS
    - CHOLESTEROL, 7659*
    - ETIOLOGY, 7659*
  - SERUM
    - ISOLATION, 7520
  - SYNTHESIS
    - CHOLESTEROL, 7413*
  - TRANSPORT, 7399*
  - VAGOTOMY
    - DIARRHEA, 7854*

- BILE DUCTS
  - BILE ACIDS AND SALTS
    - CHOLECYSTECTOMY, 7394*
    - STARVATION, 7394*
  - CALCULI
    - SURGERY, 7840
  - CYSTS
    - CLASSIFICATION, 7849
    - NEOPLASMS, MALIGNANT, 7849
    - SURGERY, 7849

BILE DUCTS (continued)
- NEOPLASMS, MALIGNANT
  - SURGERY, 7825*
- SURGERY
  - TECHNIQUES, 7825*

BILE SALTS
- SEE BILE ACIDS AND SALTS

BILIARY CIRRHOSIS
- SEE LIVER CIRRHOSIS, OBSTRUCTIVE

BILIARY TRACT
- ANOMALY, 7843
- ASCARIASIS, 7894
- BACTERIA, 7834
- CYSTS
  - CHOLANGIOGRAPHY, 7841
  - CLASSIFICATION, 7849
  - DIAGNOSIS, 7841
  - NEOPLASMS, MALIGNANT, 7849
  - RADIOLOGY, 7841
  - SURGERY, 7849
- DRUG METABOLISM, 7848
- FISTULA, 7828
- INFLAMMATION
  - CHOLELITHIASIS, 7847
- MARKER STUDY
  - SULFOBROMOPHTHALEIN, 7420*
  - TECHNIQUES, 7420*
- OBSTRUCTION
  - CHOLELITHIASIS, 7847
  - DIAGNOSIS, 7823*
  - ULTRASONOGRAPHY, 7823*, 7845
- PERFORATION
  - CHILD, 7843
- SCANNING, SCINTILLATION
  - FOOD, 7844
- SECRETION
  - BILE, 7390*
  - FATS, 7390*
  - PHOSPHOLIPIDS, 7398*

BILIARY TRACT DISEASES
- DIAGNOSIS
  - CHOLANGIOGRAPHY, 7839
  - ULTRASONOGRAPHY, 7823*
- ERYTHROCYTES
  - METABOLISM, 7758
- SURGERY
  - REVIEW, 7830

BILIRUBIN
- FATTY ACIDS
  - ALBUMINS, 7771*
  - BINDING, 7771*
- HEPATITIS, CHRONIC
  - METABOLISM, 7801
- LIVER CIRRHOSIS
  - METABOLISM, 7801

BILIRUBIN ENCEPHALOPATHY
- SEE KERNICTERUS

BIRTH
- SEE PREGNANCY

BLADDER
- SEE UROGENITAL SYSTEM

BLEEDING
- SEE ALSO HEMORRHAGE
- ESOPHAGUS
  - STENOSIS, 7556
  - VARICES, 7558

BLOOD
- BILE
  - ENZYMES, 7407*
- INTESTINE, SMALL
  - PERFUSION, 7489*
- LIPIDS
  - ALCOHOLS, 7515*

BLOOD FLOW
- SEE CIRCULATION

BLOOD GROUPS
- AUSTRALIA ANTIGEN
  - CARRIER STATE, 7787*
- INTESTINE, SMALL
  - ENTEROKINASE, 7490*

BLOOD PLATELETS
- LIVER CIRRHOSIS
  - ENZYMES, 7814*
  - MONOAMINE OXIDASE, 7814*

BOMBESIN
- SEE HORMONES, GASTROINTESTINAL

BREAST FEEDING
- JAUNDICE
  - FATTY ACIDS, 7771*

CADMIUM
- DUODENUM
  - ENZYMES, 7507
  - METALS, 7507
  - PROTEINS, 7507
- INTESTINAL ABSORPTION
  - NEONATE, 7299*
- INTESTINE, SMALL
  - ENZYMES, 7507
  - METALS, 7507
  - PROTEINS, 7507

CALCIUM
- BILE
  - SYNTHESIS, 7384*
- PANCREAS
  - SYMPATHOMIMETICS, 7369*
- SALIVARY GLANDS
  - ADRENERGIC RECEPTOR AGONISTS, 7340
  - ION TRANSPORT, 7340
  - IONOPHORES, 7341
  - PERMEABILITY, 7340
  - SECRETION, 7341
  - TRANSPORT, 7340
- TRANSPORT
  - ADRENERGIC RECEPTOR AGONISTS, 7340

CALCULI
- SEE ALSO COMMON BILE DUCT CALCULI
- BILE DUCTS
  - SURGERY, 7840

CANCER
- SEE NEOPLASMS

- CARBOHYDRATES
  - ANEMIA
    - DIETARY FACTORS, 7868
  - HEMOCHROMATOSIS
    - GENETICS, 7815*
  - LIVER
    - ENZYMES, 7409*
  - LIVER CIRRHOSIS
    - ERYTHROCYTES, 7812*
  - LIVER DISEASES
    - METABOLISM, 7793
  - METABOLISM
    - SHUNT, INTESTINAL, 7630

- CARBON DIOXIDE
  - BREATH TEST
    - TECHNIQUES, 7552

- CARBON TETRACHLORIDE
  - HEPATITIS, TOXIC
    - HEMATOPOIESIS, 7480
  - LIVER
    - OXIDOREDUCTASES, 7406*
  - LIVER INJURY
    - HEMATOPOIESIS, 7480
    - LYSOSOMES, 7468
    - TRANQUILIZING AGENTS, 7468

- CARCINOGENS
  - LIVER
    - NEOPLASMS, 7425*

- CARCINOID TUMOR
  - APPENDIX
    - CHILD, 7678

- CARDIOVASCULAR SYSTEM
  - SEE ALSO CIRCULATION

- CATECHOLAMINES
  - COLON
    - PERISTALSIS, 7321*
  - SECRETION
    - POTASSIUM, 7336*

- CATHARTICS
  - COLON
    - SCANNING, SCINTILLATION, 7687
  - INTESTINE, SMALL
    - MORPHOLOGY, 7484*
    - TOXICITY, 7484*

- CECUM
  - SEE ALSO COLON. INTESTINE, LARGE
  - BACTERIA
    - ACIDITY, 7509*
    - OXIDATION, 7509*
  - BILE ACIDS AND SALTS
    - CHOLECYSTECTOMY, 7394*
    - STARVATION, 7394*
  - HEMORRHAGE
    - DYSPLASIA, 7657*
  - HEPATECTOMY
    - BILE ACIDS AND SALTS, 7448*
  - INTESTINAL OBSTRUCTION
    - COMPLICATIONS, 7709
    - DISTENTION, 7709
    - ISCHEMIA, 7709

- CECUM (continued)
  - LACTATES
    - METABOLISM, 7339*
    - SYNTHESIS, 7339*
  - NEOPLASMS
    - DIAGNOSIS, 7702
    - INFLAMMATION, 7702
    - MORPHOLOGY, 7702
    - RADIOLOGY, 7702

- CELIAC DISEASE
  - ANTIBIOTICS
    - ABSORPTION, 7636*
    - DIAGNOSIS, 7636*
  - DIAGNOSIS
    - CHILD, 7900
    - ELECTROPHORESIS, 7900
    - LYMPHOCYTES, 7900
  - INTESTINE, SMALL
    - IMMUNOGLOBULINS, 7634*
  - JEJUNUM
    - IMMUNOGLOBULINS, 7634*
  - NUCLEIC ACIDS
    - SYNTHESIS, 7635*

- CHEMOTHERAPEUTIC AGENTS
  - SEE ANTINEOPLASTIC AGENTS

- CHEMOTHERAPY
  - SEE DRUG THERAPY

- CHENODEOXYCHOLIC ACID
  - BIOCHEMISTRY, 7436*
  - CHOLELITHIASIS
    - DRUG THERAPY, 7824*
    - THERAPY, 7824*
  - ENDOCRINE GLANDS
    - DRUG EFFECTS ON, 7401*
  - KIDNEYS
    - DRUG EFFECTS ON, 7401*
  - LIVER
    - DRUG EFFECTS ON, 7401*
  - SOLUBILITY, 7436*

- CHILD
  - ANORECTUM
    - MANOMETRY, 7698
  - APPENDICITIS
    - DIAGNOSIS, 7665
    - RADIOLOGY, 7666
  - APPENDIX
    - CARCINOID TUMOR, 7678
  - BILE ACIDS AND SALTS
    - METABOLISM, 7756
  - BILIARY TRACT
    - PERFORATION, 7843
  - CELIAC DISEASE
    - DIAGNOSIS, 7900
  - CONSTIPATION, 7698
  - CROHN'S DISEASE
    - DIAGNOSIS, 7900
  - CYSTIC FIBROSIS
    - IRON, 7749*
  - DEFECATION
    - REVIEW, 7879
  - DRUG THERAPY
    - BILE ACIDS AND SALTS, 7765
  - DUODENUM
    - OBSTRUCTION, 7611

CHILD (continued)
  GASTROENTERITIS
    ETIOLOGY, 7871
    VIRUSES, 7872
  GASTROINTESTINAL DISEASES
    BILE ACIDS AND SALTS, 7756
    DIET, 7883
    NUTRITION, 7883
    PSYCHOLOGICAL FACTORS, 7881
  GASTROINTESTINAL SYSTEM
    NEOPLASMS, 7569
    PSEUDOTUMORS, 7569
  INFLAMMATORY BOWEL DISEASES
    DIAGNOSIS, 7900
  INTESTINAL OBSTRUCTION
    DRUG-INDUCED, 7765
  MALABSORPTION SYNDROMES
    BILE ACIDS AND SALTS, 7756
    REVIEW, 7654
  NUTRITION DISORDERS
    DIAGNOSIS, 7887
  RECTUM
    MANOMETRY, 7698
  REVIEW
    EXCRETION, 7879
  SALIVARY GLANDS
    DISEASE, 7882

CHOLAGOGUES AND CHOLERETICS
  BILE
    SYNTHESIS, 7449

CHOLANGIOGRAPHY
  BILIARY TRACT
    CYSTS, 7841
  BILIARY TRACT DISEASES
    DIAGNOSIS, 7839
  COMMON BILE DUCT, 7832
  ENDOSCOPY
    PANCREATOGRAPHY, 7539
    REVIEW, 7539
  GALLBLADDER
    ANOMALY, 7852
  TECHNIQUES, 7839

CHOLECYSTECTOMY
  BILE DUCTS
    BILE ACIDS AND SALTS, 7394*
  CECUM
    BILE ACIDS AND SALTS, 7394*
  DRAINAGE, 7833
  GALLBLADDER
    NEOPLASMS, MALIGNANT, 7850
  INTESTINE, SMALL
    BILE ACIDS AND SALTS, 7394*
  LIVER
    BILE ACIDS AND SALTS, 7394*
  STARVATION
    BILE ACIDS AND SALTS, 7394*
  TECHNIQUES, 7833

CHOLECYSTITIS
  CIRCULATION, 7857
  HEMORRHAGE, 7857

CHOLEDOCHOLITHIASIS
  SEE COMMON BILE DUCT CALCULI

CHOLELITHIASIS
  SEE ALSO GALLSTONES
  BILE
    BILE ACIDS AND SALTS, 7437*
    CHEMICAL COMPOSITION, 7437*
    CHOLESTEROL, 7437*
  BILIARY TRACT
    INFLAMMATION, 7847
    OBSTRUCTION, 7847
  CHOLESTEROL
    REVIEW, 7829, 7837
  DRUG-INDUCED
    REVIEW, 7851
  DRUG THERAPY
    CHENODEOXYCHOLIC ACID, 7824*
  ETIOLOGY
    CHEMICAL COMPOSITION, 7388*
    ETHNIC FACTORS, 7388*
  GALLBLADDER
    ULTRASONOGRAPHY, 7845
  HEPATOCYTES
    MITOCHONDRIA, 7836
  THERAPY
    BILE ACIDS AND SALTS, 7824*
    CHENODEOXYCHOLIC ACID, 7824*
  ULTRASONOGRAPHY, 7842

CHOLERA
  DIAGNOSIS
    TECHNIQUES, 7545
  MALABSORPTION SYNDROMES
    DISEASES ASSOCIATED WITH, 7644

CHOLERESIS
  TRANQUILIZING AGENTS
    BILE, 7414*
    MICROSOMES, 7414*

CHOLERETICS
  SEE CHOLAGOGUES AND CHOLERETICS

CHOLESTASIS
  BILE ACIDS AND SALTS
    TECHNIQUES, 7393*
  CELLS
    ALKALINE PHOSPHATASE, 7403*
    ENZYMES, 7403*
  DIAGNOSIS
    ULTRASONOGRAPHY, 7823*
  DRUG THERAPY
    COMPLICATIONS, 7765
  ESTROGENS
    BILE ACIDS AND SALTS, 7399*
  ETIOLOGY
    BILE ACIDS AND SALTS, 7443*
  HEPATOCYTES
    ALKALINE PHOSPHATASE, 7403*
    ENZYMES, 7403*
  LIPOPROTEINS
    DIAGNOSIS, 7827*

CHOLESTEROL
  BILE
    PHOSPHOLIPIDS, 7398*
  BILE ACIDS AND SALTS
    METABOLISM, 7400*
    SYNTHESIS, 7413*

CHOLESTEROL (continued)
  CHEMICAL PROPERTIES, 7479
  CHOLELITHIASIS
    BILE, 7437*
    REVIEW, 7829, 7837
  COLITIS, ULCERATIVE
    FECES, 7717*
    METABOLISM, 7717*
  COLON
    NEOPLASMS, 7659*
  LIVER
    BILE ACIDS AND SALTS, 7400*
    LIPOPROTEINS, 7397*
    METABOLISM, 7413*
    PHOSPHOLIPIDS, 7398*
    SYNTHESIS, 7397*
  METABOLISM
    BILE ACIDS AND SALTS, 7413*
  PHOSPHOLIPIDS
    FATTY ACIDS, 7398*
  POLYPS
    BILE ACIDS AND SALTS, 7659*
  SERUM
    PHOSPHOLIPIDS, 7398*

CHOLIC ACID
  BACTERIA
    INTESTINES, 7440*

CHOLINERGIC AGENTS
  SEE PARASYMPATHOMIMETICS

CHROMATOGRAPHY
  BILE ACIDS AND SALTS
    TECHNIQUES, 7391*
  DUODENUM
    AMINO PEPTIDASES, 7506
    DISACCHARIDASES, 7506
    ENTEROKINASE, 7506
    ENZYMES, 7506
  GALLSTONES
    PIGMENTS, 7826*
  LIVER
    CONTRAST MEDIA, 7386*
    RADIONUCLIDES, 7386*
  LIVER COMA
    FATTY ACIDS, 7751*
  LIVER DISEASES
    BILE ACIDS AND SALTS, 7391*

CHYLOMICRONS
  INTESTINES
    ABSORPTION, 7302*
    TRANSPORT, 7302*
  LIVER
    NEONATE, 7461

CIRCADIAN RHYTHM
  PANCREAS
    ENZYMES, 7377
    LIPASE, 7377
  SERUM
    GASTRIN, 7575
  ULCER, PEPTIC
    GASTRIN, 7575

CIRCULATION
  CHOLECYSTITIS, 7857
  ENTERITIS, 7857

CIRCULATION (continued)
  HEPATECTOMY
    CLEARANCE STUDY, 7475
    REGENERATION, 7462
  INDOCYANINE GREEN
    CLEARANCE STUDY, 7432*
  INTESTINE, SMALL
    ABSORPTION, 7297*
  LIVER
    CLEARANCE STUDY, 7462
    REGENERATION, 7462
  NECROSIS, 7857
  PROTEINS
    TRANSMISSION, 7304*
  STOMACH
    HORMONE CONTROL, 7342*
    HORMONE EFFECTS ON, 7347*, 7375*
    MOTILIN, 7347*
    NERVOUS CONTROL, 7342*
    NOREPINEPHRINE, 7342*
    SOMATOSTATIN, 7375*
  ULCER
    STRESS, 7857

CIRRHOSIS
  SEE LIVER CIRRHOSIS

CIRRHOSIS, BILIARY
  SEE LIVER CIRRHOSIS, OBSTRUCTIVE

CITRATES
  LIVER
    METABOLISM, 7450
    STRESS, 7450
    SURGERY, 7450
  METABOLISM
    STRESS, 7450
  STRESS
    SURGERY, 7450

COENZYMES
  LIVER
    ALCOHOL OXIDOREDUCTASES, 7405*
    LIPOGENESIS, 7417*

COLITIS
  BACTERIA
    DRUG EFFECTS ON, 7720
  ETIOLOGY
    ISCHEMIA, 7706
  ISCHEMIA
    DIAGNOSIS, 7706
  THERAPY, 7721

COLITIS, ULCERATIVE
  BILE ACIDS AND SALTS
    METABOLISM, 7717*
  CHOLESTEROL
    METABOLISM, 7717*
  DIAGNOSIS
    GRANULOCYTES, 7718*
    LYSOZYMES, 7718*
  DRUG THERAPY
    ANTI-INFLAMMATORY AGENTS, 7719
    IMMUNOTHERAPY, 7719
  FECES
    BILE ACIDS AND S
    CHOLESTEROL, 771

COLLAGEN
- GASTROENTERITIS
  - METABOLISM, 7870
- HEPATITIS, CHRONIC
  - SYNTHESIS, 7742*
- HEPATITIS, TOXIC
  - SYNTHESIS, 7742*
- INTESTINE, SMALL
  - HYPERTROPHY, 7488*
  - MUSCLES, 7488*
  - SYNTHESIS, 7488*
- LIVER DISEASES, ALCOHOLIC
  - SYNTHESIS, 7742*

COLON
- SEE ALSO CECUM, INTESTINE, LARGE
- ABSORPTION
  - VITAMIN K, 7314
- ACIDS
  - NUCLEIC ACIDS, 7483*
  - PERMEABILITY, 7483*
  - SECRETION, 7483*
- AMEBIASIS
  - DIAGNOSIS, 7893
  - ENZYMES, 7893
- ANOMALY, 7660*
- ANOMALY, CONGENITAL
  - DIAGNOSIS, 7690, 7691
  - MALROTATION, 7690
  - RADIOLOGY, 7690, 7691
- BIOPSY
  - INFLAMMATORY BOWEL DISEASES, 7551
- CELLS
  - MORPHOLOGY, 7693
  - ULTRASTRUCTURE, 7693
- DIVERTICULUM
  - RADIOLOGY, 7692
  - REVIEW, 7674
- ENDOSCOPY, 7675
  - REVIEW, 7677
- FISTULA, 7584
  - IATROGENESIS, 7713
  - SURGERY, 7627
  - UROGENITAL SYSTEM, 7705
- INTESTINAL OBSTRUCTION
  - COMPLICATIONS, 7709
- MALROTATION
  - DIAGNOSIS, 7690
  - RADIOLOGY, 7690
- MOTILITY
  - HYPERTENSION, 7327
- MUSCLES
  - HYPERTENSION, 7327
- NEOPLASMS
  - BILE ACIDS AND SALTS, 7659*
  - CHOLESTEROL, 7659*
  - ENDOSCOPY, 7704
  - ETIOLOGY, 7659*
  - RADIOLOGY, 7704
- NEOPLASMS, MALIGNANT
  - ANEMIA, 7665
  - COLOSTOMY, 7523
  - COMPLICATIONS, 7705, 7709
  - DISEASES ASSOCIATED WITH, 7667
  - ENDOSCOPY, 7681
  - GROWTH FACTORS, 7681
  - RADIONUCLIDES, 7658*
  - REVIEW, 7681
  - SCANNING, SCINTILLATION, 7658*

COLON (continued)
- OBSTRUCTION
  - COMPLICATIONS, 7709
- PANCREATITIS
  - DISEASES ASSOCIATED WITH, 7735*
  - INFLAMMATION, 7735*
  - NECROSIS, 7735*
- PERFORATION, 7584
  - UROGENITAL SYSTEM, 7705
- PERFUSION
  - ACIDS, 7483*
- PERISTALSIS
  - CATECHOLAMINES, 7321*
- POLYPS, 7668
  - DIAGNOSIS, 7544
  - ENDOSCOPY, 7544, 7679, 7681, 7682
  - INFANT, 7710
  - RADIOLOGY, 7544
  - REVIEW, 7681, 7682
- PRECANCEROUS CONDITIONS
  - ENDOSCOPY, 7681
  - REVIEW, 7681
- RADIOLOGY
  - TECHNIQUES, 7864
- SCANNING, SCINTILLATION
  - CATHARTICS, 7687
  - TECHNIQUES, 7687
- SECRETION
  - CELLS, 7693
- STENOSIS
  - COMPLICATIONS, 7709
- SURGERY, 7716
  - ANTIBIOTICS, 7662*
  - TECHNIQUES, 7663, 7664*, 7688
- TRANSPORT
  - VITAMIN K, 7314
- VILLI
  - NEOPLASMS, 7676
- WOUNDS AND INJURIES
  - IATROGENESIS, 7713

COLONIC DISEASES
- COMPLICATIONS, 7697
- DIAGNOSIS
  - ENDOSCOPY, 7694
  - RADIOLOGY, 7695
- ETIOLOGY, 7696

COLONOSCOPY
- BACTERIAL INFECTIONS, 7553
- INFLAMMATORY BOWEL DISEASES, 7527*

COLOSTOMY
- COLON
  - NEOPLASMS, MALIGNANT, 7523
- COMPLICATIONS, 7689
- PROGNOSIS, 7689
- RECTUM
  - NEOPLASMS, MALIGNANT, 7523
- SURVIVAL, 7689

COMMON BILE DUCT
- CHOLANGIOGRAPHY, 7832
- WOUNDS AND INJURIES
  - IATROGENESIS, 7589

COMMON BILE DUCT CALCULI
- SEE ALSO CALCULI

COMMON BILE DUCT CALCULI (continued)
- SURGERY, 7466
  - COMPLICATIONS, 7840
  - TECHNIQUES, 7840

CONSTIPATION
- CHILD, 7698

CONTRACEPTIVES, ORAL
- LIVER
  - NEOPLASMS, 7745*
  - NEOPLASMS, BENIGN, 7767
- LIVER FUNCTION TESTS, 7426*

CONTRAST MEDIA
- LIVER
  - CHROMATOGRAPHY, 7386*
  - CLEARANCE STUDY, 7386*
  - TOLERANCE, 7386*
  - TOMOGRAPHY, 7741*
  - TRANSPORT, 7386*
- LIVER DISEASES
  - DIAGNOSIS, 7741*

COPPER
- LIVER
  - BINDING, 7434*

CROHN'S DISEASE
- SEE ALSO ENTERITIS, ENTERITIS, REGIONAL
- ANTIGENS
  - ARTHRITIS, 7896*
- COMPLICATIONS
  - FISTULA, 7898
- DIAGNOSIS
  - CHILD, 7900
  - ELECTROPHORESIS, 7900
  - GRANULOCYTES, 7718*
  - LYMPHOCYTES, 7900
  - LYSOZYMES, 7718*
- DRUG THERAPY
  - ANTI-INFLAMMATORY AGENTS, 7719
  - IMMUNOTHERAPY, 7719
- ILEUM
  - FISTULA, 7898
- SURGERY
  - TECHNIQUES, 7899

CRUVEILHIER-BAUMGARTEN SYNDROME
- SEE LIVER CIRRHOSIS

CYCLIC ADENOSINE MONOPHOSPHATE
- SEE ADENOSINE CYCLIC 3',5' MONOPHOSPHATE

CYSTIC FIBROSIS
- BILE ACIDS AND SALTS
  - BACTERIA, 7750*
- COMPLICATIONS
  - FATTY LIVER, 7766
- FATTY LIVER
  - DISEASES ASSOCIATED WITH, 7766
- FECES
  - BILE ACIDS AND SALTS, 7750*
- IRON
  - ABSORPTION, 7749*
  - CHILD, 7749*
- REVIEW, 7654

CYSTS
- BILE DUCTS
  - CLASSIFICATION, 7849
  - NEOPLASMS, MALIGNANT, 7849
  - SURGERY, 7849
- BILIARY TRACT
  - CHOLANGIOGRAPHY, 7641
  - CLASSIFICATION, 7849
  - DIAGNOSIS, 7841
  - NEOPLASMS, MALIGNANT, 7849
  - RADIOLOGY, 7841
  - SURGERY, 7849
- LIVER
  - ANGIOGRAPHY, 7759
- PANCREAS
  - DIAGNOSIS, 7727
  - ENDOSCOPY, 7727
  - PANCREATOGRAPHY, 7727

CYTOCHROMES
- HEPATOCYTES, 7415*

DEFECATION
- SEE ALSO EXCRETION
- CHILD
  - REVIEW, 7879

DEFOLIANTS
- SEE HERBICIDES

DEHYDROGENASES
- SEE OXIDOREDUCTASES

DETERGENTS
- LIVER
  - ENZYMES, 7428*

DIABETES
- LIVER CIRRHOSIS
  - DISEASES ASSOCIATED WITH, 7816
- MALABSORPTION SYNDROMES
  - DISEASES ASSOCIATED WITH, 7644
- PORPHYRIA
  - PHLEBOTOMY, 7753*

DIARRHEA
- DRUG-INDUCED
  - ANTIDIARRHEALS, 7867
- DRUG THERAPY, 7897*
- ENTERECTOMY
  - DRUG THERAPY, 7897*
- EPIDEMIOLOGY, 7869
- ETIOLOGY
  - BILE ACIDS AND SALTS, 7854*
- INTESTINE, SMALL
  - BACTERIA, 7653
  - ENZYMES, 7632
- MALABSORPTION SYNDROMES, 7642
- NUTRITION DISORDERS
  - INFANT, 7853*
- VAGOTOMY
  - BILE ACIDS AND SALTS, 7854*
  - DRUG THERAPY, 7854*
  - ETIOLOGY, 7854*

DIET
- GASTROINTESTINAL DISEASES
  - CHILD, 7883
  - INFANT, 7883

DIET (continued)
- INTESTINE, LARGE
  - SURGERY, 7712

DIGESTION
- LACTOSE
  - GENETIC FACTORS, 7646
  - REVIEW, 7646
- PANCREATITIS, CHRONIC, 7740

DISACCHARIDASES
- DUODENUM
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506

DISTENTION
- INTESTINAL OBSTRUCTION
  - CECUM, 7709

DIVERTICULITIS
- BIOPSY, 7696
- ETIOLOGY, 7696

DIVERTICULUM
- COLON
  - RADIOLOGY, 7692
  - REVIEW, 7674
- DUODENUM, 7614
- INTESTINE, SMALL, 7615
- JEJUNUM, 7613, 7615
- SIGMOID
  - RADIOLOGY, 7692

L-DOPA
- INTESTINAL ABSORPTION, 7298*
- KERNICTERUS
  - DRUG THERAPY, 7763
- LIVER
  - NEOPLASMS, 7474

DOPAMINE
- LIVER
  - NEOPLASMS, 7474

DRAINAGE
- CHOLECYSTECTOMY, 7833
- STOMACH
  - LYMPH, 7365

DRUG DEPENDENCE
- HEPATITIS
  - NARCOTICS, 7764
- LIVER DISEASES
  - NARCOTICS, 7764

DRUG-INDUCED
- CHOLELITHIASIS
  - REVIEW, 7851
- DIARRHEA
  - ANTIDIARRHEALS, 7867
- FATTY LIVER
  - ETIOLOGY, 7433*
- HEPATITIS
  - GALACTOSAMINE, 7419*
- HEPATITIS, TOXIC, 7780
  - GALACTOSAMINE, 7431*
- HEPATOMEGALY
  - HYPOLIPEMIC AGENTS, 7454

DRUG-INDUCED (continued)
- HYPERBILIRUBINEMIA
  - NEONATE, 7772*
- INTESTINAL OBSTRUCTION
  - BILE ACIDS AND SALTS, 7765
  - CHILD, 7765
- JAUNDICE
  - NEONATE, 7772*
- LIVER
  - NECROSIS, 7778
  - NEOPLASMS, 7474
  - NEOPLASMS, BENIGN, 7767
- LIVER INJURY
  - ANESTHETICS, 7779
  - OXIDOREDUCTASES, 7406*
  - TUBERCULOSIS, 7780

DRUG METABOLISM
- ALCOHOLISM, 7893*
- ANTI-INFLAMMATORY AGENTS, 7598*
- BILIARY TRACT, 7348
- DRUG EFFECTS ON, 7598*
- GILBERT'S DISEASE
  - PHENOBARBITAL, 7775
- LIVER
  - DRUG EFFECTS ON, 7412*
  - HEPATITIS, 7477
  - NEOPLASMS, 7746*
- LIVER CIRRHOSIS
  - ANTICONVULSANTS, 7811*
  - LIVER FUNCTION TESTS, 7746*
- NEOPLASM METASTASIS
  - LIVER FUNCTION TESTS, 7746*

DRUG THERAPY
- BILE ACIDS AND SALTS
  - CHILD, 7765
  - INTESTINAL OBSTRUCTION, 7765
- CHOLELITHIASIS
  - CHENODEOXYCHOLIC ACID, 7824*
- CHOLESTASIS
  - COMPLICATIONS, 7765
- COLITIS, ULCERATIVE
  - ANTI-INFLAMMATORY AGENTS, 7719
  - IMMUNOTHERAPY, 7719
- CROHN'S DISEASE
  - ANTI-INFLAMMATORY AGENTS, 7719
  - IMMUNOTHERAPY, 7719
- DIARRHEA, 7897*
- DUODENUM
  - ULCER, PEPTIC, 7572*
- ENTERECTOMY
  - DIARRHEA, 7897*
- GASTROINTESTINAL SYSTEM
  - NEOPLASMS, MALIGNANT, 7858, 7876
  - REVIEW, 7858
- GIARDIASIS, 7892*
- HEPATITIS, INFECTIOUS
  - IMMUNOGLOBULINS, 7786*
- INTESTINES
  - INFLAMMATION, 7719
- IRRITABLE COLON
  - PARASYMPATHOLYTICS, 7671
- JAUNDICE, CHRONIC IDIOPATHIC, 7773*
- KERNICTERUS
  - L-DOPA, 7763
- LIVER CIRRHOSIS, 7820, 7821
- LIVER DISEASES
  - KINETICS, 7752*

- DRUG THERAPY (continued)
  - NEOPLASMS, MALIGNANT
    - REVIEW, 7858
  - RECTUM
    - NEOPLASMS, MALIGNANT, 7703, 7715
  - SIGMOID
    - NEOPLASMS, MALIGNANT, 7715
  - STOMACH
    - ULCER, PEPTIC, 7573*
  - ULCER, PEPTIC
    - ANTACIDS, 7587
    - H2 RECEPTOR ANTAGONISTS, 7357
  - VAGOTOMY
    - DIARRHEA, 7854*

- DUBIN-JOHNSON SYNDROME
  - SEE JAUNDICE, CHRONIC IDIOPATHIC

- DUMPING SYNDROME
  - GASTRECTOMY
    - HORMONES, ADRENAL CORTEX, 7592
  - VAGOTOMY
    - ULCER, 7322*

- DUODENITIS
  - ENDOSCOPY, 7616

- DUODENUM
  - SEE ALSO ILEUM, INTESTINE, SMALL, JEJUNUM
  - AMINO PEPTIDASES
    - CHEMICAL PROPERTIES, 7506
    - CHROMATOGRAPHY, 7506
  - ANOMALY
    - AGE FACTORS, 7610, 7619
    - RADIOLOGY, 7610, 7619
    - SEX FACTORS, 7619
  - BACTERIA, 7834
  - CELLS
    - EMBRYOLOGY, 7288*
  - DISACCHARIDASES
    - CHEMICAL PROPERTIES, 7506
    - CHROMATOGRAPHY, 7506
  - DIVERTICULUM, 7614
  - ENTEROKINASE
    - CHEMICAL PROPERTIES, 7506
    - CHROMATOGRAPHY, 7506
  - ENZYMES
    - CADMIUM, 7507
    - CHEMICAL PROPERTIES, 7506
    - CHROMATOGRAPHY, 7506
  - HORMONES
    - ACID SECRETION, 7344*
  - INFLAMMATION
    - ANGIOGRAPHY, 7608*
  - METALS
    - CADMIUM, 7507
  - NEOPLASMS, MALIGNANT, 7631
  - OBSTRUCTION
    - CHILD, 7611
    - SURGERY, 7611
  - PANCREAS
    - DISEASE, 7608*
  - PANCREATIC DISEASES
    - ENZYMES, 7722*
  - PERFORATION
    - PROGNOSIS, 7595
    - SURGERY, 7595

- DUODENUM (continued)
  - PERFORATION (continued)
    - SURVIVAL, 7595
    - THERAPY, 7595
  - PROTEINS
    - CADMIUM, 7507
  - SECRETION
    - CELLS, 7288*
    - ULCER, PEPTIC, 7594
  - STOMACH
    - ACID SECRETION, 7600
  - ULCER
    - SOMATOSTATIN, 7519
  - ULCER, PEPTIC, 7599
    - ANDROGENS, 7582
    - ANOMALY, 7581
    - ANTRECTOMY, 7576
    - DISEASES ASSOCIATED WITH, 7581
    - DRUG THERAPY, 7572*
    - GASTRIN, 7575, 7598
    - H2 RECEPTOR ANTAGONISTS, 7572*
    - HORMONES, 7598
    - INSULIN, 7598
    - LIPASE, 7594
    - PEPSIN, 7594
    - PERFORATION, 7595
    - PREVENTION, 7585
    - SECRETION, 7594
    - SEX FACTORS, 7582
    - STEROIDS, 7582
    - SURGERY, 7576
    - THERAPY, 7576, 7580
    - VAGOTOMY, 7576, 7580, 7585, 7600 7604

- DYSPLASIA
  - CECUM
    - HEMORRHAGE, 7657*
  - ILEUM
    - HEMORRHAGE, 7657*
  - JEJUNUM
    - HEMORRHAGE, 7657*
  - MESENTERY
    - ANGIOGRAPHY, 7657*
    - HEMORRHAGE, 7657*

- ECHINOCOCCOSIS
  - DIAGNOSIS
    - TECHNIQUES, 7525*

- ECHOGRAPHY
  - SEE ULTRASONOGRAPHY

- ELECTROLYTES
  - ENEMA
    - COMPLICATIONS, 7683
  - ILEUM
    - TRANSPORT, 7313
  - JEJUNUM
    - TRANSPORT, 7313
  - SHUNT, INTESTINAL
    - SERUM, 7625

- ELECTRON TRANSPORT
  - SEE ALSO ION TRANSPORT

- ELECTROPHORESIS
  - CELIAC DISEASE
    - DIAGNOSIS, 7900

ELECTROPHORESIS (continued)
- CROHN'S DISEASE
  - DIAGNOSIS, 7900
- INFLAMMATORY BOWEL DISEASES
  - DIAGNOSIS, 7900

ELECTROPHYSIOLOGY
- GASTROINTESTINAL SYSTEM
  - TECHNIQUES, 7320*
- INTESTINE, LARGE
  - MUSCLES, 7328
- JEJUNUM
  - BACTERIA, 7323
  - MOTILITY, 7323
  - TRANSPORT, 7308*
- STOMACH
  - ANALGESICS AND ANTIPYRETICS, 7333
  - ANESTHETICS, 7315
  - ASPIRIN, 7333, 7334
  - DRUG EFFECTS ON, 7315, 7333, 7334
  - H2 RECEPTOR ANTAGONISTS, 7334
  - MOTILITY, 7333, 7334

EMESIS
- SEE VOMITING

EMULSIFIERS
- INTESTINAL ABSORPTION
  - TRIGLYCERIDES, 7493*

ENDOCRINE GLANDS
- CHENODEOXYCHOLIC ACID
  - DRUG EFFECTS ON, 7401*

ENDOMETRIOSIS
- ILEUM
  - THERAPY, 7617
- INTESTINE, SMALL
  - THERAPY, 7617

ENDOSCOPY
- CHOLANGIOGRAPHY
  - REVIEW, 7539
- COLON, 7675
  - NEOPLASMS, 7704
  - NEOPLASMS, MALIGNANT, 7681
  - POLYPS, 7544, 7679, 7681, 7682
  - PRECANCEROUS CONDITIONS, 7681
  - REVIEW, 7677
- COLONIC DISEASES
  - DIAGNOSIS, 7694
- COMPLICATIONS
  - REVIEW, 7536
- DUODENITIS, 7616
- ESOPHAGITIS
  - DIAGNOSIS, 7560, 7561
- GASTROINTESTINAL DISEASES
  - BIOPSY, 7537
  - CYTOLOGY, 7537
  - DIAGNOSIS, 7537, 7538, 7541
  - RADIOLOGY, 7538
  - REVIEW, 7537, 7538, 7541
- GASTROINTESTINAL SYSTEM
  - COMPLICATIONS, 7536
  - REVIEW, 7532, 7533, 7534, 7540
  - TECHNIQUES, 7533, 7534, 7540
- INTESTINE, LARGE
  - POLYPS, 7669

ENDOSCOPY (continued)
- INTESTINE, SMALL
  - REVIEW, 7535
- MALLORY-WEISS SYNDROME, 7563
- PANCREAS
  - CYSTS, 7727
  - NEOPLASMS, MALIGNANT, 7725*
- PANCREATOGRAPHY
  - CHOLANGIOGRAPHY, 7539
- TECHNIQUES
  - REVIEW, 7533, 7534, 7535, 7540, 7541
- ULCER, PEPTIC, 7586
  - DIAGNOSIS, 7590

ENEMA
- COMPLICATIONS
  - INFANT, 7683
- ELECTROLYTES
  - COMPLICATIONS, 7683
- INTESTINE, SMALL
  - TECHNIQUES, 7526*
- PHOSPHATES
  - COMPLICATIONS, 7683

ENTERECTOMY
- ADAPTATION, 7503
- COMPLICATIONS
  - ANEURYSM, 7686
  - SEPSIS, 7686
  - UROGENITAL SYSTEM, 7714
- DIARRHEA
  - DRUG THERAPY, 7897*
- INTESTINE, SMALL
  - ADAPTATION, 7501*
- OSTEOMALACIA
  - THERAPY, 7641
  - VITAMIN D, 7641
- RECTUM
  - COMPLICATIONS, 7714
- SHORT BOWEL SYNDROME
  - OSTEOMALACIA, 7641
- SIGMOID
  - COMPLICATIONS, 7686
- ULCER, PEPTIC
  - COMPLICATIONS, 7584

ENTERITIS
- SEE ALSO CROHN'S DISEASE
- CIRCULATION, 7857
- HEMORRHAGE, 7857

ENTERITIS, REGIONAL
- SEE ALSO CROHN'S DISEASE

ENTEROKINASE
- DUODENUM
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
- INTESTINE, SMALL
  - BLOOD GROUPS, 7490*
  - CHEMICAL COMPOSITION, 7490*
  - VILLI, 7490*

ERYTHROCYTES
- BILIARY TRACT DISEASES
  - METABOLISM, 7758

ERYTHROCYTES (continued)
- LIVER CIRRHOSIS
  - CARBOHYDRATES, 7812*
  - PROTEINS, 7812*
- LIVER DISEASES
  - METABOLISM, 7758

ESOPHAGEAL REFLUX
- ESOPHAGITIS
  - THERAPY, 7562
- ESOPHAGUS
  - MANOMETRY, 7554*
  - MOTILITY, 7554*
  - SPHINCTER, 7358, 7554*
- MANOMETRY
  - ESOPHAGITIS, 7554*
- MOTILITY
  - ESOPHAGITIS, 7554*
- STOMACH
  - ACID SECRETION, 7358
- SURGERY
  - COMPLICATIONS, 7521
  - ERUCTATION, 7521
  - VOMITING, 7521

ESOPHAGITIS
- DIAGNOSIS
  - BIOPSY, 7560
  - ENDOSCOPY, 7560, 7561
- ESOPHAGEAL REFLUX
  - THERAPY, 7562
- ESOPHAGUS
  - MANOMETRY, 7554*
  - MOTILITY, 7554*
  - SPHINCTER, 7554*
- MANOMETRY
  - ESOPHAGEAL REFLUX, 7554*
- MOTILITY
  - ESOPHAGEAL REFLUX, 7554*

ESOPHAGUS
- ABSORPTION
  - HYDROGEN, 7301*
- ATRESIA
  - SURGERY, 7555
- HYDROGEN
  - ALCOHOLS, 7301*
  - BILE ACIDS AND SALTS, 7301*
- MANOMETRY
  - ESOPHAGEAL REFLUX, 7554*
  - ESOPHAGITIS, 7554*
- MOTILITY
  - ESOPHAGEAL REFLUX, 7554*
  - ESOPHAGITIS, 7554*
  - VAGOTOMY, 7574*
- NEOPLASMS, MALIGNANT
  - PROGNOSIS, 7564
  - RADIOTHERAPY, 7564
  - THERAPY, 7564
- RUPTURE, 7566
- SPHINCTER
  - ESOPHAGEAL REFLUX, 7358, 7554*
  - ESOPHAGITIS, 7554*
  - MANOMETRY, 7554*
  - VAGOTOMY, 7574*
- STENOSIS
  - BLEEDING, 7556
  - DIAGNOSIS, 7556
  - DISEASES ASSOCIATED WITH, 7557

ESOPHAGUS (continued)
- STENOSIS (continued)
  - ETIOLOGY, 7556
- VARICES
  - BLEEDING, 7558
  - THERAPY, 7558

ESTROGENS
- BILE
  - METABOLISM, 7463
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 7399*
- LIVER
  - BINDING, 7481

EXCRETION
- SEE ALSO DEFECATION
- BILE ACIDS AND SALTS
  - KINETICS, 7430*
- CHILD
  - REVIEW, 7879
- DRUG METABOLISM
  - TOXICITY, 7777*
- KIDNEYS
  - KINETICS, 7395*
- LIVER
  - KINETICS, 7385*
- PORPHYRIA
  - PORPHYRINS, 7754*

FASCIOLIASIS
- SCHISTOSOMIASIS
  - IMMUNITY, 7467

FATS
- SEE ALSO LIPIDS, TRIGLYCERIDES
- ABSORPTION
  - EMBRYOLOGY, 7312
  - FETUS, 7312
  - NEONATE, 7312
- BILIARY TRACT
  - SECRETION, 7390*
- HEPATECTOMY
  - METABOLISM, 7462
  - REGENERATION, 7462
- INTESTINAL ABSORPTION
  - TRIGLYCERIDES, 7493*
- INTESTINE, SMALL
  - ABSORPTION, 7312
- LIVER
  - REGENERATION, 7462
- LIVER DISEASES
  - METABOLISM, 7793
- METABOLISM
  - SHUNT, INTESTINAL, 7630
- PANCREATIC DISEASES
  - NECROSIS, 7732
- PANCREATITIS, CHRONIC
  - FECES, 7740
- STOMACH
  - ACID SECRETION, 7390*
  - SURGERY, 7638*

FATTY ACIDS
- ALBUMINS
  - BINDING, 7771*
- BILIRUBIN
  - ALBUMINS, 7771*
  - BINDING, 7771*

FATTY ACIDS (continued)
- CHOLESTEROL
  - PHOSPHOLIPIDS, 7398*
- GLYCOLIPIDS
  - INTESTINE, SMALL, 7496*
- HEPATOCYTES
  - METABOLISM, 7444*
- INTESTINE, SMALL
  - ABSORPTION, 7316, 7317, 7505
  - ALKALINE PHOSPHATASE, 7486*, 7487*
- JAUNDICE
  - BREAST FEEDING, 7771*
- JEJUNUM
  - ABSORPTION, 7317
- LIVER
  - EMBRYOLOGY, 7452
  - LIPOGENESIS, 7417*
  - METABOLISM, 7452, 7482
  - OXIDATION, 7482
  - SYNTHESIS, 7441*
- LIVER COMA
  - CHROMATOGRAPHY, 7751*
- METABOLISM
  - EMBRYOLOGY, 7452
- SYNTHESIS
  - DIETARY FACTORS, 7441*
- TRANSPORT
  - PANCREATIC DISEASES, 7316

FATTY LIVER
- CYSTIC FIBROSIS
  - COMPLICATIONS, 7766
- DISEASES ASSOCIATED WITH
  - CYSTIC FIBROSIS, 7766
- DRUG-INDUCED
  - ETIOLOGY, 7433*
- LIVER DISEASES, ALCOHOLIC
  - DIAGNOSIS, 7804*
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- SHUNT, INTESTINAL
  - COMPLICATIONS, 7630

FECES
- BACTERIA, 7510*
- BILE ACIDS AND SALTS
  - CYSTIC FIBROSIS, 7750*
- COLITIS, ULCERATIVE
  - BILE ACIDS AND SALTS, 7717*
  - CHOLESTEROL, 7717*
- PANCREATITIS, CHRONIC
  - FATS, 7740
- PEPTIDASE
  - ANTIBIOTICS, 7378
  - DRUG EFFECTS ON, 7378
- TRYPSIN
  - ANTIBIOTICS, 7378
  - DRUG EFFECTS ON, 7378

FEEDING
- SECRETION
  - GASTRIN, 7364
- STOMACH
  - ACID SECRETION, 7364
  - GASTRIN, 7364

FETOPROTEIN, ALPHA
- SEE ALPHA FETOPROTEIN

FETUS
- ABSORPTION
  - FATS, 7312
  - PROTEINS, 7309
- ALCOHOLISM, 7442*
- GALLBLADDER
  - BILE ACIDS AND SALTS, 7396*
- INTESTINE, SMALL
  - ABSORPTION, 7309, 7312
- INTESTINES
  - BILE ACIDS AND SALTS, 7396*
- JEJUNUM
  - ABSORPTION, 7309
  - PROTEINS, 7309
- LIVER
  - ENZYMES, 7402*
  - ULTRASTRUCTURE, 7461

FIBRINOGEN
- HEPATITIS, CHRONIC
  - KINETICS, 7813*
- HEPATITIS, TOXIC
  - GALACTOSAMINE, 7431*
- LIVER CIRRHOSIS
  - KINETICS, 7813*
- LIVER DISEASES
  - METABOLISM, 7744*
- ULCER, PEPTIC
  - SERUM, 7597

FISSURE
- ANORECTUM
  - NEOPLASMS, MALIGNANT, 7672
- ANUS, 7672

FISTULA
- BILIARY TRACT, 7828
- COLON, 7584
  - IATROGENESIS, 7713
  - SURGERY, 7627
  - UROGENITAL SYSTEM, 7705
- CROHN'S DISEASE
  - COMPLICATIONS, 7898
- ILEUM
  - CROHN'S DISEASE, 7898
  - SIGMOID, 7898
- INTESTINE, SMALL
  - INFANT, 7618
  - PARENTERAL ALIMENTATION, 7618
  - THERAPY, 7618
- JEJUNUM, 7584
  - SURGERY, 7627
- PANCREAS, 7828
  - INFLAMMATION, 7729
  - SURGERY, 7729
  - WOUNDS AND INJURIES, 7729
- PANCREATITIS
  - COMPLICATIONS, 7728
- RECTUM
  - IATROGENESIS, 7713
- SIGMOID
  - IATROGENESIS, 7713
  - UROGENITAL SYSTEM, 7705
- STOMACH, 7584

FOLIC ACID
- AMINO ACIDS
  - DEFICIENCY, 7473

- FOLIC ACID (continued)
  - LIVER
    - METABOLISM, 7473
  - VITAMIN B12
    - DEFICIENCY, 7473

- FOOD
  - BILIARY TRACT
    - SCANNING, SCINTILLATION, 7844
  - STOMACH
    - MOTILITY, 7330

- FOREIGN BODIES
  - INTESTINES
    - PERFORATION, 7621
  - STOMACH
    - PERFORATION, 7621

- FUNGI
  - GASTROENTERITIS
    - LACTASE, 7511*

- FUNGUS DISEASES
  - SEE MYCOSES

- GALACTOSAMINE
  - HEPATITIS
    - DRUG-INDUCED, 7419*
  - HEPATITIS, TOXIC
    - ALBUMINS, 7431*
    - DRUG-INDUCED, 7431*
    - FIBRINOGEN, 7431*

- GALACTOSE
  - METABOLISM
    - DISEASE, 7855

- GALLBLADDER
  - ANOMALY
    - CHOLANGIOGRAPHY, 7852
  - BILE
    - CHEMICAL COMPOSITION, 7388*
  - BILE ACIDS AND SALTS
    - FETUS, 7396*
    - METABOLISM, 7396*
    - NEONATE, 7396*
    - STARVATION, 7394*
  - HEPATECTOMY
    - BILE ACIDS AND SALTS, 7448*
  - MOTILITY
    - HORMONE EFFECTS ON, 7375*
    - SOMATOSTATIN, 7375*
  - NEOPLASMS, MALIGNANT
    - CHOLECYSTECTOMY, 7850
    - THERAPY, 7850
  - SURGERY
    - REVIEW, 7830
  - ULTRASONOGRAPHY, 7842
    - CHOLELITHIASIS, 7845
    - TECHNIQUES, 7543

- GALLSTONES
  - SEE ALSO CHOLELITHIASIS
  - PIGMENTS
    - CHEMICAL COMPOSITION, 7826*
    - CHEMICAL PROPERTIES, 7826*
    - CHROMATOGRAPHY, 7826*

- GANGRENE
  - INTESTINES, 7680

- GASES
  - INTESTINE, LARGE
    - ULTRASONOGRAPHY, 7684

- GASTRECTOMY
  - COMPLICATIONS
    - PANCREATITIS, 7571
  - DUMPING SYNDROME
    - HORMONES, ADRENAL CORTEX, 7592
  - PANCREAS
    - SECRETION, 7571
  - STOMACH
    - MOTILITY, 7593, 7601
  - ULCER, PEPTIC
    - COMPLICATIONS, 7571, 7584, 7589, 7593, 7601

- GASTRIC INHIBITORY POLYPEPTIDE
  - SEE HORMONES, GASTROINTESTINAL

- GASTRIN
  - ANTRUM
    - SECRETION, 7349*, 7350*
  - DUODENUM
    - ULCER, PEPTIC, 7575, 7598
  - SECRETION
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7350*
    - FEEDING, 7364
    - VAGOTOMY, 7364
  - SERUM
    - CIRCADIAN RHYTHM, 7575
    - HORMONE EFFECTS ON, 7347*
    - MOTILIN, 7347*
    - VAGOTOMY, 7603
  - STOMACH
    - FEEDING, 7364
    - PYLOROPLASTY, 7364
    - SECRETION, 7349*, 7350*, 7364
    - VAGOTOMY, 7364
  - ULCER, PEPTIC
    - CIRCADIAN RHYTHM, 7575
    - SERUM, 7575, 7598
    - VAGOTOMY, 7600

- GASTRODUODENAL ULCER
  - SEE ULCER, PEPTIC

- GASTROENTERITIS
  - COLLAGEN
    - METABOLISM, 7870
  - DIAGNOSIS
    - INFANT, 7870
  - EPIDEMIOLOGY, 7889
  - ETHNIC FACTORS
    - INFANT, 7875
  - ETIOLOGY
    - CHILD, 7871
    - ETHNIC FACTORS, 7875
    - INFANT, 7871, 7875
  - FUNGI
    - LACTASE, 7511*
  - INFANT
    - DIAGNOSIS, 7863
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7644

GASTROENTERITIS (continued)
  VIRUSES
    CHILD, 7872
    DIAGNOSIS, 7863

GASTROINTESTINAL DISEASES
  BILE ACIDS AND SALTS
    CHILD, 7756
    METABOLISM, 7756
  CYTOLOGY
    REVIEW, 7537
  DIAGNOSIS
    BILE ACIDS AND SALTS, 7756
    BIOPSY, 7537
    CYTOLOGY, 7537
    ENDOSCOPY, 7537, 7538, 7541
    RADIOLOGY, 7538
    REVIEW, 7537
  DIET
    CHILD, 7883
    INFANT, 7883
  DISEASES ASSOCIATED WITH
    HYPERPARATHYROIDISM, 7888
  ENDOSCOPY
    BIOPSY, 7537
    CYTOLOGY, 7537
    RADIOLOGY, 7538
    REVIEW, 7537, 7538, 7541
  NUTRITION
    CHILD, 7883
    INFANT, 7883
  PSYCHOLOGICAL FACTORS
    CHILD, 7881
  RADIOLOGY
    REVIEW, 7538
  VOMITING
    INFANT, 7878

GASTROINTESTINAL SYSTEM
  ANGIOGRAPHY
    REVIEW, 7549
  DRUG THERAPY
    REVIEW, 7858
  ELECTROPHYSIOLOGY
    TECHNIQUES, 7320*
  ENDOSCOPY
    COMPLICATIONS, 7536
    REVIEW, 7532, 7533, 7534, 7540
    TECHNIQUES, 7533, 7534, 7540
  HEMORRHAGE
    ANGIOGRAPHY, 7549
    DIAGNOSIS, 7549
  LYMPHOMA
    REVIEW, 7869
  MOTILITY
    BREATH TEST, 7326
  NEOPLASMS, 7890
    CHILD, 7569
    DIAGNOSIS, 7569
    LAPAROSCOPY, 7569
  NEOPLASMS, MALIGNANT
    ANTIGENS, 7862
    DISEASES ASSOCIATED WITH, 7884
    DRUG THERAPY, 7858, 7876
    ENZYMES, 7861
    HORMONES, 7861
    RADIOTHERAPY, 7859
    REVIEW, 7859, 7860
    SURGERY, 7860

GASTROINTESTINAL SYSTEM (continued)
  PARENTERAL ALIMENTATION
    AMINO ACIDS, 7361
  PERFORATION
    FOREIGN BODIES, 7621
  PSEUDOTUMORS
    CHILD, 7569
    DIAGNOSIS, 7569
    LAPAROSCOPY, 7569
  RADIOTHERAPY
    REVIEW, 7859
  SURGERY
    INFANT, 7880
    REVIEW, 7860
  WOUNDS AND INJURIES
    PERFORATION, 7621

GENETICS
  HEMOCHROMATOSIS
    CARBOHYDRATES, 7815*
    IRON, 7815*

GIARDIASIS
  DRUG THERAPY, 7892*
  INTESTINE, SMALL
    MORPHOLOGY, 7892*
  MALABSORPTION SYNDROMES
    VITAMIN B12, 7892*

GILBERT'S DISEASE
  PHENOBARBITAL
    DRUG METABOLISM, 7775

GLUCONEOGENESIS
  LIVER, 7387*

GLUCOSE
  INTESTINE, SMALL
    METABOLISM, 7300*
    ORGAN CULTURE, 7300*

GLYCOGEN
  LIVER
    HYPOTHERMIA, 7457
    METABOLISM, 7416*
    STRESS, 7457
  METABOLISM
    AGE FACTORS, 7416*

GLYCOLIPIDS
  INTESTINE, SMALL
    CHEMICAL COMPOSITION, 7496*
    FATTY ACIDS, 7496*
  STOMACH
    CHEMICAL COMPOSITION, 7351*
    HAPTENS, 7356
    ISOLATION, 7351*

GLYCOPROTEINS
  HEPATITIS
    SERUM, 7790*
  STOMACH
    TRANSPORT, 7352*

GUANYL CYCLASE
  ILEUM
    ALCOHOLS, 7338*
  LIVER
    ALCOHOLS, 7338*

GUANYL CYCLASE (continued)
- PANCREAS
  - ALCOHOLS, 7338*
- STOMACH
  - ALCOHOLS, 7338*

H2 RECEPTOR ANTAGONISTS
- ABSORPTION
  - ANTACIDS, 7359
- DUODENUM
  - ULCER, PEPTIC, 7572*
- HISTAMINE
  - BINDING, 7289*
- STOMACH
  - ABSORPTION, 7357
  - ACID SECRETION, 7357
  - DRUG EFFECTS ON, 7360
  - ELECTROPHYSIOLOGY, 7334
  - REVIEW, 7357
- ULCER, PEPTIC
  - DRUG THERAPY, 7357
  - REVIEW, 7357

HEMATOPOIESIS
- HEPATITIS, TOXIC
  - CARBON TETRACHLORIDE, 7480
- LIVER INJURY
  - CARBON TETRACHLORIDE, 7480

HEMOCHROMATOSIS
- FAMILIAL FACTORS
  - LIVER CIRRHOSIS, 7815*
- GENETICS
  - CARBOHYDRATES, 7815*
  - IRON, 7815*

HEMORRHAGE
- SEE ALSO BLEEDING
- CECUM
  - DYSPLASIA, 7657*
- CHOLECYSTITIS, 7857
- ENTERITIS, 7857
- GASTROINTESTINAL SYSTEM
  - ANGIOGRAPHY, 7549
  - DIAGNOSIS, 7549
- ILEUM
  - DYSPLASIA, 7657*
- JEJUNUM
  - DYSPLASIA, 7657*
- MALLORY-WEISS SYNDROME, 7563
- MESENTERY
  - ANGIOGRAPHY, 7657*
  - DYSPLASIA, 7657*
- NECROSIS, 7857
- ULCER
  - STRESS, 7857
- ULCER, PEPTIC
  - COMPLICATIONS, 7596
  - ETIOLOGY, 7596
  - PROGNOSIS, 7596
  - THERAPY, 7596

HEPATECTOMY
- BILE ACIDS AND SALTS
  - CECUM, 7448*
  - GALLBLADDER, 7448*
  - INTESTINE, SMALL, 7448*
  - LIVER, 7448*

HEPATECTOMY (continued)
- CIRCULATION
  - CLEARANCE STUDY, 7475
- FATS
  - METABOLISM, 7462
- LIVER
  - CLEARANCE STUDY, 7475
- REGENERATION
  - CIRCULATION, 7462
  - FATS, 7462

HEPATITIS
- ANTIBODIES
  - EPIDEMIOLOGY, 7792
- ANTIGENS
  - CARRIER STATE, 7788*
- AUSTRALIA ANTIGEN
  - CARRIER STATE, 7788*
- DENTISTRY
  - EPIDEMIOLOGY, 7782*
- DIAGNOSIS
  - ANTIBODIES, 7789*
  - AUSTRALIA ANTIGEN, 7789*
- DRUG DEPENDENCE
  - NARCOTICS, 7764
- DRUG-INDUCED
  - GALACTOSAMINE, 7419*
- EPIDEMIOLOGY, 7781*
- LIVER
  - DRUG METABOLISM, 7477
- LIVER CIRRHOSIS
  - DISEASES ASSOCIATED WITH, 7818
- LIVER DISEASES, ALCOHOLIC
  - DIAGNOSIS, 7804*
  - ETIOLOGY, 7807*
  - HORMONES, ADRENAL CORTEX, 7808*
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- OCCUPATIONAL FACTORS, 7782*
- PATHOLOGY
  - REVIEW, 7796
- REVIEW, 7794
- SERUM
  - GLYCOPROTEINS, 7790*
- TRANSMISSION, 7781*, 7783*
- VIROLOGY
  - REVIEW, 7795, 7797
- VIRUSES
  - AGE FACTORS, 7469
  - SIMULATION, 7472

HEPATITIS, CHRONIC
- BILIRUBIN
  - METABOLISM, 7801
- COLLAGEN
  - SYNTHESIS, 7742*
- DIAGNOSIS, 7800
  - ANTIBODIES, 7798*
- FIBRINOGEN
  - KINETICS, 7813*
- IMMUNOLOGY
  - REVIEW, 7799
- WILSON'S DISEASE
  - DISEASES ASSOCIATED WITH, 7769

HEPATITIS, CHRONIC INTERSTITIAL
- SEE LIVER CIRRHOSIS

- HEPATITIS, INFECTIOUS
  - DENTISTRY
    - EPIDEMIOLOGY, 7782*
  - DIAGNOSIS
    - ANTIBODIES, 7789*
    - AUSTRALIA ANTIGEN, 7789*
  - DRUG THERAPY
    - IMMUNOGLOBULINS, 7786*
  - ENZYMES
    - OCCUPATIONAL FACTORS, 7791*
    - PHYSICAL ACTIVITY, 7791*
  - EPIDEMIOLOGY, 7781*
  - IMMUNOGLOBULINS
    - TRANSMISSION, 7786*
  - OCCUPATIONAL FACTORS, 7782*
  - PATHOLOGY
    - REVIEW, 7796
  - REVIEW, 7794
  - SIMULATION, 7472
  - TRANSMISSION, 7781*, 7783*
  - VIROLOGY
    - REVIEW, 7795, 7797

- HEPATITIS, SERUM
  - DENTISTRY
    - EPIDEMIOLOGY, 7782*
  - OCCUPATIONAL FACTORS, 7782*

- HEPATITIS, TOXIC
  - ANESTHETICS, 7778
  - CARBON TETRACHLORIDE
    - HEMATOPOIESIS, 7480
  - COLLAGEN
    - SYNTHESIS, 7742*
  - DRUG-INDUCED, 7780
    - GALACTOSAMINE, 7431*
  - GALACTOSAMINE
    - ALBUMINS, 7431*
    - FIBRINOGEN, 7431*
  - LIVER
    - MORPHOLOGY, 7419*
  - LYSOSOMES
    - TRANQUILIZING AGENTS, 7468

- HEPATITIS, VIRAL
  - SEE HEPATITIS, INFECTIOUS

- HEPATOCYTES
  - ALBUMINS, 7291*
  - BILE ACIDS AND SALTS
    - TRANSPORT, 7443*
  - CHOLESTASIS
    - ALKALINE PHOSPHATASE, 7403*
    - ENZYMES, 7403*
  - CLEARANCE STUDY, 7455
  - CYTOCHROMES, 7415*
  - FATTY ACIDS
    - METABOLISM, 7444*
  - ISOLATION, 7415*
  - LIPIDS
    - METABOLISM, 7444*
  - MEMBRANES
    - BILE ACIDS AND SALTS, 7392*
  - MITOCHONDRIA
    - AGE FACTORS, 7418*
    - CHOLELITHIASIS, 7836
  - PHENOBARBITAL, 7415*
  - ULTRASTRUCTURE
    - TECHNIQUES, 7294

- HEPATOLENTICULAR DEGENERATION
  - SEE WILSON'S DISEASE

- HEPATOMEGALY
  - DRUG-INDUCED
    - HYPOLIPEMIC AGENTS, 7454

- HERNIA
  - APPENDECTOMY
    - COMPLICATIONS, 7685

- HIATAL HERNIA
  - STOMACH
    - SECRETION, 7559

- HIRSCHSPRUNG'S DISEASE
  - DIAGNOSIS
    - MANOMETRY, 7698
  - REVIEW, 7670

- HISTAMINE
  - BINDING
    - DRUG EFFECTS ON, 7289*
  - H2 RECEPTOR ANTAGONISTS
    - BINDING, 7289*
  - INTESTINE, SMALL
    - DRUG EFFECTS ON, 7289*
    - MUSCLES, 7494*

- HORMONE CONTROL
  - ILEUM
    - ION TRANSPORT, 7313
  - INTESTINE, SMALL
    - GROWTH FACTORS, 7502
    - ION TRANSPORT, 7313
    - NEONATE, 7502
  - JEJUNUM
    - ION TRANSPORT, 7313
  - SECRETION
    - PROTEINS, 7376
  - STOMACH
    - ACID SECRETION, 7342*
    - CIRCULATION, 7342*

- HORMONES
  - DUODENUM
    - ACID SECRETION, 7344*
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, MALIGNANT, 7861
  - PANCREAS
    - NEOPLASMS, MALIGNANT, 7861

- HORMONES, ADRENAL CORTEX
  - GASTRECTOMY
    - DUMPING SYNDROME, 7592
  - ILEUM
    - ION TRANSPORT, 7313
  - INTESTINE, SMALL
    - ION TRANSPORT, 7313
  - JEJUNUM
    - ION TRANSPORT, 7313
  - LIVER
    - AGE FACTORS, 7416*
  - LIVER DISEASES, ALCOHOLIC
    - HEPATITIS, 7808*
  - ULCER, PEPTIC, 7592

HORMONES, GASTROINTESTINAL
- KIDNEYS, 7885
- REVIEW, 7874

HYDROGEN
- ALCOHOLS
  - METABOLISM, 7429*
- ESOPHAGUS
  - ABSORPTION, 7301*
  - ALCOHOLS, 7301*
  - BILE ACIDS AND SALTS, 7301*
- MOTILITY
  - BREATH TEST, 7326

HYPERBILIRUBINEMIA
- NEONATE
  - DRUG-INDUCED, 7772*
  - ETIOLOGY, 7772*
  - REVIEW, 7776
  - THERAPY, 7776

HYPERCHLORHYDRIA
- SEE ALSO ACID SECRETION, SECRETION

HYPERGLYCEMIA
- PANCREAS
  - BICARBONATE SECRETION, 7380
  - SECRETION, 7380
- SECRETION
  - PROTEINS, 7380

HYPERTENSION
- ALCOHOLISM
  - REVIEW, 7809
- COLON
  - MOTILITY, 7327
  - MUSCLES, 7327

HYPERTENSION, PORTAL
- VEINS
  - HYPOPLASIA, 7464

HYPERTROPHY
- INTESTINE, SMALL
  - COLLAGEN, 7488*
  - SECRETION, 7290*
- LIVER
  - NEOPLASMS, BENIGN, 7770
  - NEOPLASMS, MALIGNANT, 7770

HYPOLIPEMIA
- LIVER
  - PEROXISOMES, 7454

HYPOLIPEMIC AGENTS
- HEPATOMEGALY
  - DRUG-INDUCED, 7454
- LIVER
  - DRUG EFFECTS ON, 7454
  - PEROXISOMES, 7454

HYPOPLASIA
- LIVER
  - VEINS, 7464
- VEINS
  - HYPERTENSION, PORTAL, 7464

HYPOTHERMIA
- LIVER
  - GLYCOGEN, 7457
  - STRESS, 7457
  - ULTRASTRUCTURE, 7457

ICTERUS
- SEE JAUNDICE

ILEUM
- SEE ALSO DUODENUM. INTESTINE, SMALL. JEJUNUM
- ABSORPTION
  - VITAMIN K, 7314
  - WATER, 7305*
- ENDOMETRIOSIS
  - THERAPY, 7617
- FISTULA
  - CROHN'S DISEASE, 7898
  - SIGMOID, 7898
- GUANYL CYCLASE
  - ALCOHOLS, 7339*
- HEMORRHAGE
  - DYSPLASIA, 7657*
- INTRINSIC FACTOR, 7495*
- ION TRANSPORT
  - HORMONE CONTROL, 7313
  - HORMONES, ADRENAL CORTEX, 7313
- LYMPH
  - SECRETION, 7498*
- MOTILITY
  - ENKEPHALINS, 7325
- NERVOUS SYSTEM
  - NEOPLASMS, MALIGNANT, 7612
- TRANSPORT
  - ELECTROLYTES, 7313
  - VITAMIN K, 7314
  - WATER, 7305*, 7313

ILEUS
- SEE INTESTINAL OBSTRUCTION

IMMUNITY
- SCHISTOSOMIASIS
  - FASCIOLIASIS, 7467

IMMUNOGLOBULINS
- ALCOHOLISM
  - DIAGNOSIS, 7804*
- HEPATITIS, INFECTIOUS
  - DRUG THERAPY, 7786*
  - TRANSMISSION, 7786*
- INTESTINE, SMALL
  - BINDING, 7319
  - CELIAC DISEASE, 7634*
  - TRANSPORT, 7318, 7319
- JEJUNUM
  - BINDING, 7319
  - CELIAC DISEASE, 7634*
  - TRANSPORT, 7318, 7319
- LIVER DISEASES, ALCOHOLIC
  - FATTY LIVER, 7804*
  - HEPATITIS, 7804*
  - LIVER CIRRHOSIS, 7804*

IMMUNOTHERAPY
- COLITIS, ULCERATIVE
  - DRUG THERAPY, 7719

IMMUNOTHERAPY (continued)
  CROHN'S DISEASE
    DRUG THERAPY, 7719
  INTESTINES
    INFLAMMATION, 7719

INDOCYANINE GREEN
  CLEARANCE STUDY
    CIRCULATION, 7432*
    DRUG EFFECTS ON, 7432*
  LIVER
    CLEARANCE STUDY, 7432*

INFANT
  COLON
    POLYPS, 7710
  ENEMA
    COMPLICATIONS, 7683
  GASTROENTERITIS
    DIAGNOSIS, 7863, 7870
    ETHNIC FACTORS, 7875
    ETIOLOGY, 7871, 7875
  GASTROINTESTINAL DISEASES
    DIET, 7883
    NUTRITION, 7883
    VOMITING, 7878
  GASTROINTESTINAL SYSTEM
    SURGERY, 7880
  INTESTINE, SMALL
    FISTULA, 7618
  LIVER
    SURGERY, 7880
  NUTRITION DISORDERS
    DIARRHEA, 7853*
    PARENTERAL ALIMENTATION, 7853*
    THERAPY, 7853*
  SIGMOID
    POLYPS, 7710

INFARCTION
  INTESTINE, SMALL
    BARIUM, 7606*

INFECTION, BACTERIA
  SEE BACTERIAL INFECTIONS

INFECTION, FUNGUS
  SEE MYCOSES

INFECTION, RICKETTSIAL
  SEE RICKETTSIAL DISEASES

INFECTION, VIRUS
  SEE VIRUS DISEASES

INFLAMMATION
  BILIARY TRACT
    CHOLELITHIASIS, 7847
  CECUM
    NEOPLASMS, 7702
  DUODENUM
    ANGIOGRAPHY, 7608*
  INTESTINES
    ANTI-INFLAMMATORY AGENTS, 7719
    DRUG THERAPY, 7719
    IMMUNOTHERAPY, 7719
  PANCREAS
    FISTULA, 7729
    STEROIDS, 7736*

INFLAMMATION (continued)
  PANCREATITIS
    COLON, 7725*

INFLAMMATORY BOWEL DISEASES
  COLON
    BIOPSY, 7551
  COLONOSCOPY, 7527*
  DIAGNOSIS
    CHILD, 7900
    ELECTROPHORESIS, 7900
    LYMPHOCYTES, 7900
  INTESTINE, LARGE
    MORPHOLOGY, 7707
  NUCLEIC ACIDS
    SYNTHESIS, 7635*
  PSYCHOLOGICAL FACTORS, 7628
  RECTUM
    BIOPSY, 7551

INSULIN
  DUODENUM
    ULCER, PEPTIC, 7598
  SYNTHESIS, 7379
  ULCER, PEPTIC
    SERUM, 7598

INTESTINAL ABSORPTION
  AMINO ACIDS, 7298*
  CADMIUM
    NEONATE, 7299*
  L-DOPA, 7298*
  ENZYMES, 7306
  INTESTINE, SMALL
    NEONATE, 7304*
  LIPOPROTEINS
    LYMPH, 7497*
  NEONATE
    TRANSMISSION, 7304*
  SURGERY
    VITAMIN D, 7609*
  TRANSMISSION
    PROTEINS, 7304*
  TRIGLYCERIDES
    EMULSIFIERS, 7493*
    FATS, 7493*
  VITAMIN D
    PLASMA, 7609*

INTESTINAL OBSTRUCTION
  ANOMALY
    VEINS, 7661*
  CECUM
    DISTENTION, 7709
    ISCHEMIA, 7709
  COLON
    COMPLICATIONS, 7709
  COMPLICATIONS
    CECUM, 7709
  DRUG-INDUCED
    BILE ACIDS AND SALTS, 7765
    CHILD, 7765
  DRUG THERAPY
    BILE ACIDS AND SALTS, 7765

INTESTINE, LARGE
  SEE ALSO CECUM COLON
  ABSORPTION
    VITAMIN K, 7314

- INTESTINE, LARGE (continued)
  - ARTERIES
    - ANEURYSM, 7686
  - INFLAMMATORY BOWEL DISEASES
    - MORPHOLOGY, 7707
  - MUSCLES
    - ELECTROPHYSIOLOGY, 7328
  - NEOPLASMS, BENIGN
    - DIAGNOSIS, 7711
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 7711
  - POLYPS
    - DIAGNOSIS, 7711
    - ENDOSCOPY, 7669
  - SEPSIS
    - ANEURYSM, 7686
  - SURGERY
    - DIET, 7712
  - TRANSPORT
    - VITAMIN K, 7314
  - ULTRASONOGRAPHY
    - GASES, 7684
    - TECHNIQUES, 7684

- INTESTINE, SMALL
  - SEE ALSO DUODENUM, ILEUM, JEJUNUM
  - ABSORPTION
    - AMINO ACIDS, 7297*
    - CIRCULATION, 7297*
    - EMBRYOLOGY, 7309, 7310, 7312
    - FATS, 7312
    - FATTY ACIDS, 7316, 7317, 7505
    - FETUS, 7309, 7312
    - MORPHOLOGY, 7309
    - MOTILITY, 7297*
    - NEONATE, 7311, 7312
    - VITAMIN K, 7314
    - WATER, 7305*
  - ALKALINE PHOSPHATASE
    - FATTY ACIDS, 7486*
  - AMINO ACIDS
    - ENZYMES, 7491*
    - KINETICS, 7491*
  - ANTIGENS
    - SCLEROSIS, 7891
  - BACTERIA
    - DIARRHEA, 7653
    - REVIEW, 7653
  - BILE ACIDS AND SALTS
    - BINDING, 7485*
    - CHOLECYSTECTOMY, 7394*
    - STARVATION, 7394*
  - CATHARTICS
    - TOXICITY, 7484*
  - CELLS
    - EMBRYOLOGY, 7288*
  - COLLAGEN
    - SYNTHESIS, 7488*
  - DIVERTICULUM, 7615
  - ENDOMETRIOSIS
    - THERAPY, 7617
  - ENDOSCOPY
    - REVIEW, 7535
  - ENEMA
    - TECHNIQUES, 7526*
  - ENTERECTOMY
    - ADAPTATION, 7501*
  - ENTEROKINASE
    - BLOOD GROUPS, 7490*

- INTESTINE. SMALL (continued)
  - ENTEROKINASE (continued)
    - CHEMICAL COMPOSITION, 7490*
    - VILLI, 7490*
  - ENZYMES
    - CADMIUM, 7507
    - CHEMICAL PROPERTIES, 7506
    - CHROMATOGRAPHY, 7506
    - DIARRHEA, 7632
    - NUTRITION DISORDERS, 7632
    - PERFUSION, 7489*
  - FATTY ACIDS
    - ALKALINE PHOSPHATASE, 7487*
  - FISTULA
    - INFANT 7618
    - PARENTERAL ALIMENTATION, 7618
    - THERAPY, 7618
  - GLUCOSE
    - METABOLISM, 7300*
  - GLYCOLIPIDS
    - CHEMICAL COMPOSITION, 7496*
    - FATTY ACIDS, 7496*
  - GROWTH FACTORS
    - HORMONE CONTROL, 7502
    - THYROID GLAND, 7502
  - HEPATECTOMY
    - BILE ACIDS AND SALTS, 7448*
  - HISTAMINE
    - DRUG EFFECTS ON, 7289*
  - HYPERTROPHY
    - COLLAGEN, 7488*
  - IMMUNOGLOBULINS
    - BINDING, 7319
    - CELIAC DISEASE, 7634*
  - INFARCTION
    - BARIUM, 7606*
  - INTRINSIC FACTOR, 7495*
  - ION TRANSPORT
    - HORMONE CONTROL, 7313
    - HORMONES, ADRENAL CORTEX, 7313
  - LACTATES
    - METABOLISM, 7339*
    - SYNTHESIS, 7339*
  - LIPIDS
    - METABOLISM, 7505
  - LIPOPROTEINS
    - LYMPH, 7497*
    - SYNTHESIS, 7497*
  - LYMPH
    - SECRETION, 7498*
  - LYMPHOMA
    - MALABSORPTION SYNDROMES, 7643
  - MALABSORPTION SYNDROMES
    - BACTERIA, 7653
  - METALS
    - CADMIUM, 7507
  - MITOSIS
    - DRUG EFFECTS ON, 7500*
    - KINETICS, 7500*
  - MORPHOLOGY
    - CATHARTICS, 7484*
    - DRUG EFFECTS ON, 7484*
    - EPITHELIUM, 7307
    - GIARDIASIS, 7892*
    - SECRETAGOGUES, 7484*
  - MOTILITY
    - HORMONE EFFECTS ON, 7324
    - MOTILIN, 7324

INTESTINE, SMALL (continued)
- MUSCLES
  - COLLAGEN, 7488*
  - HISTAMINE, 7494*
- NEONATE
  - GROWTH FACTORS, 7502
  - HORMONE CONTROL, 7502
  - INTESTINAL ABSORPTION, 7304*
  - THYROID GLAND, 7502
- NERVOUS SYSTEM
  - NEOPLASMS, MALIGNANT, 7612
- OBSTRUCTION
  - MALABSORPTION SYNDROMES, 7643
- ORGAN CULTURE
  - GLUCOSE, 7300*
  - METABOLISM, 7300*
- PEPTIDES
  - ABSORPTION, 7499*
  - TRANSPORT, 7499*
- PERFUSION
  - BLOOD, 7489*
- PROTEINS
  - CADMIUM, 7507
- SECRETAGOGUES
  - TOXICITY, 7484*
- SECRETION
  - CELLS, 7288*
  - DEFICIENCY, 7290*
  - DILATATION, 7290*
  - HYPERTROPHY, 7290*
  - MORPHOLOGY, 7290*
- SEROTONIN
  - HISTOCHEMISTRY, 7513*
  - NERVOUS CONTROL, 7513*
- STRICTURE
  - DIAGNOSIS, 7607*
  - ISCHEMIA, 7607*
- SURGERY
  - VITAMIN D, 7609*
- TRANSPORT
  - ANGIOTENSIN, 7303*
  - DRUG EFFECTS ON, 7303*
  - HORMONE EFFECTS ON, 7303*
  - IMMUNOGLOBULINS, 7318, 7319
  - VITAMIN K, 7314
  - WATER, 7305*
- TRYPSIN
  - PANCREAS, 7723*
- TUBERCULOSIS
  - MALABSORPTION SYNDROMES, 7643
- VIRUSES
  - SCLEROSIS, 7877, 7891

INTESTINES
- ABSORPTION
  - CHYLOMICRONS, 7302*
  - LIPIDS, 7302*
- BILE ACIDS AND SALTS
  - ANTIBIOTICS, 7389*
  - BACTERIA, 7389*, 7440*
  - FETUS, 7396*
  - METABOLISM, 7396*
  - NEONATE, 7396*
- CELLS
  - MALABSORPTION SYNDROMES, 7656
- CHOLIC ACID
  - BACTERIA, 7440*
- ENZYMES
  - IMMUNOCHEMISTRY, 7492*

INTESTINES (continued)
- GANGRENE, 7680
- INFLAMMATION
  - ANTI-INFLAMMATORY AGENTS, 7719
  - DRUG THERAPY, 7719
  - IMMUNOTHERAPY, 7719
- ISCHEMIA, 7680
- MORPHOLOGY
  - MALABSORPTION SYNDROMES, 7656
- OBSTRUCTION
  - PSYCHOLOGICAL FACTORS, 7628
- PARENTERAL ALIMENTATION, 7504
- PERFORATION
  - COMPLICATIONS, 7621
  - FOREIGN BODIES, 7621
  - SURGERY, 7621
- SUCRASE
  - IMMUNOCHEMISTRY, 7492*
- SURGERY
  - COMPLICATIONS, 7626
- TRANSPORT
  - CHYLOMICRONS, 7302*
  - LIPIDS, 7302*
- WOUNDS AND INJURIES
  - COMPLICATIONS, 7620
  - PERFORATION, 7621

INTRINSIC FACTOR
- ILEUM, 7495*
- INTESTINE, SMALL, 7495*
- PYLORUS, 7495*
- STOMACH, 7495*

INTUSSUSCEPTION
- RECTUM
  - ETIOLOGY, 7708
  - NEOPLASMS, 7708
- SIGMOID
  - ETIOLOGY, 7708
  - NEOPLASMS, 7708

ION TRANSPORT
- ILEUM
  - HORMONE CONTROL, 7313
  - HORMONES, ADRENAL CORTEX, 7313
- INTESTINE, SMALL
  - HORMONE CONTROL, 7313
  - HORMONES, ADRENAL CORTEX, 7313
- JEJUNUM
  - HORMONE CONTROL, 7313
  - HORMONES, ADRENAL CORTEX, 7313
- SALIVARY GLANDS
  - CALCIUM, 7340
- STOMACH, 7354
  - ANESTHETICS, 7315
  - DRUG EFFECTS ON, 7315

IRON
- CYSTIC FIBROSIS
  - ABSORPTION, 7749*
  - CHILD, 7749*
- HEMOCHROMATOSIS
  - GENETICS, 7815*
- PORPHYRIA
  - PATHOLOGY, 7755*

IRRITABLE COLON
- DRUG THERAPY
  - PARASYMPATHOLYTICS, 7671

- ISCHEMIA
  - BILE
    - SYNTHESIS, 7470
  - COLITIS
    - DIAGNOSIS, 7706
    - ETIOLOGY, 7706
  - INTESTINAL OBSTRUCTION
    - CECUM, 7709
  - INTESTINE, SMALL
    - STRICTURE, 7607*
  - INTESTINES. 7680

- JAUNDICE
  - BREAST FEEDING
    - FATTY ACIDS, 7771*
  - DIAGNOSIS, 7846
    - ULTRASONOGRAPHY, 7823*
  - LIVER
    - BIOPSY, 7846
    - ENZYMES, 7407*
  - NEONATE
    - DRUG-INDUCED, 7772*
    - ETIOLOGY, 7772*

- JAUNDICE, CHRONIC IDIOPATHIC
  - DRUG THERAPY, 7773*
  - METABOLISM, 7773*
  - PREGNANCY, 7774*

- JAUNDICE, OBSTRUCTIVE
  - DIAGNOSIS
    - ULTRASONOGRAPHY, 7823*

- JEJUNUM
  - SEE ALSO DUODENUM, ILEUM, INTESTINE, SMALL
  - ABSORPTION
    - FATTY ACIDS, 7317
    - FETUS, 7309
    - MORPHOLOGY, 7309
    - WATER, 7305*
  - ANTIGENS
    - SCLEROSIS, 7891
  - DIVERTICULUM, 7613, 7615
  - ELECTROPHYSIOLOGY
    - BACTERIA, 7323
  - FISTULA, 7584
    - SURGERY, 7627
  - HEMORRHAGE
    - DYSPLASIA, 7657*
  - IMMUNOGLOBULINS
    - BINDING, 7319
    - CELIAC DISEASE, 7634*
  - ION TRANSPORT
    - HORMONE CONTROL, 7313
    - HORMONES, ADRENAL CORTEX, 7313
  - MOTILITY
    - ELECTROPHYSIOLOGY, 7323
  - NERVOUS SYSTEM
    - NEOPLASMS, MALIGNANT, 7612
  - PEPTIDES
    - ABSORPTION, 7499*
    - TRANSPORT, 7499*
  - PERFORATION, 7584
  - PROTEINS
    - FETUS, 7309
  - TRANSPORT
    - ANGIOTENSIN, 7303*
    - DRUG EFFECTS ON, 7303*

- JEJUNUM (continued)
  - TRANSPORT (continued)
    - ELECTROLYTES, 7313
    - ELECTROPHYSIOLOGY, 7308*
    - HORMONE EFFECTS ON, 7303*
    - IMMUNOGLOBULINS, 7318, 7319
    - WATER, 7305*, 7313
  - VIRUSES
    - SCLEROSIS, 7877, 7891

- KERNICTERUS
  - L-DOPA
    - DRUG THERAPY, 7763

- KIDNEYS
  - BILE ACIDS AND SALTS
    - METABOLISM, 7831
  - CHENODEOXYCHOLIC ACID
    - DRUG EFFECTS ON, 7401*
  - EXCRETION
    - KINETICS, 7385*
  - HORMONES, GASTROINTESTINAL, 7885

- KININS
  - STOMACH
    - MUCUS, 7355
  - ULCER, PEPTIC
    - SERUM, 7597

- LACTASE
  - DEFICIENCY
    - CHEMICAL PROPERTIES, 7647
    - REVIEW, 7647
  - GASTROENTERITIS
    - FUNGI, 7511*

- LACTASE DEFICIENCY
  - SEE LACTOSE INTOLERANCE

- LACTATES
  - CECUM
    - METABOLISM, 7339*
    - SYNTHESIS, 7339*
  - INTESTINE, SMALL
    - METABOLISM, 7339*
    - SYNTHESIS, 7339*
  - STOMACH
    - METABOLISM, 7339*
    - SYNTHESIS, 7339*

- LACTOSE
  - DIGESTION
    - GENETIC FACTORS, 7646
    - REVIEW, 7646
  - MALABSORPTION SYNDROMES
    - EPIDEMIOLOGY, 7645
    - ETHNIC FACTORS, 7645
    - GENETIC FACTORS, 7646
    - GEOGRAPHICAL FACTORS, 7646
    - REVIEW, 7646, 7647
    - SOCIOECONOMIC FACTORS, 7645

- LACTOSE INTOLERANCE
  - EPIDEMIOLOGY
    - ETHNIC FACTORS, 7645
    - SOCIOECONOMIC FACTORS, 7645
  - GENETIC FACTORS, 7646
  - GEOGRAPHICAL FACTORS, 7646
  - REVIEW, 7646, 7647

- LAMBLIASIS
  - SEE GIARDIASIS

- LAPAROSCOPY
  - APPENDICITIS
    - DIAGNOSIS, 7700
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, 7569
    - PSEUDOTUMORS, 7569
  - LIVER
    - NEOPLASMS, MALIGNANT, 7761

- LARGE INTESTINE
  - SEE INTESTINE, LARGE

- LAXATIVES
  - SEE CATHARTICS

- LIPASE
  - DUODENUM
    - ULCER, PEPTIC, 7594
  - PANCREAS
    - CIRCADIAN RHYTHM, 7377
    - DIETARY FACTORS, 7377
  - SECRETION
    - ULCER, PEPTIC, 7594

- LIPIDS
  - SEE ALSO FATS, TRIGLYCERIDES
  - BILE
    - ETHNIC FACTORS, 7835
  - BILE ACIDS AND SALTS
    - DIFFUSION, 7395*
    - SOLUBILITY, 7395*
  - BLOOD
    - ALCOHOLS, 7515*
  - CHEMICAL PROPERTIES, 7479
  - HEPATOCYTES
    - METABOLISM, 7444*
  - INTESTINE, SMALL
    - METABOLISM, 7505
  - INTESTINES
    - ABSORPTION, 7302*
    - TRANSPORT, 7302*
  - METABOLISM
    - ALCOHOLS, 7805*
    - DRUG EFFECTS ON, 7805*

- LIPOGENESIS
  - LIVER
    - COENZYMES, 7417*
    - DIETARY FACTORS, 7458
    - FATTY ACIDS, 7417*
    - PROTEINS, 7417*

- LIPOPROTEINS
  - CHOLESTASIS
    - DIAGNOSIS, 7827*
  - INTESTINAL ABSORPTION
    - LYMPH, 7497*
  - INTESTINE, SMALL
    - LYMPH, 7497*
    - SYNTHESIS, 7497*
  - LIVER
    - CHOLESTEROL, 7397*

- LIVER
  - ABSCESS
    - BACTERIAL INFECTIONS, 7757
  - ALCOHOL OXIDOREDUCTASES
    - COENZYMES, 7405*
  - ALCOHOLS
    - METABOLISM, 7423*, 7429*
  - ALDEHYDES
    - METABOLISM, 7428*
  - AMEBIASIS
    - ABSCESS, 7471
  - AMINO ACIDS
    - METABOLISM, 7397*
  - ANGIOGRAPHY, 7529*
  - ANTI-ARTHRITIC AGENTS, 7478
  - ARTERIES
    - MORPHOLOGY, 7293
    - REVIEW, 7293
  - ASCARIASIS, 7895
  - BILE
    - SYNTHESIS, 7384*, 7470
  - BILE ACIDS AND SALTS
    - CHOLECYSTECTOMY, 7394*
    - CHOLESTEROL, 7400*
    - METABOLISM, 7831
    - STARVATION, 7394*
    - SYNTHESIS, 7413*, 7424*
  - BIOPSY
    - JAUNDICE, 7846
  - CELLS
    - ALKALINE PHOSPHATASE, 7403*
    - ANALYSIS, 7383*
    - ENZYMES, 7403*
    - MORPHOLOGY, 7383*
  - CHENODEOXYCHOLIC ACID
    - DRUG EFFECTS ON, 7401*
  - CHOLESTEROL
    - LIPOPROTEINS, 7397*
    - METABOLISM, 7413*
    - PHOSPHOLIPIDS, 7399*
    - SYNTHESIS, 7397*
  - CHYLOMICRONS
    - NEONATE, 7461
  - CIRCULATION
    - CLEARANCE STUDY, 7462
  - CITRATES
    - METABOLISM, 7450
    - STRESS, 7450
    - SURGERY, 7450
  - CONTRAST MEDIA
    - CHROMATOGRAPHY, 7386*
    - CLEARANCE STUDY, 7386*
    - TOLERANCE, 7386*
    - TRANSPORT, 7386*
  - COPPER
    - BINDING, 7434*
  - CYSTS
    - ANGIOGRAPHY, 7759
  - DRUG EFFECTS ON, 7456
    - HYPOLIPEMIC AGENTS, 7454
  - DRUG METABOLISM
    - DRUG EFFECTS ON, 7412*
    - HEPATITIS, 7477
  - EMBRYOLOGY, 7292, 7461
  - ENZYMES, 7446
    - ALCOHOLS, 7408*, 7409*
    - ANALYSIS, 7404*
    - CARBOHYDRATES, 7409*
    - DETERGENTS, 7433*

LIVER (continued)
- ENZYMES (continued)
  - DIETARY FACTORS, 7460
  - DRUG EFFECTS ON, 7409*
  - FETUS, 7402*
  - TECHNIQUES, 7404*
- ESTROGENS
  - BINDING, 7481
- EXCRETION
  - KINETICS, 7385*
- FATTY ACIDS
  - EMBRYOLOGY, 7452
  - METABOLISM, 7452, 7482
  - OXIDATION, 7482
  - SYNTHESIS, 7441*
- FOLIC ACID
  - METABOLISM, 7473
- GLUCONEOGENESIS, 7387*
- GLYCOGEN
  - HYPOTHERMIA, 7457
  - METABOLISM, 7416*
  - STRESS, 7457
- GUANYL CYCLASE
  - ALCOHOLS, 7339*
- HEPATECTOMY
  - BILE ACIDS AND SALTS, 7448*
  - CLEARANCE STUDY, 7475
- HORMONE EFFECTS ON
  - ANDROGENS, 7476
- HORMONES, ADRENAL CORTEX
  - AGE FACTORS, 7416*
- INDOCYANINE GREEN
  - CLEARANCE STUDY, 7432*
- JAUNDICE
  - ENZYMES, 7407*
- LIPOGENESIS
  - COENZYMES, 7417*
  - DIETARY FACTORS, 7458
  - FATTY ACIDS, 7417*
  - PROTEINS, 7417*
- LYSOSOMES
  - ENZYMES, 7427*
  - TRANQUILIZING AGENTS, 7468
  - UREMIA, 7453
- MORPHOLOGY
  - HEPATITIS, TOXIC, 7419*
- NECROSIS
  - ANESTHETICS, 7778
  - BACTERIA, 7465
  - DRUG-INDUCED, 7778
- NEOPLASM METASTASIS
  - DISEASES ASSOCIATED WITH, 7667
  - RADIONUCLIDES, 7658*
  - SCANNING, SCINTILLATION, 7658*, 7667
- NEOPLASMS
  - ANGIOGRAPHY, 7747*
  - ANTINEOPLASTIC AGENTS, 7748*
  - ANTIOXIDANTS, 7425*
  - CARCINOGENS, 7425*
  - CONTRACEPTIVES, ORAL, 7745*
  - L-DOPA, 7474
  - DOPAMINE, 7474
  - DRUG-INDUCED, 7474
  - DRUG METABOLISM, 7746*
  - PHENOBARBITAL, 7425*
- NEOPLASMS, BENIGN
  - CONTRACEPTIVES, ORAL, 7767
  - DRUG-INDUCED, 7767

LIVER (continued)
- NEOPLASMS, BENIGN (continued)
  - HYPERTROPHY, 7770
  - THERAPY, 7767
- NEOPLASMS, MALIGNANT
  - ALCOHOLISM, 7768
  - ALPHA FETOPROTEIN, 7762, 7768
  - AUSTRALIA ANTIGEN, 7762
  - DIAGNOSIS, 7761
  - DISEASES ASSOCIATED WITH, 7768
  - EPIDEMIOLOGY, 7768
  - HYPERTROPHY, 7770
  - LAPAROSCOPY, 7761
  - LIVER CIRRHOSIS, 7768
- NITROGEN
  - METABOLISM, 7460
- OXIDATION
  - ALCOHOLS, 7410*
- OXIDOREDUCTASES
  - CARBON TETRACHLORIDE, 7406*
- PEROXISOMES
  - DRUG EFFECTS ON, 7454
  - HYPOLIPEMIA, 7454
  - HYPOLIPEMIC AGENTS, 7454
- PORPHYRINS
  - METABOLISM, 7435*
  - STEROIDS, 7435*
- PROTEINS
  - ALCOHOLISM, 7442*
  - ALCOHOLS, 7439*
  - BINDING, 7422*
  - SYNTHESIS, 7387*, 7442*
- RADIONUCLIDES
  - CHROMATOGRAPHY, 7386*
  - CLEARANCE STUDY, 7386*
  - TOLERANCE, 7386*
  - TRANSPORT, 7386*
- REGENERATION
  - BIOCHEMISTRY, 7447
  - CIRCULATION, 7462
  - FATS, 7462
  - NUCLEIC ACIDS, 7423*
- SCANNING, SCINTILLATION
  - RADIONUCLIDES, 7421*
- STRESS
  - HYPOTHERMIA, 7457
- SURGERY
  - INFANT, 7880
- THROMBOSIS
  - BACTERIA, 7465
  - NECROSIS, 7465
- TOMOGRAPHY
  - CONTRAST MEDIA, 7741*
  - TECHNIQUES, 7741*
- TOXICITY
  - ANDROGENS, 7476
  - TANNIC ACID, 7451
- TRANQUILIZING AGENTS
  - MICROSOMES, 7414*
- TRANSPORT
  - AMINO ACIDS, 7387*
- ULTRASTRUCTURE
  - AGE FACTORS, 7392*
  - FETUS, 7461
  - HYPOTHERMIA, 7457
  - NEONATE, 7461
  - STRESS, 7457
- VEINS
  - HYPOPLASIA, 7464

LIVER (continued)
- WOUNDS AND INJURIES
  - DIAGNOSIS, 7530*
  - SCANNING, SCINTILLATION, 7530*
- ZINC
  - BINDING, 7434*

LIVER CIRRHOSIS
- ALCOHOLISM
  - ETIOLOGY, 7802*
  - IMMUNOLOGY, 7802*
  - PROGNOSIS, 7802*
  - SEX FACTORS, 7802*
- ANTICONVULSANTS
  - DRUG METABOLISM, 7811*
- ASCITES
  - REVIEW, 7819
- BILIRUBIN
  - METABOLISM, 7801
- BLOOD PLATELETS
  - ENZYMES, 7814*
  - MONOAMINE OXIDASE, 7814*
- CLASSIFICATION
  - REVIEW, 7817
- DIAGNOSIS
  - MORPHOLOGY, 7817
  - REVIEW, 7817
- DISEASES ASSOCIATED WITH
  - DIABETES, 7816
  - HEPATITIS, 7818
- DRUG METABOLISM
  - LIVER FUNCTION TESTS, 7746*
- DRUG THERAPY, 7820, 7821
- ENZYMES, 7814*, 7822
- ERYTHROCYTES
  - CARBOHYDRATES, 7812*
  - PROTEINS, 7812*
- ETIOLOGY
  - IMMUNOLOGY, 7802*
  - REVIEW, 7817
- FIBRINOGEN
  - KINETICS, 7813*
- HEMOCHROMATOSIS
  - FAMILIAL FACTORS, 7815*
- IMMUNOLOGY
  - REVIEW, 7817
- LIVER
  - NEOPLASMS, MALIGNANT, 7768
- LIVER DISEASES, ALCOHOLIC
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- LIVER FUNCTION TESTS, 7822
- MONOAMINE OXIDASE, 7814*
- PROGNOSIS
  - SEX FACTORS, 7802*
- WILSON'S DISEASE
  - DISEASES ASSOCIATED WITH, 7769

LIVER CIRRHOSIS, OBSTRUCTIVE
- DIAGNOSIS
  - ANTIBODIES, 7799*

LIVER COMA
- FATTY ACIDS
  - CHROMATOGRAPHY, 7751*

LIVER DISEASES
- BILE ACIDS AND SALTS
  - ASSAY, 7743*

LIVER DISEASES (continued)
- BILE ACIDS AND SALTS (continued)
  - CHROMATOGRAPHY, 7391*
  - DIAGNOSIS, 7743*
  - TECHNIQUES, 7393*
- CARBOHYDRATES
  - METABOLISM, 7793
- DIAGNOSIS
  - ANGIOGRAPHY, 7529*
  - BILE ACIDS AND SALTS, 7528*
  - CONTRAST MEDIA, 7741*
  - TOMOGRAPHY, 7741*
  - ULTRASONOGRAPHY, 7823*
- DRUG DEPENDENCE
  - NARCOTICS, 7764
- DRUG THERAPY
  - KINETICS, 7752*
- ERYTHROCYTES
  - METABOLISM, 7758
- FATS
  - METABOLISM, 7793
- FIBRINOGEN
  - METABOLISM, 7744*
- MAGNESIUM
  - METABOLISM, 7793
- PROGNOSIS
  - BILE ACIDS AND SALTS, 7528*
- PROTEINS
  - METABOLISM, 7793
- SERUM
  - BILE ACIDS AND SALTS, 7528*, 7743*
- TOMOGRAPHY
  - DIAGNOSIS, 7531*

LIVER DISEASES, ALCOHOLIC
- ALCOHOLISM
  - REVIEW, 7809
- COLLAGEN
  - SYNTHESIS, 7742*
- ETIOLOGY
  - ALDEHYDES, 7428*
  - IMMUNOLOGY, 7802*
  - REVIEW, 7807*
- FATTY LIVER
  - DIAGNOSIS, 7804*
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- HEPATITIS
  - DIAGNOSIS, 7804*
  - ETIOLOGY, 7807*
  - HORMONES, ADRENAL CORTEX, 7808*
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- LIVER CIRRHOSIS
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- NECROSIS
  - ETIOLOGY, 7807*
- PROGNOSIS
  - SEX FACTORS, 7802*
- PROTEINS
  - SECRETION, 7806*
  - SYNTHESIS, 7806*
- SEX FACTORS
  - REVIEW, 7807*

LIVER FUNCTION TESTS
- CONTRACEPTIVES, ORAL, 7426*

- LIVER FUNCTION TESTS (continued)
  - LIVER CIRRHOSIS, 7822
    - DRUG METABOLISM, 7746*
  - NEOPLASM METASTASIS
    - DRUG METABOLISM, 7746*
  - PORPHYRIA, 7822
  - SHUNT, INTESTINAL
    - OBESITY, 7625

- LIVER INJURY
  - ALCOHOLISM
    - ALDEHYDES, 7428*
  - ANDROGENS, 7476
  - CARBON TETRACHLORIDE
    - HEMATOPOIESIS, 7480
    - LYSOSOMES, 7468
    - TRANQUILIZING AGENTS, 7468
  - DIAGNOSIS
    - SCANNING, SCINTILLATION, 7530*
  - DRUG-INDUCED
    - ANESTHETICS, 7778
    - TUBERCULOSIS, 7780
  - OXIDOREDUCTASES
    - DRUG-INDUCED, 7406*
  - SHUNT, INTESTINAL
    - AMINO ACIDS, 7637*
    - COMPLICATIONS, 7637*
  - TANNIC ACID, 7451
  - VITAMIN A, 7779

- LUNG
  - SEE RESPIRATORY SYSTEM

- LYMPH
  - EPITHELIUM
    - TRACER STUDY, 7514*
    - TRANSPORT, 7514*
  - ILEUM
    - SECRETION, 7498*
  - INTESTINAL ABSORPTION
    - LIPOPROTEINS, 7497*
  - INTESTINE, SMALL
    - LIPOPROTEINS, 7497*
    - SECRETION, 7498*
  - STOMACH
    - DRAINAGE, 7365
  - TRANSPORT
    - TRACER STUDY, 7514*

- LYMPHATIC SYSTEM
  - NEOPLASMS, MALIGNANT
    - MALABSORPTION SYNDROMES, 7639
  - OBSTRUCTION
    - MALABSORPTION SYNDROMES, 7643
  - STOMACH, 7365

- LYMPHOCYTES
  - CELIAC DISEASE
    - DIAGNOSIS, 7900
  - CROHN'S DISEASE
    - DIAGNOSIS, 7900
  - INFLAMMATORY BOWEL DISEASES
    - DIAGNOSIS, 7900

- LYMPHOMA
  - GASTROINTESTINAL SYSTEM
    - REVIEW, 7669
  - INTESTINE, SMALL
    - MALABSORPTION SYNDROMES, 7643

- LYMPHOMA (continued)
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7643
    - REVIEW, 7643

- LYSOSOMES
  - HEPATITIS, TOXIC
    - TRANQUILIZING AGENTS, 7468
  - LIVER
    - ENZYMES, 7427*
    - TRANQUILIZING AGENTS, 7468
    - UREMIA, 7453
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 7468

- LYSOZYMES
  - COLITIS, ULCERATIVE
    - DIAGNOSIS, 7718*
  - CROHN'S DISEASE
    - DIAGNOSIS, 7718*

- MAGNESIUM
  - LIVER DISEASES
    - METABOLISM, 7793

- MALABSORPTION SYNDROMES
  - ALBUMINS
    - DISEASES ASSOCIATED WITH, 7648
  - BACTERIAL INFECTIONS, 7642
  - BILE ACIDS AND SALTS
    - CHILD, 7756
    - METABOLISM, 7756
  - CHILD
    - REVIEW, 7654
  - CLASSIFICATION
    - REVIEW, 7655
  - DIAGNOSIS
    - BILE ACIDS AND SALTS, 7756
    - REVIEW, 7650
  - DIARRHEA, 7642
  - DISEASES ASSOCIATED WITH
    - CHOLERA, 7644
    - DIABETES, 7644
    - GASTROENTERITIS, 7644
    - LYMPHOMA, 7643
    - NEOPLASMS, MALIGNANT, 7644
    - SPRUE, TROPICAL, 7644
    - TUBERCULOSIS, 7643
  - GIARDIASIS
    - VITAMIN B12, 7892*
  - IMMUNOLOGY
    - REVIEW, 7652
  - INTESTINE, SMALL
    - BACTERIA, 7653
    - LYMPHOMA, 7643
    - OBSTRUCTION, 7643
    - TUBERCULOSIS, 7643
  - INTESTINES
    - CELLS, 7656
    - MORPHOLOGY, 7656
  - LACTOSE
    - EPIDEMIOLOGY, 7645
    - ETHNIC FACTORS, 7645
    - GENETIC FACTORS, 7646
    - GEOGRAPHICAL FACTORS, 7646
    - REVIEW, 7646, 7647
    - SOCIOECONOMIC FACTORS, 7645

- MALABSORPTION SYNDROMES (continued)
  - LYMPHATIC SYSTEM
    - NEOPLASMS, MALIGNANT, 7639
    - OBSTRUCTION, 7643
  - LYMPHOMA
    - REVIEW, 7643
  - PATHOLOGY
    - REVIEW, 7651
  - PROTEINS
    - DISEASES ASSOCIATED WITH, 7648
  - REVIEW, 7656
  - SHUNT, INTESTINAL
    - COMPLICATIONS, 7630
  - STOMACH
    - SURGERY, 7638*
  - SUCROSE
    - REVIEW, 7649
  - THERAPY, 7866
  - VITAMIN B12, 7640

- MALLORY-WEISS SYNDROME
  - ALCOHOLISM, 7563
  - ENDOSCOPY, 7563
  - HEMORRHAGE, 7563
  - VOMITING, 7563

- MALNUTRITION
  - SEE NUTRITION DISORDERS

- MANOMETRY
  - ANORECTUM
    - CHILD, 7698
    - NEONATE, 7698
  - ESOPHAGEAL REFLUX
    - ESOPHAGITIS, 7554*
  - ESOPHAGUS
    - ESOPHAGEAL REFLUX, 7554*
    - ESOPHAGITIS, 7554*
    - SPHINCTER, 7554*
  - HIRSCHSPRUNG'S DISEASE
    - DIAGNOSIS, 7698
  - RECTUM
    - CHILD, 7698
    - NEONATE, 7698

- MEGACOLON
  - SEE ALSO HIRSCHSPRUNG'S DISEASE

- MEGAESOPHAGUS
  - SEE ACHALASIA

- MESENTERY
  - DYSPLASIA
    - ANGIOGRAPHY, 7657*
  - HEMORRHAGE
    - ANGIOGRAPHY, 7657*
    - DYSPLASIA, 7657*

- METALS
  - DUODENUM
    - CADMIUM, 7507
  - INTESTINE, SMALL
    - CADMIUM, 7507

- METASTASIS
  - SEE NEOPLASM METASTASIS

- MICELLES
  - BILE ACIDS AND SALTS, 7445*

- MICROSOMES
  - CHOLERESIS
    - TRANQUILIZING AGENTS, 7414*
  - TRANQUILIZING AGENTS
    - LIVER, 7414*

- MITOCHONDRIA
  - HEPATOCYTES
    - AGE FACTORS, 7418*
    - CHOLELITHIASIS, 7836

- MITOSIS
  - INTESTINE, SMALL
    - DRUG EFFECTS ON, 7500*
    - KINETICS, 7500*

- MONOAMINE OXIDASE
  - LIVER CIRRHOSIS, 7814*
    - BLOOD PLATELETS, 7814*

- MOTILIN
  - INTESTINE, SMALL
    - MOTILITY, 7324
  - SERUM
    - GASTRIN, 7347*
  - STOMACH
    - ACID SECRETION, 7347*
    - CIRCULATION, 7347*

- MOTILITY
  - BREATH TEST
    - HYDROGEN, 7326
  - COLON
    - HYPERTENSION, 7327
  - ESOPHAGEAL REFLUX
    - ESOPHAGITIS, 7554*
  - ESOPHAGUS
    - ESOPHAGEAL REFLUX, 7554*
    - ESOPHAGITIS, 7554*
    - VAGOTOMY, 7574*
  - GALLBLADDER
    - HORMONE EFFECTS ON, 7375*
    - SOMATOSTATIN, 7375*
  - GASTROINTESTINAL SYSTEM
    - BREATH TEST, 7326
  - ILEUM
    - ENKEPHALINS, 7325
  - INTESTINE, SMALL
    - ABSORPTION, 7297*
    - HORMONE EFFECTS ON, 7324
    - MOTILIN, 7324
  - JEJUNUM
    - ELECTROPHYSIOLOGY, 7323
  - ODDI'S SPHINCTER
    - PRESSURE STUDY, 7335
  - STOMACH
    - ANTI-INFLAMMATORY AGENTS, 7329
    - DRUG EFFECTS ON, 7329
    - ELECTROPHYSIOLOGY, 7333, 7334
    - FOOD, 7330
    - GASTRECTOMY, 7593, 7601
    - NERVOUS CONTROL, 7332
    - PRESSURE STUDY, 7331
    - SURGERY, 7593
    - VAGOTOMY, 7322*, 7593

- MOTILITY (continued)
  - VAGOTOMY
    - TECHNIQUES, 7353*

- MUCUS
  - STOMACH
    - KININS, 7355

- MUSCLES
  - COLON
    - HYPERTENSION, 7327
  - INTESTINE, LARGE
    - ELECTROPHYSIOLOGY, 7328
  - INTESTINE, SMALL
    - COLLAGEN, 7488*
    - HISTAMINE, 7494*

- NARCOTICS
  - HEPATITIS
    - DRUG DEPENDENCE, 7764
  - LIVER DISEASES
    - DRUG DEPENDENCE, 7764

- NECROSIS
  - CIRCULATION, 7857
  - HEMORRHAGE, 7857
  - LIVER
    - ANESTHETICS, 7778
    - BACTERIA, 7465
    - DRUG-INDUCED, 7778
    - THROMBOSIS, 7465
  - LIVER DISEASES, ALCOHOLIC
    - ETIOLOGY, 7807*
  - PANCREATIC DISEASES
    - FATS, 7732
  - PANCREATITIS
    - COLON, 7735*

- NEONATE
  - ABSORPTION
    - FATS, 7312
  - ALCOHOLISM, 7442*
  - ANORECTUM
    - MANOMETRY, 7698
  - GALLBLADDER
    - BILE ACIDS AND SALTS, 7396*
  - HYPERBILIRUBINEMIA
    - DRUG-INDUCED, 7772*
    - ETIOLOGY, 7772*
    - REVIEW, 7776
    - THERAPY, 7776
  - INTESTINAL ABSORPTION
    - CADMIUM, 7299*
    - TRANSMISSION, 7304*
  - INTESTINE, SMALL
    - ABSORPTION, 7311, 7312
    - GROWTH FACTORS, 7502
    - HORMONE CONTROL, 7502
    - INTESTINAL ABSORPTION, 7304*
    - THYROID GLAND, 7502
  - INTESTINES
    - BILE ACIDS AND SALTS, 7396*
  - JAUNDICE
    - DRUG-INDUCED, 7772*
    - ETIOLOGY, 7772*
  - LIVER
    - CHYLOMICRONS, 7461
    - ULTRASTRUCTURE, 7461

- NEONATE (continued)
  - RECTUM
    - MANOMETRY, 7698

- NEOPLASM METASTASIS
  - DRUG METABOLISM
    - LIVER FUNCTION TESTS, 7746*
  - LIVER
    - DISEASES ASSOCIATED WITH, 7667
    - RADIONUCLIDES, 7658*
    - SCANNING, SCINTILLATION, 7658*, 7667
  - PANCREAS, 7726*

- NEOPLASMS
  - BACTERIA, 7465
  - CECUM
    - DIAGNOSIS, 7702
    - INFLAMMATION, 7702
    - MORPHOLOGY, 7702
    - RADIOLOGY, 7702
  - COLON
    - BILE ACIDS AND SALTS, 7659*
    - CHOLESTEROL, 7659*
    - ENDOSCOPY, 7704
    - ETIOLOGY, 7659*
    - RADIOLOGY, 7704
    - VILLI, 7676
  - DIAGNOSIS
    - TECHNIQUES, 7568*
  - GASTROINTESTINAL SYSTEM, 7890
    - CHILD, 7569
    - DIAGNOSIS, 7569
    - LAPAROSCOPY, 7569
  - LIVER
    - ANGIOGRAPHY, 7747*
    - ANTINEOPLASTIC AGENTS, 7748*
    - ANTIOXIDANTS, 7425*
    - CARCINOGENS, 7425*
    - CONTRACEPTIVES, ORAL, 7745*
    - L-DOPA, 7474
    - DOPAMINE, 7474
    - DRUG-INDUCED, 7474
    - DRUG METABOLISM, 7746*
    - PHENOBARBITAL, 7425*
  - PANCREAS, 7726*
    - ASCITES, 7724*
    - HEMORRHAGE, 7734*
  - RECTUM
    - INTUSSUSCEPTION, 7708
    - VILLI, 7676
  - SIGMOID
    - INTUSSUSCEPTION, 7708
  - STOMACH
    - DIAGNOSIS, 7568*
    - EPIDEMIOLOGY, 7567*
    - ETHNIC FACTORS, 7567*

- NEOPLASMS, BENIGN
  - INTESTINE, LARGE
    - DIAGNOSIS, 7711
  - LIVER
    - CONTRACEPTIVES, ORAL, 7767
    - DRUG-INDUCED, 7767
    - HYPERTROPHY, 7770
    - THERAPY, 7767
  - SALIVARY GLANDS
    - ADENOSINE TRIPHOSPHATASE, 7296
    - ALKALINE PHOSPHATASE, 7296
    - ULTRASTRUCTURE, 7296

NEOPLASMS, MALIGNANT
  ANORECTUM
    FISSURE, 7672
  ANUS, 7673
  BILE DUCTS
    CYSTS, 7849
    SURGERY, 7825*
  BILIARY TRACT
    CYSTS, 7849
  COLON
    ANEMIA, 7665
    COLOSTOMY, 7523
    COMPLICATIONS, 7705, 7709
    DISEASES ASSOCIATED WITH, 7667
    ENDOSCOPY, 7681
    GROWTH FACTORS, 7681
    RADIONUCLIDES, 7658*
    REVIEW, 7681
    SCANNING, SCINTILLATION, 7658*
  DRUG THERAPY
    REVIEW, 7858
  DUODENUM, 7631
  ESOPHAGUS
    PROGNOSIS, 7564
    RADIOTHERAPY, 7564
    THERAPY, 7564
  GALLBLADDER
    CHOLECYSTECTOMY, 7850
    THERAPY, 7850
  GASTROINTESTINAL SYSTEM
    ANTIGENS, 7862
    DISEASES ASSOCIATED WITH, 7884
    DRUG THERAPY, 7858, 7876
    ENZYMES, 7861
    HORMONES, 7861
    RADIOTHERAPY, 7859
    REVIEW, 7859, 7860
    SURGERY, 7860
  ILEUM
    NERVOUS SYSTEM, 7612
  INTESTINE, LARGE
    DIAGNOSIS, 7711
  INTESTINE, SMALL
    NERVOUS SYSTEM, 7612
  JEJUNUM
    NERVOUS SYSTEM, 7612
  LIVER
    ALCOHOLISM, 7768
    ALPHA FETOPROTEIN, 7762, 7768
    AUSTRALIA ANTIGEN, 7762
    DIAGNOSIS, 7761
    DISEASES ASSOCIATED WITH, 7768
    EPIDEMIOLOGY, 7768
    HYPERTROPHY, 7770
    LAPAROSCOPY, 7761
    LIVER CIRRHOSIS, 7768
  LYMPHATIC SYSTEM
    MALABSORPTION SYNDROMES, 7639
  MALABSORPTION SYNDROMES
    DISEASES ASSOCIATED WITH, 7644
  PANCREAS
    DIAGNOSIS, 7725*
    ENDOSCOPY, 7725*
    ENZYMES, 7861
    HORMONES, 7861
    PANCREATOGRAPHY, 7725*
  RECTUM
    COLOSTOMY, 7523
    DISEASES ASSOCIATED WITH, 7667

NEOPLASMS, MALIGNANT (continued)
  RECTUM (continued)
    DRUG THERAPY, 7703, 7715
  SIGMOID
    COMPLICATIONS, 7705
    DRUG THERAPY, 7715
  STOMACH
    DIAGNOSIS, 7573*

NERVOUS CONTROL
  INTESTINE, SMALL
    SEROTONIN, 7513*
  STOMACH
    ACID SECRETION, 7342*
    CIRCULATION, 7342*
    MOTILITY, 7332

NERVOUS SYSTEM
  ILEUM
    NEOPLASMS, MALIGNANT, 7612
  INTESTINE, SMALL
    NEOPLASMS, MALIGNANT, 7612
  JEJUNUM
    NEOPLASMS, MALIGNANT, 7612

NICOTINE
  STOMACH
    ACID SECRETION, 7348*

NITROGEN
  LIVER
    METABOLISM, 7460
  METABOLISM
    DIETARY FACTORS, 7460
  STOMACH
    SURGERY, 7638*

NOREPINEPHRINE
  STOMACH
    ACID SECRETION, 7342*
    CIRCULATION, 7342*

NUCLEIC ACIDS
  COLON
    ACIDS, 7483*
  LIVER
    REGENERATION, 7423*
  SYNTHESIS
    CELIAC DISEASE, 7635*
    INFLAMMATORY BOWEL DISEASES, 7635*

NUTRITION
  GASTROINTESTINAL DISEASES
    CHILD, 7883
    INFANT, 7883

NUTRITION DISORDERS
  ALBUMINS, 7524
  DIAGNOSIS
    CHILD, 7887
  DIARRHEA
    INFANT, 7853*
  INFANT
    PARENTERAL ALIMENTATION, 7853*
    THERAPY, 7853*
  INTESTINE, SMALL
    ENZYMES, 7632
  SERUM
    PROTEINS, 7856*

- NUTRITION DISORDERS (continued)
  - STOMACH
    - ACID SECRETION, 7873
    - SURGERY, 7638*
  - THERAPY
    - PARENTERAL ALIMENTATION, 7853*

- OBESITY
  - BILE ACIDS AND SALTS
    - METABOLISM, 7459
  - SHUNT, INTESTINAL
    - ALKALINE PHOSPHATASE, 7625
    - ARTHRITIS, 7629
    - COMPLICATIONS, 7629, 7630
    - LIVER FUNCTION TESTS, 7625
    - PROGNOSIS, 7622
  - SURGERY
    - REVIEW, 7630
    - SHUNT, INTESTINAL, 7623, 7624
  - THERAPY
    - REVIEW, 7630
    - SHUNT, INTESTINAL, 7623, 7624, 7630

- OBSTRUCTION
  - BILIARY TRACT
    - CHOLELITHIASIS, 7847
    - DIAGNOSIS, 7823*
    - ULTRASONOGRAPHY, 7823*, 7845
  - COLON
    - COMPLICATIONS, 7709
  - DUODENUM
    - CHILD, 7611
    - SURGERY, 7611
  - INTESTINE, SMALL
    - MALABSORPTION SYNDROMES, 7643
  - INTESTINES
    - PSYCHOLOGICAL FACTORS, 7628
  - LYMPHATIC SYSTEM
    - MALABSORPTION SYNDROMES, 7643

- OBSTRUCTIVE JAUNDICE
  - SEE JAUNDICE, OBSTRUCTIVE

- ODDI'S SPHINCTER
  - MOTILITY
    - PRESSURE STUDY, 7335
  - STENOSIS
    - SURGERY, 7838

- ORAL CONTRACEPTIVES
  - SEE CONTRACEPTIVES, ORAL

- ORGAN CULTURE
  - INTESTINE, SMALL
    - GLUCOSE, 7300*
    - METABOLISM, 7300*

- OXIDATION
  - CECUM
    - BACTERIA, 7509*
  - LIVER
    - ALCOHOLS, 7410*
    - FATTY ACIDS, 7482

- OXIDOREDUCTASES
  - LIVER
    - CARBON TETRACHLORIDE, 7406*
  - LIVER INJURY
    - DRUG-INDUCED, 7406*

- OXYGEN
  - ABDOMEN
    - SURGERY, 7583

- PAIN
  - PANCREAS, 7733

- PANCREAS
  - ALCOHOLISM
    - PARASYMPATHOMIMETICS, 7367*
  - ANEURYSM
    - HEMORRHAGE, 7734*
  - ANOMALY
    - HEMORRHAGE, 7734*
  - ASCITES
    - ETIOLOGY, 7724*
    - NEOPLASMS, 7724*
    - PANCREATOGRAPHY, 7724*
  - BICARBONATE SECRETION
    - ALCOHOLS, 7368*
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7368*, 7372*, 7731
    - HYPERGLYCEMIA, 7380
  - CALCIUM
    - SYMPATHOMIMETICS, 7369*
  - CYSTS
    - DIAGNOSIS, 7727
    - ENDOSCOPY, 7727
    - PANCREATOGRAPHY, 7727
  - DISEASE
    - ANGIOGRAPHY, 7608*
  - DRUG EFFECTS ON
    - ALKALOIDS, 7371*
  - DUODENUM
    - DISEASE, 7608*
  - ENZYMES
    - CIRCADIAN RHYTHM, 7377
    - DIETARY FACTORS, 7377
    - HORMONE EFFECTS ON, 7373*
    - SECRETION, 7723*
    - SYMPATHOMIMETICS, 7369*
  - FISTULA, 7828
    - SURGERY, 7729
  - GUANYL CYCLASE
    - ALCOHOLS, 7338*
  - INFLAMMATION
    - FISTULA, 7729
    - STEROIDS, 7736*
  - LIPASE
    - CIRCADIAN RHYTHM, 7377
    - DIETARY FACTORS, 7377
  - NEOPLASM METASTASIS, 7726*
  - NEOPLASMS, 7726*
    - HEMORRHAGE, 7734*
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 7725*
    - ENDOSCOPY, 7725*
    - ENZYMES, 7861
    - HORMONES, 7861
    - PANCREATOGRAPHY, 7725*
  - PAIN, 7733

- PANCREAS (continued)
  - PEPTIDASE
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - PROTEINS
    - HORMONE EFFECTS ON, 7373*
    - SYMPATHOMIMETICS, 7369*
  - SECRETIN
    - METABOLISM, 7381
    - PLASMA, 7374*
    - TECHNIQUES, 7374*
  - SECRETION
    - ALCOHOLS, 7368*
    - AMYLASES, 7370*
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7368*, 7370*, 7371*, 7372*, 7570, 7731
    - ENZYMES, 7371*, 7731
    - GASTRECTOMY, 7571
    - HORMONE EFFECTS ON, 7375*
    - HYPERGLYCEMIA, 7380
    - MORPHOLOGY, 7366*
    - PROTEINS, 7376, 7380
    - SECRETIN, 7374*
    - TRYPSIN, 7723*
  - TRYPSIN
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
    - INTESTINE, SMALL, 7723*
  - ULCER, PEPTIC, 7602
  - ULTRASONOGRAPHY
    - TECHNIQUES, 7547
  - WOUNDS AND INJURIES
    - FISTULA, 7729

- PANCREATECTOMY
  - PANCREATITIS, CHRONIC
    - PROGNOSIS, 7739

- PANCREATIC DISEASES
  - ANGIOGRAPHY
    - HEMORRHAGE, 7734*
  - DIAGNOSIS
    - ULTRASONOGRAPHY, 7547
  - DUODENUM
    - ENZYMES, 7722*
  - NECROSIS
    - FATS, 7732
  - TRANSPORT
    - FATTY ACIDS, 7316

- PANCREATIC DUCT
  - WOUNDS AND INJURIES
    - IATROGENESIS, 7589

- PANCREATITIS
  - COLON
    - DISEASES ASSOCIATED WITH, 7735*
    - INFLAMMATION, 7735*
    - NECROSIS, 7735*
  - COMPLICATIONS
    - FISTULA, 7728
    - PSEUDOCYSTS, 7728
  - GASTRECTOMY
    - COMPLICATIONS, 7571

- PANCREATITIS, CHRONIC
  - ABDOMEN
    - HEMORRHAGE, 7734*
  - BICARBONATE SECRETION
    - DRUG EFFECTS ON, 7731
  - CLASSIFICATION, 7737
  - COMPLICATIONS, 7740
  - DIGESTION, 7740
  - FECES
    - FATS, 7740
  - MORPHOLOGY, 7738
  - PANCREATECTOMY
    - PROGNOSIS, 7739
  - PATHOLOGY, 7738
  - SECRETION, 7730
    - DRUG EFFECTS ON, 7731
    - ENZYMES, 7731
  - SURGERY, 7737
    - PROGNOSIS, 7739

- PANCREATOGRAPHY
  - ENDOSCOPY
    - CHOLANGIOGRAPHY, 7539
  - PANCREAS
    - ASCITES, 7724*
    - CYSTS, 7727
    - NEOPLASMS, MALIGNANT, 7725*

- PARASYMPATHOLYTICS
  - IRRITABLE COLON
    - DRUG THERAPY, 7671

- PARASYMPATHOMIMETICS
  - PANCREAS
    - ALCOHOLISM, 7367*

- PARATYPHOID FEVERS
  - SEE SALMONELLOSIS

- PARENTERAL ALIMENTATION
  - GASTROINTESTINAL SYSTEM
    - AMINO ACIDS, 7361
  - INTESTINE, SMALL
    - FISTULA, 7618
  - INTESTINES, 7504
  - NUTRITION DISORDERS
    - INFANT, 7853*
    - THERAPY, 7853*

- PEPSIN
  - DUODENUM
    - ULCER, PEPTIC, 7594
  - SECRETION
    - ULCER, PEPTIC, 7594
  - STOMACH
    - SECRETION, 7362

- PEPTIC ULCER
  - SEE ULCER, PEPTIC

- PEPTIDASE
  - FECES
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - PANCREAS
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378

- PEPTIDES
    - INTESTINE, SMALL
        - ABSORPTION, 7499*
        - TRANSPORT, 7499*
    - JEJUNUM
        - ABSORPTION, 7499*
        - TRANSPORT, 7499*

- PERFORATION
    - AORTA
        - ANEURYSM, 7556
    - APPENDICITIS
        - COMPLICATIONS, 7699, 7701
    - BILIARY TRACT
        - CHILD, 7843
    - COLON, 7584
        - UROGENITAL SYSTEM, 7705
    - DUODENUM
        - PROGNOSIS, 7595
        - SURGERY, 7595
        - SURVIVAL, 7595
        - THERAPY, 7595
        - ULCER, PEPTIC, 7595
    - GASTROINTESTINAL SYSTEM
        - WOUNDS AND INJURIES, 7621
    - INTESTINES
        - COMPLICATIONS, 7621
        - FOREIGN BODIES, 7621
        - SURGERY, 7621
        - WOUNDS AND INJURIES, 7621
    - JEJUNUM, 7584
    - SIGMOID
        - UROGENITAL SYSTEM, 7705
    - STOMACH, 7584
        - COMPLICATIONS, 7621
        - FOREIGN BODIES, 7621
        - SURGERY, 7621
        - WOUNDS AND INJURIES, 7621
    - ULCER, PEPTIC
        - PROGNOSIS, 7595
        - SURGERY, 7595
        - SURVIVAL, 7595
        - THERAPY, 7595

- PERFUSION
    - COLON
        - ACIDS, 7483*
    - INTESTINE, SMALL
        - BLOOD, 7489*
        - ENZYMES, 7489*

- PERINEUM
    - WOUNDS AND INJURIES
        - THERAPY, 7899

- PERISTALSIS
    - COLON
        - CATECHOLAMINES, 7321*

- PETIDASE
    - SEE PEPTIDE HYDROLASES

- PHENOBARBITAL
    - GILBERT'S DISEASE
        - DRUG METABOLISM, 7775
    - HEPATOCYTES, 7415*
    - LIVER
        - NEOPLASMS, 7425*

- PHOSPHATES
    - ENEMA
        - COMPLICATIONS, 7683

- PHOSPHOLIPIDS
    - BILIARY TRACT
        - SECRETION, 7398*
    - CHOLESTEROL
        - BILE, 7398*
        - FATTY ACIDS, 7398*
        - LIVER, 7398*
        - SERUM, 7398*

- PHOSPHORYLATION, OXIDATIVE
    - SEE OXIDATIVE PHOSPHORYLATION

- PIGMENTS
    - GALLSTONES
        - CHEMICAL COMPOSITION, 7826*
        - CHEMICAL PROPERTIES, 7826*
        - CHROMATOGRAPHY, 7826*

- PLASMA
    - INTESTINAL ABSORPTION
        - VITAMIN D, 7609*
    - PANCREAS
        - SECRETIN, 7374*

- PLATELETS
    - SEE BLOOD PLATELETS

- POLYPS
    - BILE ACIDS AND SALTS
        - CHOLESTEROL, 7659*
        - ETIOLOGY, 7659*
    - COLON, 7668
        - DIAGNOSIS, 7544
        - ENDOSCOPY, 7544, 7670, 7681, 7682
        - INFANT, 7710
        - RADIOLOGY, 7544
        - REVIEW, 7681, 7682
    - INTESTINE, LARGE
        - DIAGNOSIS, 7711
        - ENDOSCOPY, 7669
    - SIGMOID
        - INFANT, 7710

- PORPHYRIA
    - ENZYMES, 7822
    - IRON
        - PATHOLOGY, 7755*
    - LIVER FUNCTION TESTS, 7822
    - METABOLISM
        - REVIEW, 7754*
    - PHLEBOTOMY
        - DIABETES, 7753*
        - PORPHYRINS, 7753*
        - SURVIVAL, 7753*
        - THERAPY, 7753*
    - PORPHYRIN
        - EXCRETION, 7754*
        - METABOLISM, 7754*

- PORPHYRINS
    - LIVER
        - METABOLISM, 7435*
        - STEROIDS, 7435*

- PORPHYRINS (continued)
    - PORPHYRIA
        - EXCRETION, 7754*
        - METABOLISM, 7754*
        - PHLEBOTOMY, 7753*

- PORTAL HYPERTENSION
    - SEE HYPERTENSION, PORTAL

- POTASSIUM
    - SALIVARY GLANDS
        - SECRETION, 7336*, 7337*
    - SECRETION
        - CATECHOLAMINES, 7336*

- PRECANCEROUS CONDITIONS
    - COLON
        - ENDOSCOPY, 7681
        - REVIEW, 7681

- PREGNANCY
    - ALCOHOLISM, 7442*
    - JAUNDICE, CHRONIC IDIOPATHIC, 7774*

- PROCTOCOLITIS
    - BIOPSY, 7696
    - ETIOLOGY, 7696

- PROSTAGLANDINS
    - STOMACH
        - ACID SECRETION, 7363

- PROTEASE
    - SEE PEPTIDE HYDROLASES

- PROTEINS
    - ABSORPTION
        - EMBRYOLOGY, 7309
        - FETUS, 7309
    - DUODENUM
        - CADMIUM, 7507
    - INTESTINAL ABSORPTION
        - TRANSMISSION, 7304*
    - INTESTINE, SMALL
        - CADMIUM, 7507
    - JEJUNUM
        - FETUS, 7309
    - LIVER
        - ALCOHOLISM, 7442*
        - ALCOHOLS, 7439*
        - BINDING, 7422*
        - LIPOGENESIS, 7417*
        - SYNTHESIS, 7387*, 7442*
    - LIVER CIRRHOSIS
        - ERYTHROCYTES, 7812*
    - LIVER DISEASES
        - METABOLISM, 7793
    - LIVER DISEASES, ALCOHOLIC
        - SECRETION, 7806*
        - SYNTHESIS, 7806*
    - MALABSORPTION SYNDROMES
        - DISEASES ASSOCIATED WITH, 7648
    - METABOLISM
        - SHUNT, INTESTINAL, 7630
    - NUTRITION DISORDERS
        - SERUM, 7856*

- PROTEINS (continued)
    - PANCREAS
        - HORMONE EFFECTS ON, 7373*
        - SECRETION, 7376, 7380
        - SYMPATHOMIMETICS, 7369*
    - SECRETION
        - HORMONE CONTROL, 7376
        - HYPERGLYCEMIA, 7380
        - SECRETIN, 7376
    - SYNTHESIS
        - ALCOHOLISM, 7442*
    - TRANSMISSION
        - CIRCULATION, 7304*

- PSEUDOCYSTS
    - PANCREATITIS
        - COMPLICATIONS, 7728

- PSEUDOTUMORS
    - GASTROINTESTINAL SYSTEM
        - CHILD, 7569
        - DIAGNOSIS, 7569
        - LAPAROSCOPY, 7569

- PYLOROPLASTY
    - STOMACH
        - ACID SECRETION, 7364
        - GASTRIN, 7364

- PYLORUS
    - INTRINSIC FACTOR, 7495*
    - SPHINCTER
        - ANTI-INFLAMMATORY AGENTS, 7329
        - DRUG EFFECTS ON, 7329

- RADIOIMMUNOASSAY
    - AUSTRALIA ANTIGEN
        - ANTIBODIES, 7785*
        - TECHNIQUES, 7785*

- RADIOLOGY
    - APPENDICITIS
        - CHILD, 7666
    - BILIARY TRACT
        - CYSTS, 7841
    - CECUM
        - NEOPLASMS, 7702
    - COLON
        - ANOMALY, CONGENITAL, 7690, 7691
        - DIVERTICULUM, 7692
        - MALROTATION, 7690
        - NEOPLASMS, 7704
        - POLYPS, 7544
        - TECHNIQUES, 7864
    - COLONIC DISEASES
        - DIAGNOSIS, 7695
    - DUODENUM
        - ANOMALY, 7610, 7619
    - GASTROINTESTINAL DISEASES
        - DIAGNOSIS, 7538
        - ENDOSCOPY, 7538
        - REVIEW, 7538
    - SIGMOID
        - DIVERTICULUM, 7692
    - STOMACH
        - TECHNIQUES, 7548

- RADIONUCLIDES
  - COLON
    - NEOPLASMS, MALIGNANT, 7658*
  - LIVER
    - CHROMATOGRAPHY, 7386*
    - CLEARANCE STUDY, 7386*
    - NEOPLASM METASTASIS, 7658*
    - SCANNING, SCINTILLATION, 7421*
    - TOLERANCE, 7386*
    - TRANSPORT, 7385*

- RADIOTHERAPY
  - ESOPHAGUS
    - NEOPLASMS, MALIGNANT, 7564
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, MALIGNANT, 7859
    - REVIEW, 7859

- RECTUM
  - SEE ALSO ANORECTUM, ANUS
  - BIOPSY
    - INFLAMMATORY BOWEL DISEASES, 7551
  - ENTERECTOMY
    - COMPLICATIONS, 7714
  - FISTULA
    - IATROGENESIS, 7713
  - INTUSSUSCEPTION
    - ETIOLOGY, 7708
    - NEOPLASMS, 7703
  - MANOMETRY
    - CHILD, 7698
    - NEONATE, 7698
  - NEOPLASMS, MALIGNANT
    - COLOSTOMY, 7523
    - DISEASES ASSOCIATED WITH, 7667
    - DRUG THERAPY, 7703, 7715
  - SURGERY, 7716
    - ANTIBIOTICS, 7662*
    - TECHNIQUES, 7664*
  - VILLI
    - NEOPLASMS, 7676
  - WOUNDS AND INJURIES
    - IATROGENESIS, 7713

- REFLUX
  - STOMACH
    - ANTI-INFLAMMATORY AGENTS, 7329
    - DRUG EFFECTS ON, 7329

- REGIONAL ENTERITIS
  - SEE ENTERITIS, REGIONAL

- RESPIRATORY SYSTEM
  - ALCOHOLISM
    - REVIEW, 7810

- REYE'S SYNDROME
  - DIAGNOSIS, 7760
  - THERAPY, 7760

- RUPTURE
  - ESOPHAGUS, 7566

- SALICYLATES
  - METABOLISM, 7512*

- SALIVARY GLANDS
  - ADENOSINE TRIPHOSPHATASE, 7296
  - ALKALINE PHOSPHATASE, 7296
  - CALCIUM
    - ADRENERGIC RECEPTOR AGONISTS, 7340
    - IONOPHORES, 7341
  - CELLS
    - GROWTH FACTORS, 7295
    - MORPHOLOGY, 7295
  - DISEASE
    - CHILD, 7882
  - ION TRANSPORT
    - CALCIUM, 7340
  - NEOPLASMS, BENIGN
    - ADENOSINE TRIPHOSPHATASE, 7296
    - ALKALINE PHOSPHATASE, 7296
    - ULTRASTRUCTURE, 7296
  - PERMEABILITY
    - CALCIUM, 7340
  - SECRETION
    - AMYLASES, 7341
    - CALCIUM, 7341
    - POTASSIUM, 7336*, 7337*
  - TRANSPORT
    - CALCIUM, 7340
  - ULTRASTRUCTURE, 7296

- SALMONELLOSIS
  - BACTERIA, 7522
  - EPIDEMIOLOGY, 7865

- SCANNING, SCINTILLATION
  - BILIARY TRACT
    - FOOD, 7844
  - COLON
    - CATHARTICS, 7697
    - NEOPLASMS, MALIGNANT, 7658*
    - TECHNIQUES, 7697
  - LIVER
    - NEOPLASM METASTASIS, 7658*, 7667
    - RADIONUCLIDES, 7421*
    - WOUNDS AND INJURIES, 7530*
  - LIVER INJURY
    - DIAGNOSIS, 7530*
  - SPLEEN
    - WOUNDS AND INJURIES, 7530*

- SCHISTOSOMIASIS
  - IMMUNITY
    - FASCIOLIASIS, 7467

- SCLEROSIS
  - INTESTINE, SMALL
    - ANTIGENS, 7891
    - VIRUSES, 7877, 7891
  - JEJUNUM
    - ANTIGENS, 7891
    - VIRUSES, 7877, 7891

- SECRETIN
  - PANCREAS
    - METABOLISM, 7391
    - PLASMA, 7374*
    - SECRETION, 7374*
    - TECHNIQUES, 7374*
  - SECRETION
    - PROTEINS, 7376

- SECRETIN (continued)
  - SERUM
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7372*

- SECRETION
  - SEE ALSO ACID SECRETION. BICARBONATE SECRETION, HYPERCHLORHYDRIA
  - AMYLASES
    - DRUG EFFECTS ON, 7370*
  - ANTRUM
    - GASTRIN, 7349*, 7350*
  - BILIARY TRACT
    - BILE, 7390*
    - FATS, 7390*
    - PHOSPHOLIPIDS, 7398*
  - COLON
    - ACIDS, 7483*
    - CELLS, 7693
  - DUODENUM
    - CELLS, 7288*
    - ULCER, PEPTIC, 7594
  - GASTRIN
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7350*
    - FEEDING, 7364
    - PYLOROPLASTY, 7364
    - VAGOTOMY, 7364
  - ILEUM
    - LYMPH, 7498*
  - INTESTINE, SMALL
    - CELLS, 7288*
    - DEFICIENCY, 7290*
    - DILATATION, 7290*
    - HYPERTROPHY, 7290*
    - LYMPH, 7498*
    - MORPHOLOGY, 7290*
  - LIPASE
    - ULCER, PEPTIC, 7594
  - LIVER DISEASES, ALCOHOLIC
    - PROTEINS, 7806*
  - PANCREAS
    - ALCOHOLS, 7368*
    - AMYLASES, 7370*
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7368*, 7370*, 7371*, 7372*, 7570, 7731
    - ENZYMES, 7371*, 7723*, 7731
    - GASTRECTOMY, 7571
    - HORMONE EFFECTS ON, 7375*
    - HYPERGLYCEMIA, 7380
    - MORPHOLOGY, 7366*
    - PROTEINS, 7376, 7380
    - SECRETIN, 7374*
    - TRYPSIN, 7723*
  - PANCREATITIS, CHRONIC, 7730
    - DRUG EFFECTS ON, 7731
    - ENZYMES, 7731
  - PEPSIN
    - ULCER, PEPTIC, 7594
  - POTASSIUM
    - CATECHOLAMINES, 7336*
  - PROTEINS
    - HORMONE CONTROL, 7376
    - HYPERGLYCEMIA, 7380
    - SECRETIN, 7376
  - SALIVARY GLANDS
    - AMYLASES, 7341

- SECRETION (continued)
  - SALIVARY GLANDS (continued)
    - CALCIUM, 7341
    - POTASSIUM, 7336*, 7337*
  - STOMACH
    - CARBONATES, 7360
    - DRUG EFFECTS ON, 7360
    - GASTRIN, 7349*, 7350*, 7364
    - HIATAL HERNIA, 7559
    - HORMONE EFFECTS ON, 7347*, 7375*
    - PEPSIN, 7362
  - TRANQUILIZING AGENTS
    - BILE, 7414*

- SEPSIS
  - ENTERECTOMY
    - COMPLICATIONS, 7686
  - INTESTINE, LARGE
    - ANEURYSM, 7686

- SEROTONIN
  - INTESTINE, SMALL
    - HISTOCHEMISTRY, 7513*
    - NERVOUS CONTROL, 7513*

- SERUM
  - AMYLASES
    - TECHNIQUES, 7560
  - BILE ACIDS AND SALTS
    - ISOLATION, 7520
  - CHOLESTEROL
    - PHOSPHOLIPIDS, 7398*
  - GASTRIN
    - CIRCADIAN RHYTHM, 7575
    - HORMONE EFFECTS ON, 7347*
    - MOTILIN, 7347*
    - VAGOTOMY, 7603
  - HEPATITIS
    - GLYCOPROTEINS, 7790*
  - LIVER DISEASES
    - BILE ACIDS AND SALTS, 7528*, 7743*
  - NUTRITION DISORDERS
    - PROTEINS, 7856*
  - SECRETIN
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7372*
  - SHUNT, INTESTINAL
    - ELECTROLYTES, 7625
  - ULCER, PEPTIC
    - FIBRINOGEN, 7597
    - GASTRIN, 7575, 7598
    - HORMONES, 7598
    - INSULIN, 7598
    - KININS, 7597
    - TRYPSIN, 7597

- SHORT BOWEL SYNDROME
  - ENTERECTOMY
    - OSTEOMALACIA, 7641
  - OSTEOMALACIA
    - THERAPY, 7641
    - VITAMIN D, 7641

- SHUNT, INTESTINAL
  - CARBOHYDRATES
    - METABOLISM, 7630
  - COMPLICATIONS
    - FATTY LIVER, 7630
    - LIVER INJURY, 7637*

- SHUNT, INTESTINAL (continued)
  - COMPLICATIONS (continued)
    - MALABSORPTION SYNDROMES, 7630
    - REVIEW, 7630
  - FATS
    - METABOLISM, 7630
  - LIVER INJURY
    - AMINO ACIDS, 7637*
  - OBESITY
    - ALKALINE PHOSPHATASE, 7625
    - ARTHRITIS, 7629
    - COMPLICATIONS, 7629, 7630
    - LIVER FUNCTION TESTS, 7625
    - PROGNOSIS, 7622
    - SURGERY, 7623, 7624
    - THERAPY, 7623, 7624, 7630
  - PROTEINS
    - METABOLISM, 7630
  - SERUM
    - ELECTROLYTES, 7625

- SIGMOID
  - DIVERTICULUM
    - RADIOLOGY, 7692
  - ENTERECTOMY
    - COMPLICATIONS, 7686
  - FISTULA
    - IATROGENESIS, 7713
    - UROGENITAL SYSTEM, 7705
  - ILEUM
    - FISTULA, 7898
  - INTUSSUSCEPTION
    - ETIOLOGY, 7708
    - NEOPLASMS, 7708
  - NEOPLASMS, MALIGNANT
    - COMPLICATIONS, 7705
    - DRUG THERAPY, 7715
  - PERFORATION
    - UROGENITAL SYSTEM, 7705
  - POLYPS
    - INFANT, 7710
  - SURGERY
    - COMPLICATIONS, 7686
  - WOUNDS AND INJURIES
    - IATROGENESIS, 7713

- SMALL INTESTINE
  - SEE INTESTINE, SMALL

- SOMATOSTATIN
  - DUODENUM
    - ULCER, 7519
  - GALLBLADDER
    - MOTILITY, 7375*
  - STOMACH
    - ACID SECRETION, 7375*
    - CIRCULATION, 7375*

- SPHINCTER
  - ESOPHAGUS
    - ESOPHAGEAL REFLUX, 7358, 7554*
    - ESOPHAGITIS, 7554*
    - MANOMETRY, 7554*
    - VAGOTOMY, 7574*
  - PYLORUS
    - ANTI-INFLAMMATORY AGENTS, 7329
    - DRUG EFFECTS ON, 7329

- SPLEEN
  - WOUNDS AND INJURIES
    - DIAGNOSIS, 7530*
    - SCANNING, SCINTILLATION, 7530*

- SPRUE, TROPICAL
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7644

- STARVATION
  - BILE DUCTS
    - BILE ACIDS AND SALTS, 7394*
  - CECUM
    - BILE ACIDS AND SALTS, 7394*
  - CHOLECYSTECTOMY
    - BILE ACIDS AND SALTS, 7394*
  - INTESTINE, SMALL
    - BILE ACIDS AND SALTS, 7394*
  - LIVER
    - BILE ACIDS AND SALTS, 7394*

- STEATOSIS
  - SEE FATTY LIVER

- STENOSIS
  - COLON
    - COMPLICATIONS, 7709
  - ESOPHAGUS
    - BLEEDING, 7556
    - DIAGNOSIS, 7556
    - DISEASES ASSOCIATED WITH, 7557
    - ETIOLOGY, 7556
  - ODDI'S SPHINCTER
    - SURGERY, 7838
  - VATER'S AMPULLA
    - ASCARIASIS, 7894

- STEROIDS
  - ABSORPTION
    - ANTACIDS, 7359
  - DUODENUM
    - ULCER, PEPTIC, 7582
  - LIVER
    - PORPHYRINS, 7435*
  - PANCREAS
    - INFLAMMATION, 7736*

- STOMACH
  - ABSORPTION
    - H2 RECEPTOR ANTAGONISTS, 7357
  - ACID SECRETION, 7343*, 7363
    - BILE, 7390*
    - DRUG EFFECTS ON, 7345*, 7357, 7363
    - DUODENUM, 7600
    - ESOPHAGEAL REFLUX, 7358
    - FATS, 7390*
    - FEEDING, 7364
    - H2 RECEPTOR ANTAGONISTS, 7357
    - HORMONE CONTROL, 7342*
    - HORMONE EFFECTS ON, 7347*, 7375*
    - MOTILIN, 7347*
    - NERVOUS CONTROL, 7342*
    - NICOTINE, 7348*
    - NOREPINEPHRINE, 7342*
    - NUTRITION DISORDERS, 7873
    - PROSTAGLANDINS, 7363
    - PYLOROPLASTY, 7364
    - SOMATOSTATIN, 7375*
    - VAGOTOMY, 7364, 7603

STOMACH (continued)
- CIRCULATION
  - HORMONE CONTROL, 7342*
  - HORMONE EFFECTS ON, 7347*, 7375*
  - MOTILIN, 7347*
  - NERVOUS CONTROL, 7342*
  - NOREPINEPHRINE, 7342*
  - SOMATOSTATIN, 7375*
- DRUG EFFECTS ON
  - H2 RECEPTOR ANTAGONISTS, 7360
- ELECTROPHYSIOLOGY
  - ANALGESICS AND ANTIPYRETICS, 7333
  - ANESTHETICS, 7315
  - ASPIRIN, 7333, 7334
  - DRUG EFFECTS ON, 7315, 7333, 7334
  - H2 RECEPTOR ANTAGONISTS, 7334
- EPITHELIUM
  - ANTACIDS, 7346*
- FISTULA, 7584
- GASTRIN
  - FEEDING, 7364
  - PYLOROPLASTY, 7364
  - VAGOTOMY, 7364
- GLYCOLIPIDS
  - CHEMICAL COMPOSITION, 7351*
  - HAPTENS, 7356
  - ISOLATION, 7351*
- GUANYL CYCLASE
  - ALCOHOLS, 7338*
- H2 RECEPTOR ANTAGONISTS
  - REVIEW, 7357
- INTRINSIC FACTOR, 7495*
- ION TRANSPORT, 7354
  - ANESTHETICS, 7315
  - DRUG EFFECTS ON, 7315
- LACTATES
  - METABOLISM, 7339*
  - SYNTHESIS, 7339*
- LYMPH
  - DRAINAGE, 7365
- LYMPHATIC SYSTEM, 7365
- MORPHOMETRY
  - ULCER, PEPTIC, 7599
- MOTILITY
  - ANTI-INFLAMMATORY AGENTS, 7329
  - DRUG EFFECTS ON, 7329
  - ELECTROPHYSIOLOGY, 7333, 7334
  - FOOD, 7330
  - GASTRECTOMY, 7593, 7601
  - NERVOUS CONTROL, 7332
  - PRESSURE STUDY, 7331
  - SURGERY, 7593
  - VAGOTOMY, 7322*, 7593
- MUCUS
  - KININS, 7355
- NEOPLASMS
  - DIAGNOSIS, 7568*
  - EPIDEMIOLOGY, 7567*
  - ETHNIC FACTORS, 7567*
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 7573*
- PERFORATION, 7584
  - COMPLICATIONS, 7621
  - FOREIGN BODIES, 7621
  - SURGERY, 7621
- RADIOLOGY
  - TECHNIQUES, 7548
- REFLUX
  - ANTI-INFLAMMATORY AGENTS, 7329

STOMACH (continued)
- REFLUX (continued)
  - DRUG EFFECTS ON, 7329
- SECRETION
  - CARBONATES, 7360
  - DRUG EFFECTS ON, 7360
  - GASTRIN, 7349*, 7350*, 7364
  - HIATAL HERNIA, 7559
  - HORMONE EFFECTS ON, 7347*, 7375*
  - PEPSIN, 7362
- SURGERY
  - FATS, 7638*
  - MALABSORPTION SYNDROMES, 7638*
  - METABOLISM, 7638*
  - NITROGEN, 7638*
  - NUTRITION DISORDERS, 7638*
- TRANSPORT
  - GLYCOPROTEINS, 7352*
- ULCER
  - ACIDS, 7516
  - PREVENTION, 7516
  - ZINC, 7517
- ULCER, PEPTIC
  - DRUG THERAPY, 7573*
  - VAGOTOMY, 7585
- ULTRASONOGRAPHY
  - TECHNIQUES, 7546
- ULTRASTRUCTURE
  - ULCER, PEPTIC, 7599
- WOUNDS AND INJURIES
  - PERFORATION, 7621

STRESS
- CITRATES
  - METABOLISM, 7450
  - SURGERY, 7450
- LIVER
  - CITRATES, 7450
  - GLYCOGEN, 7457
  - HYPOTHERMIA, 7457
  - ULTRASTRUCTURE, 7457
- ULCER
  - CIRCULATION, 7357
  - HEMORRHAGE, 7857

STRICTURE
- INTESTINE, SMALL
  - DIAGNOSIS, 7607*
  - ISCHEMIA, 7607*

SUCRASE
- INTESTINES
  - IMMUNOCHEMISTRY, 7492*

SUCROSE
- MALABSORPTION SYNDROMES
  - REVIEW, 7649

SUGAR
- SEE CARBOHYDRATES

SULFOBROMOPHTHALEIN
- BILIARY TRACT
  - MARKER STUDY, 7420*

- SYMPATHOMIMETICS
  - PANCREAS
    - CALCIUM, 7369*
    - ENZYMES, 7369*
    - PROTEINS, 7369*

- THIAMINE
  - SEE VITAMIN B1

- THROMBOSIS
  - LIVER
    - BACTERIA, 7465
    - NECROSIS, 7465

- THYROID GLAND
  - INTESTINE, SMALL
    - GROWTH FACTORS, 7502
    - NEONATE, 7502

- TOMOGRAPHY
  - LIVER
    - CONTRAST MEDIA, 7741*
    - TECHNIQUES, 7741*
  - LIVER DISEASES
    - DIAGNOSIS, 7531*, 7741*

- TOXICITY
  - ALCOHOLS
    - METABOLISM, 7410*
  - DRUG METABOLISM
    - EXCRETION, 7777*
    - URINE, 7777*
  - INTESTINE, SMALL
    - CATHARTICS, 7484*
    - SECRETAGOGUES, 7484*
  - LIVER
    - ANDROGENS, 7476
    - TANNIC ACID, 7451

- TRANQUILIZING AGENTS
  - BILE
    - SECRETION, 7414*
  - CHOLERESIS
    - BILE, 7414*
    - MICROSOMES, 7414*
  - HEPATITIS, TOXIC
    - LYSOSOMES, 7468
  - LIVER
    - LYSOSOMES, 7468
    - MICROSOMES, 7414*
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 7468

- TRANSPORT
  - BILE ACIDS AND SALTS, 7399*
  - CALCIUM
    - ADRENERGIC RECEPTOR AGONISTS, 7340
  - COLON
    - VITAMIN K, 7314
  - FATTY ACIDS
    - PANCREATIC DISEASES, 7316
  - HEPATOCYTES
    - BILE ACIDS AND SALTS, 7443*
  - ILEUM
    - ELECTROLYTES, 7313
    - VITAMIN K, 7314
    - WATER, 7305*
  - INTESTINE, LARGE
    - VITAMIN K, 7314

- TRANSPORT (continued)
  - INTESTINE, SMALL
    - ANGIOTENSIN, 7303*
    - DRUG EFFECTS ON, 7303*
    - HORMONE EFFECTS ON, 7303*
    - IMMUNOGLOBULINS, 7318, 7319
    - PEPTIDES, 7499*
    - VITAMIN K, 7314
    - WATER, 7305*
  - INTESTINES
    - CHYLOMICRONS, 7302*
    - LIPIDS, 7302*
  - JEJUNUM
    - ANGIOTENSIN, 7303*
    - DRUG EFFECTS ON, 7303*
    - ELECTROLYTES, 7313
    - ELECTROPHYSIOLOGY, 7308*
    - HORMONE EFFECTS ON, 7303*
    - IMMUNOGLOBULINS, 7318, 7319
    - PEPTIDES, 7499*
    - WATER, 7305*, 7313
  - LIVER
    - AMINO ACIDS, 7387*
    - CONTRAST MEDIA, 7386*
    - RADIONUCLIDES, 7386*
  - LYMPH
    - EPITHELIUM, 7514*
    - TRACER STUDY, 7514*
  - SALIVARY GLANDS
    - CALCIUM, 7340
  - STOMACH
    - GLYCOPROTEINS, 7352*
  - VITAMIN K
    - BILE, 7314
    - FATTY ACIDS, 7314

- TRAUMA
  - SEE STRESS, WOUNDS AND INJURIES

- TRIGLYCERIDES
  - SEE ALSO FATS, LIPIDS
  - INTESTINAL ABSORPTION
    - EMULSIFIERS, 7493*
    - FATS, 7493*

- TRYPSIN
  - FECES
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - INTESTINE, SMALL
    - PANCREAS, 7723*
  - PANCREAS
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
    - SECRETION, 7723*
  - ULCER, PEPTIC
    - SERUM, 7597

- TUBERCULOSIS
  - INTESTINE, SMALL
    - MALABSORPTION SYNDROMES, 7643
  - LIVER INJURY
    - DRUG-INDUCED, 7780
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7643

- TYPHOID
  - SEE SALMONELLOSIS

- ULCER
  - DUODENUM
    - SOMATOSTATIN, 7519
  - PREVENTION
    - ACIDS, 7516
  - STOMACH
    - ACIDS, 7516
    - PREVENTION, 7516
    - ZINC, 7517
  - STRESS
    - CIRCULATION, 7857
    - HEMORRHAGE, 7857
  - VAGOTOMY
    - DUMPING SYNDROME, 7322*

- ULCER, PEPTIC
  - ACID SECRETION
    - REVIEW, 7579
  - COMPLICATIONS
    - HEMORRHAGE, 7596
  - DIAGNOSIS
    - ENDOSCOPY, 7590
  - DRUG THERAPY
    - ANTACIDS, 7587
    - H2 RECEPTOR ANTAGONISTS, 7357
  - DUODENUM
    - ANDROGENS, 7582
    - ANOMALY, 7581
    - ANTRECTOMY, 7576
    - DISEASES ASSOCIATED WITH, 7581
    - DRUG THERAPY, 7572*
    - GASTRIN, 7575, 7598
    - H2 RECEPTOR ANTAGONISTS, 7572*
    - HORMONES, 7598
    - INSULIN, 7598
    - LIPASE, 7594
    - PEPSIN, 7594
    - PERFORATION, 7595
    - PREVENTION, 7585
    - SECRETION, 7594
    - SEX FACTORS, 7582
    - STEROIDS, 7582
    - SURGERY, 7576
    - THERAPY, 7576, 7580
    - VAGOTOMY, 7576, 7580, 7585, 7600, 7604
  - ENDOSCOPY, 7586
  - ENTERECTOMY
    - COMPLICATIONS, 7584
  - ETIOLOGY
    - REVIEW, 7579
  - GASTRECTOMY
    - COMPLICATIONS, 7571, 7584, 7589, 7593, 7601
  - GASTRIN .
    - CIRCADIAN RHYTHM, 7575
  - GENETIC FACTORS
    - REVIEW, 7578
  - H2 RECEPTOR ANTAGONISTS
    - REVIEW, 7357
  - HEMORRHAGE
    - ETIOLOGY, 7596
    - PROGNOSIS, 7596
    - THERAPY, 7596
  - HORMONES, ADRENAL CORTEX, 7592
  - PANCREAS, 7602
  - PERFORATION
    - PROGNOSIS, 7595
    - SURGERY, 7595

- ULCER, PEPTIC (continued)
  - PERFORATION (continued)
    - SURVIVAL, 7595
    - THERAPY, 7595
  - RECURRENCE, 7588
  - SECRETION
    - LIPASE, 7594
    - PEPSIN, 7594
  - SERUM
    - FIBRINOGEN, 7597
    - GASTRIN, 7575, 7598
    - HORMONES, 7598
    - INSULIN, 7598
    - KININS, 7597
    - TRYPSIN, 7597
  - STOMACH
    - DRUG THERAPY, 7573*
    - VAGOTOMY, 7585
  - SURGERY
    - COMPLICATIONS, 7593
  - THERAPY
    - REVIEW, 7577, 7591
  - VAGOTOMY
    - COMPLICATIONS, 7600
    - GASTRIN, 7600
    - PROGNOSIS, 7600
  - VITAMIN B1, 7605
  - VITAMINS, 7605

- ULCERATIVE COLITIS
  - SEE COLITIS, ULCERATIVE

- ULCERATIVE ENTERITIS
  - SEE ENTERITIS, ULCERATIVE

- ULTRASONOGRAPHY
  - BILIARY TRACT
    - OBSTRUCTION, 7823*, 7845
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 7823*
  - CHOLELITHIASIS, 7842
  - CHOLESTASIS
    - DIAGNOSIS, 7823*
  - GALLBLADDER, 7842
    - CHOLELITHIASIS, 7845
    - TECHNIQUES, 7543
  - INTESTINE, LARGE
    - GASES, 7684
    - TECHNIQUES, 7684
  - JAUNDICE
    - DIAGNOSIS, 7823*
  - JAUNDICE, OSTRUCTIVE
    - DIAGNOSIS, 7823*
  - LIVER DISEASES
    - DIAGNOSIS, 7823*
  - PANCREAS
    - TECHNIQUES, 7547
  - PANCREATIC DISEASES
    - DIAGNOSIS, 7547
  - REVIEW, 7542
  - STOMACH
    - TECHNIQUES, 7546

- UREMIA
  - LIVER
    - LYSOSOMES, 7453

URINE
- AMYLASES
  - TECHNIQUES, 7550
- DRUG METABOLISM
  - TOXICITY, 7777*

UROGENITAL SYSTEM
- COLON
  - FISTULA, 7705
  - PERFORATION, 7705
- ENTERECTOMY
  - COMPLICATIONS, 7714
- SIGMOID
  - FISTULA, 7705
  - PERFORATION, 7705

VAGOTOMY
- DIARRHEA
  - BILE ACIDS AND SALTS, 7854*
  - DRUG THERAPY, 7854*
  - ETIOLOGY, 7854*
- DUODENUM
  - ULCER, PEPTIC, 7576, 7580, 7585, 7600, 7604
- ESOPHAGUS
  - MOTILITY, 7574*
  - SPHINCTER, 7574*
- SECRETION
  - GASTRIN, 7364
- SERUM
  - GASTRIN, 7603
- STOMACH
  - ACID SECRETION, 7364, 7603
  - GASTRIN, 7364
  - MOTILITY, 7322*, 7593
  - ULCER, PEPTIC, 7585
- TECHNIQUES
  - ACID SECRETION, 7353*
  - MOTILITY, 7353*
- ULCER
  - DUMPING SYNDROME, 7322*
- ULCER, PEPTIC
  - COMPLICATIONS, 7600
  - GASTRIN, 7600
  - PROGNOSIS, 7600

VARICES
- ESOPHAGUS
  - BLEEDING, 7558
  - THERAPY, 7558

VASOACTIVE INTESTINAL PEPTIDE
- SEE HORMONES, GASTROINTESTINAL

VATER'S AMPULLA
- STENOSIS
  - ASCARIASIS, 7894

VEINS
- HYPOPLASIA
  - HYPERTENSION, PORTAL, 7464
- INTESTINAL OBSTRUCTION
  - ANOMALY, 7661*
- LIVER
  - HYPOPLASIA, 7464

VILLI
- COLON
  - NEOPLASMS, 7676
- INTESTINE, SMALL
  - ENTEROKINASE, 7490*
- RECTUM
  - NEOPLASMS, 7676

VIRUSES
- GASTROENTERITIS
  - CHILD, 7872
  - DIAGNOSIS, 7863
- HEPATITIS
  - AGE FACTORS, 7469
  - SIMULATION, 7472
- INTESTINE, SMALL
  - SCLEROSIS, 7877, 7891
- JEJUNUM
  - SCLEROSIS, 7877, 7891

VITAMIN A
- LIVER INJURY, 7779

VITAMIN B1
- ULCER, PEPTIC, 7605

VITAMIN B12
- DEFICIENCY
  - FOLIC ACID, 7473
- GIARDIASIS
  - MALABSORPTION SYNDROMES, 7892*
- MALABSORPTION SYNDROMES, 7640

VITAMIN D
- ENTERECTOMY
  - OSTEOMALACIA, 7641
- INTESTINAL ABSORPTION
  - PLASMA, 7609*
  - SURGERY, 7609*
- INTESTINE, SMALL
  - SURGERY, 7609*
- SHORT BOWEL SYNDROME
  - OSTEOMALACIA, 7641

VITAMIN K
- COLON
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- ILEUM
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- INTESTINE, LARGE
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- INTESTINE, SMALL
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- TRANSPORT
  - BILE, 7314

VITAMINS
- ABSORPTION
  - ANTACIDS, 7359
- ULCER, PEPTIC, 7605

VOLVULUS
- SEE INTESTINAL OBSTRUCTION

- VOMITING
  - ESOPHAGEAL REFLUX
    - SURGERY, 7521
  - GASTROINTESTINAL DISEASES
    - INFANT, 7878
  - MALLORY-WEISS SYNDROME, 7563

- WATER
  - ILEUM
    - ABSORPTION, 7305*
    - TRANSPORT, 7305*
  - INTESTINE, SMALL
    - ABSORPTION, 7305*
    - TRANSPORT, 7305*
  - JEJUNUM
    - ABSORPTION, 7305*
    - TRANSPORT, 7305*, 7313

- WILSON'S DISEASE
  - DISEASES ASSOCIATED WITH
    - HEPATITIS, CHRONIC, 7769
    - LIVER CIRRHOSIS, 7769

- WOUNDS AND INJURIES
  - COLON
    - IATROGENESIS, 7713
  - COMMON BILE DUCT
    - IATROGENESIS, 7589
  - GASTROINTESTINAL SYSTEM
    - PERFORATION, 7621
  - INTESTINES
    - COMPLICATIONS, 7620
    - PERFORATION, 7621
  - LIVER
    - DIAGNOSIS, 7530*
    - SCANNING, SCINTILLATION, 7530*
  - PANCREAS
    - FISTULA, 7729
  - PANCREATIC DUCT
    - IATROGENESIS, 7589
  - PERINEUM
    - THERAPY, 7899
  - RECTUM
    - IATROGENESIS, 7713
  - SIGMOID
    - IATROGENESIS, 7713
  - SPLEEN
    - DIAGNOSIS, 7530*
    - SCANNING, SCINTILLATION, 7530*
  - STOMACH
    - PERFORATION, 7621

- ZINC
  - ACRODERMATITIS
    - DEFICIENCY, 7633*
    - ULTRASTRUCTURE, 7633*
  - LIVER
    - BINDING, 7434*
  - STOMACH
    - ULCER, 7517

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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CONTENTS

Abstracts, Citations — Page

PRE-CLINICAL SCIENCES

- Morphology, Cellular Structure and Histochemistry . . 7901-7910 1023
- Absorption--Excretion--Transport. 7911-7934 1024
- Motility. 7935-7955 1028
- Secretion and Metabolism. 7956-7958 1031
  - Stomach 7959-7981 1031
  - Pancreas. 7982-7991 1035
  - Hepatobiliary Tract 7992-8082 1036
  - Intestine 8083-8098 1054
- General 8099-8122 1057

DIAGNOSTIC PROCEDURES 8123-8145 1061

GASTROINTESTINAL DISEASES

- Esophagus 8146-8161 1063
- Stomach 8162-8179 1064
  - Peptic Ulcers 8180-8189 1067
- Small Intestine 8190-8224 1068
  - Malabsorption 8225-8232 1071
- Large Intestine 8233-8262 1072
  - Ulcerative Colitis. 8263-8266 1075
- Pancreas. 8267-8270 1076
  - Pancreatitis. 8271-8280 1077
- Liver and Biliary Tract 8281-8335 1078
  - Hyperbilirubinemic States 8336-8338 1087
  - Nonviral Hepatitis and Hepatic Injury 8339-8347 1088
  - Acute Viral Hepatitis 8348-8380 1089
  - Chronic Hepatitis 8381-8388 1094
  - Alcoholic Liver Disease 8389-8395 1096
  - Cirrhosis 8396-8418 1096
  - Gallbladder and Biliary Tract Diseases. 8419-8450 1100

- General 8451-8499 1104
  - Parasitology. 8500-8506 1108
  - Regional Enteritis. 8507-8517 1108

AUTHOR INDEX

SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

7901 A MORPHOMETRIC STUDY OF VENOUS VASCULAR DENSITY OF THE TUNICA MUSCULARIS OF THE ESOPHAGEAL PORTION OF THE ESOPHAGOGASTRIC TRANSITION SEGMENT IN ADULTS. (Por.) Fugimura, I.; de Carvalho, C. A. F. (Dep. de Cirurg., Universidade de Sao Paulo, FMUSP, Brazil). *Arq. Gastroenterol.* 14 (1):17-24; 1977.

Venous vascular bed density was measured in the tunica muscularis of the aboral esophageal region in specimens from 30 cadavers (young adults, 20-30 yr old, who died of portal hypertension). The specimens consisted of 6 cm above and 3 cm below the line of transition (z-line) between the esophagus and stomach; the specimens were treated as a Cartesian coordinate system, with the z-line as the abscissa and the line separating dorsal and ventral halves of the body as the ordinate. The venous density (mm/cm^2) was determined in six levels of ventral and dorsal halves as well as in longitudinal and circular sections (either whole sections or dorsal and ventral half-sections). Longitudinal section densities were generally higher than circular section densities (F=7.74, significant at the 1% level), which suggests a more abundant drainage in the longitudinal direction. Venous density was very slighty higher in the ventral than the dorsal half, and the density decreased very slightly in a caudal to cranial direction.

7902 STUDIES ON RECEPTORS FOR IgG ON EPITHELIAL CELLS OF THE RAT INTESTINE. (Eng.) Borthistle, B. K.; Kubo, R. T.; Brown, W. R.; Grey, H. M. (Veterans Admin. Hosp., Sam Jackson Park, Portland, OR 97207). *J. Immunol.* 119(2):471-476; 1977.

The binding of mouse immunoglobulins to the intestinal epithelium of neonatal rats was investigated. Radioiodinated mouse immunoglobulins of various classes and IgG subclasses, antigen-binding fragments (Fab) and constant fragments (Fc) of IgG, and monomeric and heat-aggregated forms of IgG were instilled into loops of intestine prepared from rats of various ages. The specificity of the radiolabeled immunoglobulin binding was evaluated by competitive inhibition with unlabeled proteins. Monomeric IgG bound specifically to the apical regions of villi in the proximal jejunum. Specific binding progressively decreased from the 12th day of life and could not be demonstrated after about the 21st day of life. Mouse IgA and IgM did not bind specifically. Radioiodinated Fc fragments of IgG bound specifically, whereas radioiodinated Fab fragments did not. Treatment of 14-day-old rats with cortisone acetate caused binding of monomeric IgG to cease prematurely by day 16. Intestinal loops treated with trypsin no longer bound radioiodinated IgG. Heat-aggregated IgG also bound specifically to jejunal epithelium. In contrast to the binding of monomeric immunoglobulin, this binding continued into adulthood and increased in response to cortisone treatment. Aggregated immunoglobulin did not inhibit the binding of monomeric immunoglobulin, but did inhibit the binding of aggregates. These studies (a) confirm the presence of receptors for the Fc region of monomeric IgG on absorptive epithelial cells of the rat jejunum, (b) demonstrate that the receptors disappear at the time when immunoglobulin transport is known to cease, and therefore appear to be critically involved in transport of monomeric IgG, (c) demonstrate that the receptors for monomeric IgG are sensitive to trypsin and disappear prematurely after cortisone treatment, and (d) demonstrate specific binding of aggregated IgG, perhaps by receptor mechanisms different from those involved in the binding of monomeric IgG.

7903 QUALITATIVE AND QUANTITATIVE PRESERVATION OF THE FINE STRUCTURE OF ABSORPTIVE CELLS IN CULTURED BIOPSIES OF HUMAN SMALL-INTESTINE. (Eng.) Ginsel, L. A.; van der Want, J. J. L; Daems, W. T. (Lab. Electron Microscopy, Univ. Leiden, Rijnsburgerweg 10, Leiden, Netherlands). *Cell Tissue Res.* 181(2):143-162; 1977.

The ultrastructure of the absorptive cells in human small intestinal biopsies cultured for 6, 24, and 48 hr was analyzed qualitatively and quantitatively. The cultured absorptive cells were well preserved and had a normal distribution, size, and relative volume of their cell organelles. However, there was a systematic decrease in the apical cell surface and an increase in the number of apical vesicles and tubules after culturing. Since the apical vesicles and tubules are thought to have a function in the transport of cell coat material from the Golgi apparatus to the cell surface, these findings raise the question of whether a delayed transport or extrusion of cell surface material occurs. The diminished relative volume of the mitochondria and the increased signs of autophagy in some poorly preserved absorptive cells are assumed to be an adaptation to less favorable culture conditions.

7904 ULTRASTRUCTURE OF CELL LOSS IN INTESTINAL MUCOSA. (Eng.) Potten, C. S.; Allen, T. D. (Christie Hosp. and Holt Radium Inst., Withington, Manchester M20 9BX, England). *J. Ultrastruct. Res.* 60(2):272-277; 1977.

The process of cell loss from the villi was studied ultrastructurally in the mucosa of the small intestine of PBA-2 mice. The surface of the individual villi was usually marked by numerous longitudinal and horizontal creases. Under electron microscopy, the surface of the tips of the villi varied in appearance from smooth to irregular. Those with an irregular surface often showed evidence of cell separation within and around the clefts. The cell separation was accompanied by changes in the surface morphology due to the production of microvesicles among and above the microvilli. The cell separation extended down between the cells to the basement membrane. The cells became separated from their neighbors when intercellular vacuoles were formed. The separation continued until individual cells were lost, occasionally leaving holes. Relatively normal epithelial cells, as well as occasional dead or dying apoptotic cells and effete goblet cells, were extruded from the mucosa. All three processes occurred at any position on the villus, although most cell loss occurred over the upper third. Cell loss appeared to be more predominant in the early hours of the morning.

7905 ULTRASTRUCTURE OF THE HUMAN PYLORIC GLANDS WITH EMPHASIS ON THE MUCOUS CELL COMPONENT. PART I. (Eng.) Krause, W. J.; Ivey, K. J.; Baskin, W. N.; MacKercher, P. (Sch. Medicine, Univ. Missouri, Columbia, MO 65201). *Acta Anat. (Basel)* 99(1):1-10; 1977.

The ultrastructure of the mucous cell component of the pyloric glands was studied in gastric biopsy specimens from four normal men. The pyloric glands were seen to be simple or branched tubular glands that spiral through the connective tissue of the lamina propria. They were comprised of three cell types: the pyloric gland (mucous) cell, the parietal cell, and endocrine cells. The mucous cell was the most common cell type and was characterized by an abundance of secretory granules. The secretory granules were usually round and varied considerably in diameter. They were membrane-bound and comprised a heterogeneous population. The larger granules contained a light-staining amorphous material and often possessed an area of increased electron density near the limiting membrane of the granule, which gave them a mottled appearance. A smaller, more electron-dense secretory granule was also found in relation both to the Golgi complex and to cell apex. The morphological observations indicate that the mechanism of mucin production by the mucous cells of the human pyloric glands may be similar to that reported in other mucin-secreting cells.

7906 CHANGES OF THE PANCREATIC DUCT SYSTEM ASSOCIATED WITH AGING. (Ger.) Schmitz-Moormann, P.; Hein, J. (Pathologisches Institut der Universitat, Robert-Koch-Str. 5, D-3550 Marburg, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 371(2): 145-152; 1976.

7907 THE EFFECT OF CALORIFICALLY SUBSTANDARD NUTRITION ON THE THIOL GROUPS IN THE CELLULAR NUCLEI HISTORIES OF THE LIVER IN ALBINO RATS OF DIFFERENT AGES. (Rus.) Klimenko, A. I.; Stefanovic A. N. (Inst. Biology, A. M. Gorkii Univ., Kharkov, USSR). *Vopr. Okhr. Materin. Det.* 21(9):15-18; 1976.

7908 THE PYLORUS: CURRENT DATA. (Fre.) Capro J. P.; Dupas, J. L. (Centre Hospitalier Universitaire, place Victor-Pauchet, F 80030 Amiens, France). *Gastroenterol. Clin. Biol.* 1(6/7):593-597; 1977.

7909 FUNCTIONAL-MORPHOLOGICAL CHANGES OF THE GASTROINTESTINAL MUCOSA IN EXPERIMENTAL REPRODUCTION OF HYPOFERRIC CONDITIONS. (Rus.) Ryss, E. S. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Patol. Fiziol. Eksp. Ter.* 1:37-40; 1976.

7910 ELECTRON MICROSCOPIC STUDIES ON THE INNERVATION OF THE STOMACH MUSCLE AND THE INTERSTITIAL CELL OF CAJAL IN THE SMALL INTESTINE OF THE MOUSE AND BAT. (Eng.) Yamamoto, M. (Teikyo Univ Sch. Medicine, Kaga-2-11-1, Itabashi-ku, Tokyo 173, Japan). *Arch. Histol. Jpn.* 40(3):171-201; 1977.

See also, 7938, 7959, 7960, 7964, 8056, 8080, 8086, 8164, 8165, 8181, 8301, 8332, 8456.

ABSORPTION - EXCRETION - TRANSPORT

7911 INHIBITION OF INTESTINAL UPTAKE OF AMINO ACIDS BY UNCONJUGATED BILE SALT. (Eng.) Burke, V.; Gracey, M.; Thomas, J.; Malajczuk, A. (Princess Margaret Children's Medical Res. Foundation, Perth, Western Australia). *Aust. J. Exp. Biol. Med. Sci.* 54(4):391-402; 1976.

Isolated segments of intestine from Wistar rats were used to study the effect of the unconjugated bile salt sodium deoxycholate (SD) on the intestinal uptake of amino acids. Uptake of radioactive-labeled L-glycine, L-leucine, L-proline, L-tyrosine, L-lysine, L-arginine, and L-ornithine was measured after intestinal tissue was exposed to 0.5 mM SD for 10, 20, 30, 40, or 50 min. The concentrations of L-glycine, L-leucine, L-proline, L-lysine, and L-tyrosine in the intestine were significantly ($p<0.005$, 0.05, 0.02, 0.005, and 0.005, resp.) decreased after exposure to SD. The effect was reversible, except for that of L-lysine, as demonstrated by the normal uptake levels after intestinal segments were rinsed with buffer. It is suggested that the hypoproteinemia observed in patients with bacterial overgrowth in the upper small intestine who have excessive SD in the intestinal lumen may be attributed to interference of amino acid intestinal absorption by the SD.

7912 EFFECT OF GLYCYLGLYCINE ON ABSORPTION FROM HUMAN JEJUNUM OF AN AMINO ACID MIXTURE SIMULATING CASEIN AND A PARTIAL ENZYMIC HYDROLYSATE OF CASEIN CONTAINING SMALL PEPTIDES.

(Eng.) Fairclough, P. D.; Silk, D. B. A.; Clark, M. L.; Matthews, D. M.; Marrs, T. C.; Burston, D.; *et al.* (St. Bartholomew's Hosp., London, England). *Clin. Sci. Mol. Med.* 53(1):27-33; 1977.

Using a jejunal perfusion technique, jejunal absorption of amino acid residues from a partial enzymic hydrolysate of casein in which about 50% of the amino acids existed as small peptides, and also from an equivalent mixture of free amino acids, was determined in normal subjects. The effect of a high concentration of glycylglycine (100 mmol/l) on the absorption of amino acid residues from these preparations was studied to quantify the importance of mucosal uptake of intact peptides during absorption of the partial hydrolysate of casein. Glycylglycine significantly inhibited absorption of several amino acid residues (aspartic acid + asparagine, serine, glutamic acid + glutamine, proline, alanine, phenylalanine, threonine, and isoleucine) from the free amino acid mixture, whereas it significantly inhibited the absorption of only two (serine, glutamic acid + glutamine) from the peptide-containing partial casein hydrolysate. The effect of glycylglycine on absorption of amino acids from the mixture of free amino acids was apparently due to inhibition of amino acid uptake by free glycine liberated from the dipeptide during perfusion. The failure of glycylglycine to cause extensive inhibition of absorption from the partial hydrolysate may be due to glycylglycine being only a weak inhibitor of peptide uptake, but the possibility that some peptides are taken up by a system unavailable to glycylglycine has to be considered.

7913 THE ROLE OF SOME SMALL PEPTIDES IN THE TRANSFER OF AMINO NITROGEN ACROSS THE WALL OF VASCULARLY PERFUSED INTESTINE.

(Eng.) Cheeseman, C. I.; Parsons, D. S. (Dept. Physiology, Univ. Leicester, Leicester LE1 7RH, England). *J. Physiol. (Lond.)* 262(2):459-476; 1976.

The characteristics of the transfer into the vascular bed of L-leucine and glycine from free amino acids or peptides were investigated in the intestinal lumen of *Rana pipiens*. Over the concentration range 0.5-10 mM, the transfer of L-leucine was little affected by the presence of equimolar concentrations of glycine, but glycine transfer was greatly inhibited by the presence of L-leucine. With glycyl-L-leucine in the intestinal lumen, the rate of transfer of glycine into the vascular bed was much greater than from the mixture of the two amino acids and was equal to that of the L-leucine. From L-leucylglycine, the rates of transfer of leucine and of glycine were also higher than from the mixture of the two amino acids, but the rate of glycine transfer was lower than that of leucine. There was no evidence of the presence of the dipeptides in the effluent from the portal vein. When glycyl-L-leucine was added to the lumen in the presence of 10 mM concentrations of the free amino acids, additional amounts of L-leucine and of glycine were transferred in approximately equimolar quantities into the vascular bed. This additional transfer exhibited saturation with respect to concentration of peptide in the intestinal lumen. An additional transfer of amino acids was also found when L-leucyl-glycine was added to the lumen in the presence of saturating concentrations of the two amino acids. The presence of the dipeptides in the intestinal lumen had little effect on the transfer of free amino acids from the lumen into the vascular bed. Although the transfer of free amino acids from the lumen into the vascular bed was significantly, but not completely, abolished when the Na in the intestinal lumen was replaced by K, the transfer of the amino acids from the dipeptides was little affected. The findings are discussed in relation to the view that the dipeptides are transported into the mucosal epithelium by a process that is distinct from those promoting uptake of the individual amino acids. Being completely hydrolyzed, there is no evidence for an accumulative uptake of the peptides; this may be related to the fact that the peptide uptake occurs in the absence of Na in the intestinal lumen.

7914 STUDIES ON KALLIKREINS. IV. ENHANCEMENT OF VALINE TRANSPORT ACROSS THE RAT SMALL INTESTINE.

(Eng.) Moriwaki, C.; Fujimori, H.; Moriya, H.; Kiruki, K. (Lab. Physiological Chemistry, Science Univ. Tokyo, Ichigaya Funagawaracho, Shinjuku-ku, Tokyo, Japan). *Chem. Pharm. Bull.* 25(6):1174-1178; 1977.

The effect of a highly purified hog pancreatic kallikrein and of synthetic bradykinin on the transport of valine across the rat small intestine was examined by an *in vitro* experiment with the sac of inverted jejunum and by an *in situ* mesenteric perfusion experiment. The flow of valine from the mucosal to the serosal side of everted intestine was stimulated significantly ($p<0.01$) by the addition of kallikrein (0.1 KU/ml), to the mucosal fluid while bradykinin was effective only by its addition to the serosal fluid. In a perfusion experiment, valine transport into the vascular system was enhanced significantly by the intraintestinal administration of 0.02-20 KU of kallikrein. The maximum effect was obtained with 2 KU, and the absorption of valine was 1.9 times larger than that of the control. Bradykinin infusion into the mesenteric perfusion system in concentrations of 1.0-100 nM also increased the transport of valine. A bell-shaped dose-response curve, in which the maximum enhancement was achieved with 1 nM of bradykinin, was obtained similar to the case of kallikrein. This effect of kallikrein appeared soon after its administration into the intestinal lumen and usually lasted about 30 min under the present experimental conditions.

7915 KINETICS OF ILEAL TRANSPORT OF BILE ACID AFTER JEJUNECTOMY.

(Eng.) Tilson, M. D.; Hettena, A. J.; Wright, H. K. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *J. Surg. Res.* 22(6):611-615; 1977.

The kinetics of taurocholate transport were studied in ileal remnants after jejunectomy in male Sprague-Dawley rats. Test segments of ileum were perfused with aqueous solutions of 0.9% NaCl and 0.1% inulin with consecutively increasing concentrations of taurocholic acid (0, 10, 30, 100, and 300 μmol/l). There was a significant increase over the control in the mean flux rate for taurocholate in the ileal remnant at a perfusate concentration of 10 μM (187 ± 7 versus 161 ± 10 pM/cm/min, $p<0.05$). It was calculated that there was no difference in passive transport or in the permeability coefficient between the control and the experimental ileum. Thus, the increase in ileal bile acid transport is attributed to increased active transport. The data are consistent with the hypothesis that the affinity of the carrier for taurocholate is increased after jejunectomy.

7916 EFFECT OF ACUTE ETHANOL INGESTION ON FAT ABSORPTION.

(Eng.) Boquillon, M. (Sciences Mirande, Campus Universitaire, 21 000 Dijon, France). *Lipids* 11(12):848-852; 1976.

The effects of acute ethanol administration on fat absorption, on lymph lipid output, and on lymph fat particle size were investigated in rats after lipid feeding, and the effects of ethanol on lipid transit time were examined. A test meal (300 mg casein, 600 mg sucrose, 100 mg corn oil, and a tracer dose of 9,10-^{3}H-oleic acid) was given to fasting adult rats with intestinal lymph fistulas. The animals received either ethanol (3.2 g/kg) or water (2.5 ml) with the meal. Ethanol temporarily delayed the removal of lipid radioactivity from the stomachs. More than 25% of radioactivity fed remained 8 hr after feeding, whereas in control rats, less than 10% of lipid radioactivity fed remained 6 hr after feeding. In controls and ethanol-treated rats, the amounts of exogenous lipids in the intestinal lumen and mucosa were low and similar. Quantities of endogenous and exogenous lipids found in the lymph collected during the 24 hr after feeding were similar in the two groups, but the fat absorption peak was found after 6 hr in alcoholic rats and before 6 hr in controls. This delay was probably due to the retention of lipids in the stomach. More of the exogenous lipid was always transported by small particles moving in the region of α_1 globulins in cellulose acetate electrophoresis than by larger particles remaining at the origin. This proportion was enhanced in the ethanol-treated animals. The larger fat particles were richer in endogenous fatty acids in alcohol-treated rats than in controls. The results indicate that large doses of ethanol delay fat absorption. Ethanol ingestion also seems to increase the exogenous fat transport in lymph as small fat particles.

7917 QUANTITATIVE AND VISUALIZATION STUDIES OF THE TRANSPORT OF RAT AND BOVINE IgG AND FERRITIN ACROSS THE SEGMENTS OF THE SMALL INTESTINE OF THE SUCKLING RAT.

(Eng.) Hemmings, W. A.; Williams, E. W. (Dept. Zoology, Univ. Coll. North Wales, Bangor, Gwynedd, Wales). *Proc. R. Soc. Lond.* [*Biol.*] 197(1129):425-440; 1977.

The quantitative uptake of a homologous protein, rat IgG, and a heterologous protein, horse spleen ferritin (HSF), from the duodenum, ileum, and jejunum of 14-day-old rats was studied. The histological distribution of ^{125}I-labeled IgG and ^{131}I-labeled HSF was observed by electron microscopy. The injection mixtures contained equal activities of both isotopes and a total protein concentration of 2.4 mg/ml. A volume of 0.2 ml was injected into ileum, 0.15 ml into the duodenum and jejunum; all three sections were separated by ligatures. Radioactivity was measured in the injected portion of the gut, the gut washings, and the whole animal. Both duodenum and ileum actively transported rat IgG and HSF. The selective ratio for IgG compared to HSF was slightly greater in the duodenum. Proteolysis occurred in both segments, but there was a greater breakdown of proteins in the ileum. A high percentage of radioactivity in the whole anima was still protein-bound. The quantitative results were supported by electron microscopy studies. HSF was transported across the duodenal and ileal cells in quantity, and both proteins were distributed throughout the cell cytoplasm. It is concluded tha different mechanisms of protein transport operate in the duodenum and ileum of the young rat.

7918 POTASSIUM TRANSPORT ACROSS THE DISTAL COLON IN MAN.

(Eng.) Salas-Coll, C. A.; Kermode, J. C.; Edmonds, C. J. (Clinical Res. Center, Watford Rd., Harrow, Middlesex HA1 3UJ, England). *Clin. Sci. Mol. Med.* 51(8):287-296; 1976

The mechanism of potassium transport across human distal colon was investigated in 22 subjects without bowel disease, using a dialysis method in conjunction with measurements of the transepithelial potential difference (PD). Whether potassium was absorbed or secreted depended on its initial concentration in the lumen. The potassium net flux was approximately zero when the luminal potassium concentration was between 30 and 50 mM. The potassium secretion rate was not significantly affected by the sodium absorption rate, by the luminal sodium concentration, or by the osmolality of the luminal solution. The potassium secretion rate was increased by partial substitution of other cations for sodium, in the descending order Li>NH_4>Rb>Na. Potassium concentration increased an average of greater than 80 mM when lithium was in the lumen. The observed transepithelial PD was inadequate to account for the intraluminal potassium concentrations attained, the discrepancy being most marked when ammonium or lithium was in the lumen. It is suggested that some potassium is secreted by the epithelial cells, and this component of the total potassium flux into the lumen is increased when rubidium, ammonium, or lithium is substituted for sodium.

7919 CALCIUM-PROSTAGLANDIN AGGREGATION AND ITS EFFECT ON PROSTAGLANDIN UPTAKE BY ISOLATED RABBIT INTESTINE. (Eng.) Bikhazi, A. B.; Nadir, N. S.; Hajjar, J. J. (Sch. Pharmacy, American Univ. Beirut, Beirut, Lebanon). *J. Pharm. Sci.* 66(9): 1308-1312; 1977.

The interaction between calcium and prostaglandins was studied in the rabbit, and the data were correlated to intestinal prostaglandin uptake. A quantitative estimate of the role of calcium ions on the lipid-water partition coefficients of prostaglandin E_1 and dinoprost suggested the possibility that prostaglandin molecules and calcium ions aggregate in a 14:1 ratio to produce a lipid-soluble complex. The aggregation was postulated to be a characteristic of prostaglandin molecules as compared to simple fatty acids (e.g., 1-octanoic acid) which, in the presence of calcium, behaved differently than the prostaglandins. The uptake of prostaglandins by the mucosal surface of the rabbit intestine increased in the presence of calcium. At 25 mM calcium, prostaglandin E_1 was transported at approximately twice the rate as in the system containing no calcium. The uptake rate of dinoprost was estimated to be three times faster in the presence of 10 mM calcium than in the absence of calcium. Therefore, it is proposed that a carrier-mediated diffusion process, for both the prostaglandin molecules and calcium ions, occurs in the uptake mechanism. Diffusion coefficients ranging from 0.48×10^{-5} to 7.19×10^{-5} cm^2/sec and permeability coefficients ranging from 1.04×10^{-2} to 15.6×10^{-2} cm/sec were estimated for all systems studied.

7920 INTERRELATIONSHIP BETWEEN SUGAR-EVOKED INCREASES IN TRANSMURAL POTENTIAL DIFFERENCE AND SUGAR INFLUXES ACROSS THE MUCOSAL BORDER IN THE SMALL INTESTINE. (Eng.) Hoshi, T.; Suzuki, Y.; Kusachi, T.; Igarashi, Y. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Tohoku J. Exp. Med.* 119(3):201-209; 1976.

The relationship between changes in the transmural potential induced by actively transported sugars (ΔPD) and influxes of the sugars (J_s) was investigated in the isolated guinea pig small intestine. When the electrical conductivity of the medium remained constant, ΔPD and J_s were closely correlated; both showed very similar patterns of regional difference along the intestine, and the values of the half saturation concentration (K_m) for a sugar estimated from electrical and flux measurements were nearly identical. No such correlation was observed when medium conductivity varied. However, a simple correction of the sizes of ΔPD for medium conductivity restored a close parallel between ΔPD and J_s. The sugar-induced increase in Na^+ flux estimated from the increase in short-circuit current varied in parallel with J_s, regardless of the medium conductivity, and a fixed stoichiometric relation (approximately one-to-one coupling) was seen between Na^+ and sugar fluxes. It is concluded that the dominant factor affecting the interrelation between ΔPD and J_s is the resistance of the paracellular shunt, which is directly proportional to medium electrical conductivity.

7921 EFFECT OF INDOMETHACIN ON INTESTINAL WATER TRANSPORT IN SALMONELLA-INFECTED RHESUS MONKEYS. (Eng.) Giannella, R. A.; Rout, W. R.; Formal, S. B. (Veterans Admin. Hosp., Lexington, KY 40506). *Infect. Immun.* 17(1):136-139; 1977.

Experiments were carried out in rhesus monkeys to determine whether indomethacin can inhibit salmonella-induced intestinal secretion when administered after both infection and net intestinal secretion are well established. Indomethacin (10 mg/kg, i.v.), caused a striking enhancement of net intestinal water transport in the jejunum, ileum, and colon of salmonella-infected monkeys. These effects occurred promptly and were of sufficient magnitude in the ileum and colon to cause a reversal in the direction of net transport from net secretion to net absorption. Indomethacin also enhanced net water transport in the jejunum, ileum, and colon of normal animals. These data show that indomethacin markedly enhances net intestinal water transport in both the small and large intestines of salmonella-infected monkeys, even when administered after salmonella infection and intestinal secretion are well established. Similar enhancement also occurs in the normal intestine.

7922 THE EFFECT OF MINERALOCORTICOID AND GLUCOCORTICOID ON REGIONAL POTENTIAL DIFFERENCES IN THE RAT COLON [Abstract]. (Eng.) Monks, J. L.; Schwartz, S. E.; Burgess, L. W. (Upstate Medical Center, Syracuse, NY). *Gastroenterology* 72(5, Part 2):1104; 1977.

7923 THE EFFECT OF DIPHENYLHYDANTOIN ON SEQUENTIAL STAGES OF INTESTINAL FOLATE UPTAKE [Abstract]. (Eng.) Nelson, E. W.; Crick, W. F.; Cerda, J. J.; Streiff, R. R. (Univ. Florida Coll. Medicine, Gainesville, FL). *Gastroenterology* 72(5, Part 2):1107; 1977.

7924 INTESTINAL PHOSPHOLIPID ABSORPTION AND UTILIZATION FOR CHYLOMICRON FORMATION IN THE RAT [Abstract]. (Eng.) Ng, P. Y.; Clark, S. B.; Holt, P. R. (St. Luke's Hosp. Center, New York, NY). *Gastroenterology* 72(5, Part 2):1108; 1977.

7925 EFFECTS OF ELECTRICAL FIELD STIMULATION ON ION TRANSPORT BY RABBIT ILEUM IN VITRO [Abstract]. (Eng.) Hubel, K. A. (Dept. Medicine, Univ. Iowa, Iowa City, IA). *Gastroenterology* 72(5, Part 2):1072; 1977.

7926 EVIDENCE FOR SATURATION OF LYMPHATIC TRANSPORT OF TRIGLYCERIDE FATTY ACID (TGFA) [Abstract]. (Eng.) Balint, J. A.; Tso, P.; Court, H.; Simmonds, W. J. (Dept. Physiology, Univ. Western Australia, Australia). *Gastroenterology* 72(5, Part 2):1026; 1977.

7927 EFFECT OF PLURONIC DETERGENTS ON LIPID ABSORPTION [Abstract]. (Eng.) Bochenek, W. J.; Rodgers, J. B. (Albany Medical Coll., Albany, NY). *Gastroenterology* 72(5, Part 2):1030; 1977.

7928 INHIBITION OF ACTIVE GASTRIC ION TRANSPORT BY pCMBS REACTIVE -SH GROUPS [Abstract]. (Eng.) Fromm, D.; Fuhro, R. (Harvard Medical Sch., Boston, MA 02215). *Gastroenterology* 72(5, Part 2): 1059; 1977.

7929 α-AMINOISOBUTYRIC ACID FLUX ACROSS MUCOSAL BORDER OF RAT INTESTINE IN VIVO [Abstract]. (Eng.) Hajjar, J. J.; Schedl, H. P. (Univ. Coll. Medicine, Iowa City, IA). *Gastroenterology* 72(5, Part 2):1067; 1977.

7930 STUDIES ON A MEMBRANE-BOUND PROTEIN COMPONENT FROM HEPATOCYTES POSSIBLY INVOLVED IN BSP TRANSPORT [Abstract]. (Eng.) Tiribelli, C.; Lunazzi, G. C.; Luciani, M.; Panfili, E.; Frezza, M.; Sottocasa, G. L. (Istituti Patologia Medica e Chimica Biologica, Univ. Trieste, Trieste, Italy). *Gastroenterology* 72(5, Part 2):1141; 1977.

7931 A COMPARISON OF THE ABSORPTIVE PROPERTIES OF THE HUMAN BUCCAL MUCOSA AND THE EVERTED SAC OF RAT SMALL INTESTINE IN RELATION TO DRUG-INDUCED MALABSORPTION [Abstract]. (Eng.) Evered, D. F.; Manning, A. S.; McMullan, J. M. (Dept. Biochemistry, Chelsea Coll., Univ. London, London SW3 6LX, England). *J. Physiol. (Lond.)* 270(1):17P-18P; 1977.

7932 THE EFFECT OF NORADRENALINE AND ANGIOTENS UPON INTESTINAL FLUID TRANSPORT IN VIVO I THE RAT [Abstract]. (Eng.) Levens, N. R.; Munday, K. A.; Stewart, C. P. (Dept. Physiology, Univ. Southampton, Southampton, England). *J. Physiol. (Lond.)* 270(1):77P-78P; 1977.

7933 POSTPRANDIAL ABSORPTION OF α-AMINONITROGEN AND SUGARS IN PIGS. QUANTITATIVE MEASUREMENT USING DISCONTINUOUS PANCREATIC DERIVATION. (Eng.) Rerat, A.; Corring, T.; Vaissade, P.; Vaugelade, P. (Laboratoire de Physiologie de la Nutrition I.N.R.A., 78350 Jouy-en-Josas, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):583-588; 1977.

7934 ABSORPTION AND DISTRIBUTION STUDIES ON CHLORINATED OLEIC ACID AND EXTRACTS OF CHLORINATED LIPID AND PROTEIN FRACTIONS OF FLOUR IN RATS. (Eng.) Cunningham, H. M.; Lawrence, G. A. (Health and Welfare Canada, Tunney's Pasture, Ottawa, Canada). *Food Cosmet. Toxicol.* 15(2): 105-108; 1977.

See also, 7903, 7987, 8062, 8083, 8086, 8096, 8109, 8230, 8268, 8486.

MOTILITY

7935 NOVEL TELEMETRIC SYSTEM FOR EXTRALUMINAL MEASUREMENT OF GASTROINTESTINAL MOTILITY. (Eng.) Shearin, N. L.; Pfeiffer, C. J.; Kilam, S. (Faculty Medicine, Memorial Univ. Newfoundland, St. John's, Newfoundland A1C 5S7, Canada). *J. Appl. Physiol.* 41(3):425-428; 1976.

A frequency-modulated, telemetric system with a transducer sensitive to variation in distance between two points was developed and used to measure *in vivo* small intestinal motor function in unanesthetized dogs. The construction of the system and one application of it to the study of gastrointestinal motility is described. Data were recorded after fasting, 1 hr after feeding a standardized meat meal, and after i.v. injections of pentagastrin (10.0 μg/kg). A significant increase in motility was seen after pentagastrin injections and feeding, as compared to the motility pattern seen in a fasting animal. The telemetric system was proven to be adequate for *in vivo* measurement of motility of the gastrointestinal tract.

7936 EFFECTS OF SOMATOSTATIN AND HUMAN GASTRIN I ON THE LOWER ESOPHAGEAL SPHINCTER IN MAN. (Eng.) Heil, T.; Mattes, P.; Raptis, S. (Departement fur Chirurgie, Universitat Ulm, Postfach 3880, D-7900 Ulm/Donau, W. Germany). *Digestion* 15(6):461-468; 1977.

The influence of somatostatin and physiological concentrations of gastrin on the lower esophageal sphincter was investigated in 10 metabolically healthy volunteers and in one patient with the Zollinger-Ellison syndrome. Only unphysiologically high serum concentrations of gastrin (300-600 pg/ml) during exogenous gastrin (0.6 μg/kg/hr) administration produced a rise in pressure in the lower esophageal sphincter, while somatostatin (250 μg as an i.v. bolus, followed by 250 μg/hr for 1 hr) had no effect on the lower esophageal sphincter pressure, nor was it able to inhibit the pharmacological effect of exogenous gastrin administration. The results demonstrate that normal levels of serum gastrin do not seem to have much effect on resting lower esophageal sphincter pressure, nor does somatostatin.

7937 PERISTALSIS IN SMOOTH MUSCLE ESOPHAGUS AFTER TRANSECTION AND BOLUS DEVIATION.

(Eng.) Janssens, J.; De Wever, I.; Vantrappen, G.; Hellemans, J. (Laboratorium voor Gastrointestinale Physiopathologie, Univ. Leuven, Z.Z. St. Rafael, B-3000 Leuven, Belgium). *Gastroenterology* 71(6): 1004-1009; 1976.

The importance of the continuity of the muscle coat and of the presence of an intraluminal bolus for the peristaltic performance of the esophagus was studied in the Rhesus monkey. Transection and re-anastomosis with muscle-to-muscle contact in the striated muscle part of the esophagus did not interfere with the progression of primary peristaltic contractions. However, when the transection with re-anastomosis was performed in the smooth muscle part of the gullet, the peristaltic progression of the deglutitive contraction waves in the segment below the transection was affected. After deviation of the swallowed bolus either in the cervical striated esophagus or in the smooth muscle part of the thoracic esophagus, primary peristaltic contractions progressed over the entire length of the gullet; however, in the thoracic esophagus, the presence of a bolus facilitated the peristaltic progression of primary waves. These studies indicate that the extramural vagal innervation is involved in secondary peristaltic contractions of the smooth muscle esophagus.

7938 DYNAMICS OF THE PARTIAL RESTORATION OF SLOW-WAVE FREQUENCY OF THE DUODENUM BELOW TRANSECTION (ELECTROPHYSIOLOGICAL AND MORPHOLOGICAL INVESTIGATIONS).

(Eng.) Atanassova, E.; Jurukova, Z.; Kortezova, N. (Inst. Physiology, Bulgarian Acad. Sciences, Sofia, Bulgaria). *Acta Physiol. Pharmacol. Bulg.* 2(2):25-34; 1976.

The role of the nervous system in the restoration of the slow wave frequency of the duodenal segment below an anastomosis was studied in dogs. The proximal duodenum was transected, and this was followed by end-to-end anastomosis. The electrical activity of the duodenal wall of both segments was recorded. On the background of decreased slow wave frequency below the section, single slow waves were observed, with duration similar to that of the slow waves above the section. After surgery, their number increased, small groups of such waves appearing during and after spike activity. In some experiments from the end of the first month to the sixth month after surgery, the slow wave frequency below the section approached the slow wave rhythm above the section, as evidenced by the histograms. This was temporary and was partly eliminated by cholinergic and alpha- and beta-adrenergic antagonists. This phenomenon was also observed in definitively separated distal segments of the duodenum. Histological examination of specimens of the intestinal wall taken from the area of anastomosis showed single smooth muscle cells among the granulation tissue, filling the gap between the wound edges on the third day; on the sixth day, the number of these cells increased, and on the ninth and twelfth days, they formed small groups. From the end of the first month to the sixth month, small sheaves of smooth muscle cells were observed in the cicatricial tissue. It is concluded that the intrinsic nervous system keeps the slow wave frequency below the duodenal transection at a higher level than the smooth muscle cell regeneration might ensure.

7939 A POSSIBLE ROLE OF PROSTAGLANDINS IN GUINEA-PIG ISOLATED ILEUM CONTRACTIONS TO SEROTONIN.

(Eng.) Famaey, J. P.; Fontaine, J.; Seaman, I.; Reuse, J. (Sch. Medicine, Univ. Brussels, 115, boulevard de Waterloo, 1000 Brussels, Belgium). *Prostaglandins* 14(1):119-124; 1977.

Nine nonsteroidal anti-inflammatory drugs were tested for their effect on serotonin-induced contractions in the isolated guinea pig ileum. These drugs (flufenamic acid, mefenamic acid, bufexamac, niflumic acid, indomethacin, clopirac, ibuprofen, phenylbutazone, and alclofenac at 2.5-40, 2.5-40, 5-10, 10-40, 10-40, 40, 40, 100-200, and 200 μg/ml, resp.) inhibited the ileal contractions in a dose-related manner. This inhibition was totally reversible by washing out the drugs. The inhibition was also reversed by adding a small quantity of prostaglandin E_1 (2.5 ng/ml) to the bath. It is concluded that prostaglandins exert both specific and nonspecific effects on ileal contraction.

7940 INHIBITION OF GASTRIC ELECTRICAL AND MECHANICAL ACTIVITY BY INTRADUODENAL AGENTS IN PIGS AND THE EFFECTS OF VAGOTOMY.

(Eng.) Roze, C.; Couturier, D.; Chariot, J.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F-75877 Paris Cedex 18, France). *Digestion* 15(6):526-539; 1977.

The inhibitory effects of acid, hyperosmolar glucose, fat, and amino acids on gastric electrical and motor activity were compared after a normal meal, and the effects of truncal vagotomy on these inhibitory effects were assessed. Miniature pigs were chronically implanted with gastric electrodes, with strain gauge devices allowing the measurement of circular contractions in the antrum and body of the stomach, and with a duodenal catheter through which duodenal infusions were administered. Inhibition of gastric motility by intraduodenal agents was measured before and after truncal vagotomy in conscious animals 20 min after a normal meal. HCl (75 mEq/l), glucose (100 g/l), olive oil (10%, pH 7), amino acids, and saline were infused intraduodenally at a rate of 10 ml/min (4 min). Before vagotomy, motor activity during the first 5 min was inhibited 50-80% with respect to basal levels. The duration of inhibition was shorter with HCl than with glucose and fat. Amino acid infusion had very little effect, and saline had no effect. Inhibition was similar in the antrum and gastric body. After vagotomy, the inhibitory effect of HCl was reduced from 80% to 20% in the antrum and was completely suppressed in the gastric body. The inhibitory effects of glucose and olive oil were completely suppressed. The results stress the importance of a normal vagal supply to the duodenum and stomach in the inhibition of gastric motility induced by agents in the duodenum.

7941 A DOUBLE-BLIND COMPARATIVE STUDY OF THE INHIBITORY EFFECT OF INTRADUODENALLY ADMINISTERED HYOSCINE-N-BUTYLBROMIDE ON HUMAN DUODENAL MOTILITY. (Eng.) Miyoshi, A.; Suyama, T.; Kawamura, I. (Hiroshima Univ. Sch. Medicine, Hiroshima, Japan). *J. Int. Med. Res.* 5(4):223-232; 1977.

7942 EXTRINSIC NEURAL INFLUENCES ON GASTROINTESTINAL MOTILITY. (Eng.) Countee, R. W. (Coll. Medicine & Dentistry of New Jersey--New Jersey Medical Sch., Newark, NJ). *Am. Surg.* 43(9):621-626; 1977.

7943 ON THE BIOMECHANICAL FUNCTION OF THE LIVER CAPSULE. (Eng.) Arnold, G.; Gressner, A. M.; Clahsen, H.; Kronchen, A. (Abteilung Anatomie der RWTH, Melatener Strasse 211, D-5100 Aachen, W. Germany). *Experientia* 33(8):1089-1091; 1977.

7944 THERMAL SENSITIVITY AND ACTIVATION ENERGY OF INTRINSIC INTESTINAL MOTILITY IN SMALL VERTEBRATES. (Eng.) Studier, E. H.; Studier, A. L.; Essy, A. J.; Dapson, R. W. (Dept. Biology, Univ. Michigan-Flint, Flint, MI 48503). *J. Thermal Biol.* 2(2):101-105; 1977.

7945 ELECTRICAL AND MECHANICAL ACTIVITY OF ISOLATED CANINE STOMACH PERFUSED WITH FLUOROCARBON EMULSION. (Eng.) Kowalewski, K.; Kolodej, A. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta, Canada). *Surg. Gynecol. Obstet.* 145(3):347-352; 1977.

7946 INHIBITION BY PURINES OF PERISTALTIC ACTIVITY IN THE GUINEA-PIG ILEUM. (Eng.) Van Nueten, J. M.; Fontaine, J.; Helsen, L.; Janssen, P. A. J. (Janssen Pharmaceutica, 2340 Beerse, Belgium). *Arch. Int. Pharmacodyn. Ther.* 227(1):168-170; 1977.

7947 EFFECT OF ISOPRENALINE AND PHENYLEPHRINE ON THE ADENOSINE 3',5'-MONOPHOSPHATE CONTENT AND MECHANICAL ACTIVITY OF COLD-STORED AND FRESH TAENIA CAECUM FROM THE GUINEA-PIG. (Eng.) Honda, F.; Katsuki, S.; Miyahara, J. T.; Shibata, S. (Fujisawa Pharmaceutical Co. Ltd., Japan). *Br. J. Pharmacol.* 60(4):529-536; 1977.

7948 THE EFFECTS OF FOUR BENZODIAZEPINES AND OF THE BENZODIAZEPINE-SOLVENTS ON THE ISOLATED GUINEA-PIG ILEUM PREPARATIONS. (Eng.) Mitolo-Chieppa, D.; Cuomo, V. (Faculty Medicine and Surgery, Univ. Bari, Italy). *Pharmacol. Res. Commun.* 9(7):643-648; 1977.

7949 EFFECTS OF DILTIAZEM AND LANTHANUM ION ON THE POTASSIUM CONTRACTURE OF ISOLATED GUINEA PIG SMOOTH MUSCLE. (Eng.) Magaribuchi, T.; Nakajima, H.; Kiyomoto, A. (Tanabe Seiyaku Co., Ltd., Toda, Saitama 335, Japan). *Jpn. J. Pharmacol.* 27(3):333-339; 1977.

7950 DEPRESSIVE EFFECT OF EPINEPHRINE MEDIATED VIA ADRENERGIC BETA-RECEPTOR IN ISOLATED RAT COLON AND DUODENUM. (Eng.) Nakahata, N.; Nakanishi, H.; Suzuki, T. (Fukushima Medical Coll., Sugitsuma-cho, Fukushima 960, Japan). *Jpn. J. Pharmacol.* 27(3):341-349; 1977.

7951 EFFECTS OF DILTIAZEM ON ELECTRICAL AND MECHANICAL ACTIVITIES OF ISOLATED GUINEA PIG TAENIA COLI. (Eng.) Magaribuchi, T.; Nakajima, H.; Kiyomoto, A. (Tanabe Seiyaku Co., Ltd., Toda, Saitama 335, Japan). *Jpn. J. Pharmacol.* 27(3):361-369; 1977.

7952 INHIBITORY EFFECTS OF SEXUAL STEROIDAL HORMONES ON THE RESPONSES OF THE ISOLATED GUINEA-PIG ILEUM TO ACETYLCHOLINE AND HISTAMINE. (Eng.) Seaman, I.; Famaey, J. P.; Fontaine, J.; Reuse, J. (Sch. Medicine, Univ. Brussels, 115, boulevard de Waterloo, 1000 Brussels, Belgium). *Arch. Int. Pharmacodyn. Ther.* 227(2):233-237; 1977.

7953 GASTRIC EMPTYING OF BARIUM SULPHATE SUSPENSION COMPARED WITH THAT OF WATER. (Eng.) Ramsbottom, N.; Knox, M. T.; Hunt, J. N. (Guy's Hosp. Medical Sch., London, England). *Gut* 18(7):541-542; 1977.

7954 MECHANISM OF CONTRACTILE RESPONSE TO Mn ION IN ISOLATED RAT RECTUM. (Eng.) Yoshida, N.; Taniyama, K.; Araki, H.; Matsumoto, H. (Kobe Univ. Sch. Medicine, Ikuta-ku, Kobe 650, Japan). *Jpn. J. Pharmacol.* 27:468-473; 1977.

7955 NON-CHOLINERGIC, EXCITATORY JUNCTION POTENTIALS IN SMOOTH MUSCLE OF CHICKEN RECTUM. (Eng.) Ohashi, H.; Naito, K.; Takewaki, T.; Okada, T. (Dept. Pharmacology, Gifu Univ., Kakamigahara, Gifu 504, Japan). *Jpn. J. Pharmacol.* 27(3):379-387; 1977.

See also, 7910, 8109, 8120, 8162, 8218, 8467, 8471, 8478, 8508, 8510.

7956 RELEASE OF VASOACTIVE INTESTINAL PEPTIDE (VIP) BY INTRALUMINAL OSMOTIC STIMULI.

(Eng.) Ebeid, A. M.; Soeters, P. B.; Murray, P.; Fischer, J. F. (Dept. Surgery, Massachusetts General Hosp., Boston, MA 02114). *J. Surg. Res.* 23(1):25-30; 1977.

Blood levels of vasoactive intestinal peptide (VIP) and insulin were measured in dogs after intraluminal osmotic stimulation of the duodenum. Two methods were used to infuse 300 ml of 6% or 3% hypertonic saline solution: (1) the animals were laparotomized, and the solution was infused directly into duodenum and (2) a jejunal loop with an intact blood supply was transposed anterior to the duodenum, where one end was anastomosed to the duodenum in end-to-side fashion and one end was secured s.c.; the solution was infused extraabdominally in the "closed" animal. VIP and insulin were measured by radioimmunoassay in blood drawn 0, 3, 5, 10, 20, 40, and 60 min postinfusion. VIP was significantly elevated ($p<0.05$) at 5 and 10 min after the infusion of 6% saline. The response to 3% saline was less marked, but it was significant ($p<0.02$) at 5, 10, and 20 min. The rise in VIP levels was accompanied by significant rise in insulin, but only after the 3% saline infusion. The results were similar in the laparotomized and "closed" animals. It was concluded that VIP is an insulinotropic hormone.

7957 ROLE OF CYCLIC ADENOSINE MONOPHOSPHATE IN THE REGULATION OF THE SECRETORY FUNCTION OF THE DIGESTIVE GLANDS (LITERATURE SURVEY).

(Rus.) Radbil', O. S.; Mosin, V. I. (All-Union Scientific Res. Inst. Medical and Medico-technical Information, USSR Ministry Public Health, Moscow, USSR). *Vopr. Pitan.* (6):37-43; 1976.

7958 THE BIOCHEMISTRY OF HUMAN SALIVARY SECRETIONS.

(Ger.) Munzel, M. (Allgemeines Krankenhauses Hamburg-Harburg, Eissendorfer Pferdeweg 52, D-2100 Hamburg 90, W. Germany). *Arch. Otorhinolaryngol.* 213(1):209-285; 1976.

See also, 8109, 8237, 8272, 8486.

SECRETION AND METABOLISM

Stomach

7959 MORPHOLOGICAL AND PHARMACOLOGICAL STUDIES OF THE PARIETAL CELLS OF THE STOMACH IN THE DOG DURING PERIODS OF MAXIMAL ACID OUTPUT AND AFTER THE GASTRIC SECRETORY INHIBITOR UK-9040.

(Eng.) Hamer, D. B.; Price, A. B.; Baron, J. H. (St. Mary's Hosp., London W.2, England). *Gut* 18(2):91-98; 1977.

The effects of UK-9040, a derivative of the antihistamine triprolidine, on gastric secretion and parietal cell structure were studied in dogs. UK-9040 reduced gastric acid, pepsin, and volume output in response to food, insulin, histamine, N-methyl histamine, and pentagastrin. Doses of 6-36 mg/kg administered p.o. 4-5 hr before the secretagogues produced a dose-dependant and up to 100% inhibition in the outputs of innervated gastric fistula and denervated Heidenhain pouch. Inhibition was still present 24 hr after the administration of UK-9040 but was absent at 48 hr. Blood pressure and pulse rate were not affected. The normal ultrastructural responses to gastric secretory stimulation were arrested. UK-9040 showed no cumulative effect, tolerance did not occur, and after withdrawal of the drug, the physiological and morphological gastric responses of the parietal cells rapidly returned to normal. Although UK-9040 has not been developed for use in humans because of cardiotoxicity, it is hoped that other inhibitory drugs of this series might provide the basis for an approach to hypersecretory diathesis.

7960 THE EPITHELIUM IN HEALING EXPERIMENTAL STANDARD LESIONS IN THE GASTRIC MUCOSA OF THE RAT: A LIGHT MICROSCOPICAL AND SCANNING ELECTRON MICROSCOPICAL STUDY.

(Eng.) Schroeder, J. J. M.; James, J.; Muller, J. H.; Everts, V.; Klopper, P. J. (Histological Lab., Univ. Amsterdam, le Const. Huygenstraat 20, Amsterdam, Netherlands). *Digestion* 15(5):397-410; 1977.

The movement of the advancing sheet of epithelial cells streaming from the border region into the wound bed of standardized defects during the healing process was studied in the rat glandular stomach mucosa, using light and scanning electron microscopy. A very high synthetic activity of mucus in gastric lining cells of the border region (with a typical shift in its reaction product towards a more acidly reacting product showing metachromasia with toluidine blue) was observed histochemically, together with a loss of characteristic features of glandular cells in the border region with an increase in mitotic activity. The scanning electron microscope (SEM) images enabled a detailed analysis of the advancing epithelial front in its relation to the border regions. Considerable local differences were noted in the moving pattern of the migrating epithelium, possibly in relation to the nature of the base on which it has to move. The lesion (3 mm in diameter) usually closed after 10 days; in some instances, however, small epithelial defects were later found that could easily be traced with the SEM.

7961 CYCLIC ADENOSINE MONOPHOSPHATE AND HUMAN GASTRIC ACID SECRETION. (Eng.) Bower, R. H.; Sode, J.; Lipshutz, W. H. (Naval Regional Medical Center, San Diego, CA 92134). *Am. J. Dig. Dis.* 22 (8):705-711; 1977.

Cyclic AMP (cAMP) levels were determined by radioimmunoassay in the gastric juice, plasma, and urine of 27 subjects undergoing routine gastric analysis under maximum stimulation with betazole (1.5 mg/kg) or pentagastrin (6 μg/kg). No increase in the concentration of cAMP was noted in gastric juice, plasma, or urine following either betazole or pentagastrin stimulation. Betazole-stimulated human gastric acid secretion was associated with an increased cAMP output into the gastric juice ($p<0.05$). There was no change in cAMP output following pentagastrin stimulation. The peak acid output produced by pentagastrin and betazole was similar. The lack of increase in cAMP concentration supports the concept that cAMP is not a primary mediator in the stimulation of gastric acid secretion by betazole or pentagastrin in the human. The physiologic significance of the increase in cAMP output following betazole stimulation remains unresolved.

7962 THE EFFECT OF ANAESTHESIA ON THE INHIBITION OF PENTAGASTRIN-EVOKED GASTRIC ACID SECRETION INDUCED BY ATROPINE IN THE RAT. (Eng.) Hedges, A. R.; Parsons, M. E. (Guy's Hosp. Medical Sch., London Bridge, London SE1 9RT, England). *J. Physiol. (Lond.)* 267(1):181-194; 1977.

The effect of anesthesia on the inhibition of pentagastrin-stimulated gastric acid secretion induced by atropine was studied in rats with gastric fistulas or Heidenhain pouches. In the anesthetized vagally intact rat with a perfused gastric lumen, atropine (25 μg/kg, s.c.) inhibited maximal pentagastrin-evoked gastric acid secretion by a mean of 60.2 ± 18.5%. Submaximal pentagastrin-stimulated secretion was inhibited to a similar extent. In anesthetized vagotomized rats with a perfused gastric lumen, atropine (25 μg/kg-1.6 mg/kg, s.c.) had no inhibitory effect on maximal pentagastrin-evoked gastric acid secretion. In the conscious fistula rat, atropine (400 μg/kg) totally abolished the basal and maximal gastric acid secretion evoked by pentagastrin. In the anesthetized chronic fistula rat, doses of up to 1.6 mg/kg atropine produced a maximum inhibition of 70.2% of maximal pentagastrin-evoked gastric acid secretion. Vagotomy did not affect the response to atropine. In the conscious Heidenhain pouch rat, up to 1.6 mg/kg atropine produced a maximum inhibition of 70.9% of maximal pentagastrin-evoked gastric acid secretion. Anesthesia and/or vagotomy did not affect the response to atropine. The results indicate that anesthesia reduces the effectiveness of atropine as an inhibitor of pentagastrin-induced secretion in fistula rats but not in Heidenhain pouch rats.

7963 EFFECT OF CIMETIDINE ON PENTAGASTRIN-STIMULATED GASTRIC SECRETION IN HEALTHY MAN. (Eng.) Aadland, E.; Berstad, A.; Semb, L. S. (Aker Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(4):501-506; 1977.

The kinetics of the inhibition of pentagastrin-stimulated gastric acid and pepsin secretion by cimetidine were studied in three healthy subjects by establishing dose-response curves for both pentagastrin and cimetidine. In one series of experiments, increasing doses of cimetidine were tested on a constant background stimulation with 0.15 μg/kg/hr of pentagastrin. In another series of experiments, increasing doses of pentagastrin were given either alone or in combination with a fixed dose of cimetidine (1.2 mg/kg/hr). Pentagastrin and cimetidine were given as continuous i.v. infusions, the various doses were tested on separate days. The inhibition of acid output in response to pentagastrin stimulation increased almost linearly with the log dose of cimetidine. Fifty percent inhibition of the response to 0.15 μg/kg/hr of pentagastrin was achieved with 0.6 mg/kg/hr of cimetidine. Cimetidine at 2.4 mg/kg/hr gave an average of 90% inhibition. The inhibition caused by cimetidine decreased to a minimum of 57% and could not be overcome by increasing the doses of pentagastrin. The results suggest a mixture of competitive and noncompetitive interaction. The effect of cimetidine on pepsin secretion was less regular. Generally, pepsin output was less inhibited than acid output.

7964 LOCALIZATION OF HISTAMINE AND HISTAMINE H_2-RECEPTOR ANTAGONISTS IN THE GASTRIC MUCOSA. (Eng.) Cross, S. A. M. (Smith Kline & French Lab. Ltd., Welwyn Garden City, Hertfordshire, England). *Histochem. J.* 9(5):619-644; 1977.

Histochemical studies were done on the gastric mucosa of rats and one dog in relation to acid secretion, histamine, and the H_2-receptor antagonists. Acid secretion by the parietal cell is stimulated by histamine and inhibited by the histamine H_2-receptor antagonist. Whole-body autoradiography showed that radioactivity from ^{14}C-histamine was localized in the artery walls and in the muscularis mucosae, but that the level in the fundic mucosa was the same as that in the blood. When the H_2-receptor antagonists burimamide (33-150 mg/kg, 11 rats), metiamide (10-150 mg/kg), and cimetidine (30 mg/kg) were labeled with ^{35}S, ^{14}C, or ^{3}H and administered p.o. to rats, whole-body autoradiography showed that stomach was predominately labeled in the glandular mucosa 5-120 min after administration. Microautoradiography in the rat and dog after the i.v. injection of ^{3}H-metiamide (1 mCi/150 g; 55 mg/kg) or ^{3}H-cimetidine (1 mCi/150 g; 66 mg/kg) demonstrated an uptake in the parietal cell cytoplasm that was three to four times greater than that found in adjacent peptic cells or in areas of the muscularis mucosa. The preferential labeling persisted at a low level up to 6 hr after injection. However, the mast cells were labeled in the rats, but not in the dog. The localization of radioactivity from the H_2-receptor antagonists in the parietal cell cytoplasm correlates well with their pharmacological activity in preventing acid secretion from this cell.

7965 EVIDENCE FOR ANTRAL INHIBITION OF PENTAGASTRIN FROM EXPERIMENTS USING MUCOSAL COOLING. (Eng.) Kondo, T.; Magee, D. F. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *J. Physiol.* 270(1):37-50; 1977.

The effect of a temperature change in the pyloric and Heidenhain pouches (HP) on acid and pepsin secretion from both the HP and the main stomach of dogs was studied. In response to pentagastrin (PG), the acid secretion of the fundic mucosa in HP gradually lessened as the pouch mucosa was cooled to 5 C. When a cooled HP in dogs receiving PG was warmed to 37 C, acid and pepsin secretion from the main stomach was depressed. Change from a warm to a cool temperature produced no obvious effect. In animals receiving PG continuously, but not in those receiving histamine, lowering the temperature in a fully innervated antral pouch or the application of local anesthetics to its mucosa increased acid and pepsin secretion from the main stomach. This effect could be abolished readily by ganglionic and β-adrenergic blockade, but not by a bilateral vagal block in the neck, which suggests the existence of a sympathetically mediated inhibitory mechanism of pyloric origin. The effect of indirect vagal stimulation, using 2-deoxy-D-glucose, on secretion from the main stomach was augmented by pyloric antral local anesthesia and depressed by antral cooling. It is concluded that cooling, local anesthesia, or β-adrenergic blocking agents do not interfere with, or modify, one another with respect to acid and pepsin secretion.

7966 EFFECTS OF TANDAMINE AND PIRANDAMINE, SELECTIVE BLOCKERS OF BIOGENIC AMINE UPTAKE MECHANISMS, ON GASTRIC ACID SECRETION AND ULCER FORMATION IN THE RAT. (Eng.) Lippmann, W.; Seethaler, K. (Ayerst Res. Lab., Box 6115, Montreal, Quebec, Canada H3C 3JI). *Life Sci.* 20(8): 1393-1400; 1977.

The effects of tandamine and pirandamine and various of their structurally-related compounds on gastric acid secretion and ulcer formation were studied in the rat. Tandamine and its structurally-related compounds, but not pirandamine or its structurally-related compound, given i.p. (0.5 ml), inhibited gastric acid secretion and were similar in activity to imipramine (4 mg/kg, p.o.). Like imipramine, tandamine (0.2 ml) was effective when given p.o. None of the compounds examined, administered i.p., were effective in reducing the ulcer formation in 19-hr pylorus-ligated animals, while imipramine was effective. Tandamine, like imipramine, inhibited ulcer formation in 10-hr pylorus-ligated animals and in 19-hr pylorus-ligated animals when given in divided doses. Tandamine and its structurally-related compounds, but not pirandamine or its structurally-related compound, given s.c., prevented reserpine-induced gastric ulceration; imipramine was also effective. Tandamine and imipramine, administered i.p., prevented gastric stress ulceration. The compounds that block the norepinephrine, or in addition the serotonin, uptake mechanism, but not those that block only the serotonin uptake mechanism inhibited the gastric acid secretion and reserpine-induced ulceration. Thus, these latter activities appear to be correlated with the inhibition of the norepinephrine, rather than serotinin, uptake mechanism.

7967 VAGAL INFLUENCE ON GASTRIN AND GASTRIC ACID RESPONSES TO GASTRIC AND INTESTINAL MEALS. (Eng.) Konturek, S. J.; Llanos, O. L.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Physiol.* 232(6):E542-E546; 1977.

To study the vagal influence on gastrin and gastric acid responses to gastric and duodenal meals, five dogs were prepared with a special gastroduodenal cannula that allowed complete separation and selective stimulation of the stomach or the duodenum. The stomach or duodenum was stimulated with a 10% liver extract meal, and serum gastrin levels and acid secretions were determined. Prior administration of atropine sulfate (100 μg/kg/hr) in dogs with intact vagus nerves caused about 80% inhibition of acid secretion during the gastric phase and complete suppression of acid secretion during the intestinal phase. In these tests, atropine strongly suppressed serum gastrin levels during the gastric phase, but failed to inhibit the gastrin response in the intestinal phase. Truncal vagotomy had a weak effect on acid secretion and gastrin release during the gastric phase, but resulted in a pronounced increase in gastric acid secretion and higher levels of gastrin during the intestinal phase. Atropine in vagotomized dogs caused a similar reduction in gastric acid secretion in gastric and intestinal phases, but was more effective in blocking gastrin release in both phases after vagotomy. This study indicates that in the intact dogs, an atropine-sensitive mechanism for gastrin release is confined to the stomach, whereas an atropine-resistant mechanism is located in the intestine. After vagotomy, gastrin release in the gastric or intestinal phase becomes more atropine sensitive, which suggests that the vagus nerves exert an inhibitory influence on local cholinergic mechanisms responsible for the postprandial release of gastrin.

7968 STUDIES ON THE ROLE OF CEPHALIC-VAGAL STIMULATION IN THE ACID SECRETORY RESPONSE TO EATING IN NORMAL HUMAN SUBJECTS. (Eng.) Richardson, C. T.; Walsh, J. H.; Cooper, K. A.; Feldman, M.; Fordtran, J. S. (Univ. Texas Southwestern Medical Sch., Dallas, TX 75235). *J. Clin. Invest.* 60(2): 435-441; 1977.

The importance of cephalic-vagal stimulation in the acid secretory response to eating was studied in nine normal subjects. Cephalic stimulation was induced by a modified sham feeding (MSF) technique, during which subjects chewed and expectorated appetizing food. The response to MSF was compared with that to gastric distention with 600 ml NaCl, glucose, or food. In addition, the extent to which cephalic stimulation augmented acid secretion that had been stimulated simultaneously by these other mechanisms was studied. Cephalic stimulation accounted for approximately one-third of the acid secreted when all mechanisms acted simultaneously (food-distention plus MSF). Within the limits imposed by the maximal secretory capacity, the response to MSF was approximately the same, regardless of whether acid secretion was otherwise unstimulated or was stimulated simultaneously by gastric distention with NaCl, glucose, or food. Gastric distention prolonged the response to cephalic stimulation ($p<0.05$). Since cephalic-vagal stimulation accounts for one-third of the acid secreted when all mechanisms act simultaneously, increased vagal activity secondary to cephalic influences is an important mediator of acid secretion during and after a meal.

7969 GASTRIC MUCINOUS SECRETION UNDER VARIOUS CONDITIONS OF STIMULATION IN HYPOTHYROID DOGS. (Eng.) Kowalewski, K.; Pachkowski, T.; Secord, D. C. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta T6G 2N8, Canada). *Pharmacology* 15(4):348-358; 1977.

The effect of hypothyroidism on the gastric secretion of mucinous components and of amino acids was studied in dogs. Principal glycoproteins and amino acids of the secretions from Heidenhain pouches were studied in normothyroid and hypothyroid dogs in the resting state, following the injection of pentagastrin (6 μg/kg) or histamine (1 mg/kg) and after feeding. Hypothyroidism was produced by total thyroidectomy and chronic treatment with thiouracil. All samples showed the presence of galactose, glucosamine, galactosamine, fucose, mannose, uronic acid, and sulfate. Galactose and glucosamine were found in equimolar amounts, and the galactose to galactosamine ratio was 2:1; this ratio was not affected significantly by hypothyroidism or by the mode of gastric stimulation. Concentrations of most carbohydrate components studied were higher in normothyroid than in hypothyroid dogs. Concentrations of most amino acids analyzed were also higher in normothyroid than in hypothyroid dogs, following stimulation with secretagogues.

7970 THE EFFECT OF THE ABDOMINAL VAGAL NERVE AND ANTRAL AND DUODENAL ACIDIFICATION ON SERUM GASTRIN LEVELS IN DOGS. (Jpn.) Niki, K. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Shikoku Acta Med.* 33(1):23-35; 1977.

7971 PRELIMINARY RESULTS OF THE STUDY OF GASTRIN LEVELS IN THE SERUM AND MUCOSA IN NORMALCY AND FOLLOWING ANTRAL DISTENTION. [Abstract]. (Fre.) Blasi, A.; Catalano, F.; Marletta, F. (Faculte de Medecine de Catania, Catania, Italy). *Gastroenterol. Clin. Biol.* 1(5):490; 1977.

7972 POSSIBLE ROLE OF ADRENALIN IN THE STIMULATION OF GASTRIN SYNTHESIS AND SECRETION. (Rus.) Bassalyk, L. S.; Kertsman, V. I. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 49(2):39-40; 1977.

7973 RETENTION OF AN ANTACID IN THE STOMACH. ENDOSCOPIC OBSERVATION. (Ger.) Semler, P. (Rudolf-Virchow-Krankenhaus, Augustenburger Platz 1, D-1000 Berlin 65, W. Germany). *Munch. Med. Wochenschr.* 118(39):1251-1252; 1976.

7974 MITOCHONDRIAL MONOAMINE OXIDASE IN THE BRAIN, STOMACH AND LIVER IN EXPERIMENTAL GASTRIC ULCER AND CHANGE OF ITS ACTIVITY UNDER THE INFLUENCE OF QUATERON (AMMONIUM TRIETHYL[3-HYDROXY-2-METHYLBURYL]-IODINE p-BUTOXY-BENZOATE). (Rus.) Virabian, T. L. (Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 16(5):11-19; 1976.

7975 THE QUANTITATIVE CHANGES OF DOG GASTRIC JUICE PROTEASES DURING STOMACH ULCERATION. (Rus.) Amirov, N. Sh.; Antonov, D. V.; Trubitsyna, I. E. (Central Res. Inst. Gastroenterology, Moscow, USSR). *Biull. Eksp. Biol. Med.* 83(4):408-411; 1977.

7976 EFFECTS OF LS-519 ON THE SPONTANEOUS CHLORHYDROPEPTIC SECRETION OF RATS WITH SUBACUTE GASTRODUODENAL ULCERATION: STUDIED ACCORDING TO LAI'S TECHNIQUE. (Spa.) Aznar Lopez, J.; Sanchez de la Cuesta y Alarcon, F.; Alemany Ontiveros, J. R.; Garrido Toro, A.; Bartlett Coma, A. (Instituto de Medicina Experimental de C. H. Boehringer sohn Ingelheim, S. A. E. Barcelona, Spain). *Med. Clin. (Barcelona)* 65(10):517-522; 1975.

7977 ANALYSIS OF REGULATION OF GASTRIC SECRETION. (Rus.) Klimov, P. K.; Boiko, N. S.; Fokina, A. A. (Pavlov's Inst. Physiology, Acad. Science USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(5):715-722; 1977.

7978 ROLE OF GASTRIC MUCOSA MAST CELLS IN THE SECRETORY PROCESS. (Rus.) Uspensky, V. M.; Grinevich, V. B. (S. M. Kirov Military-Medical Acad., Leningrad, USSR). *Vrach. Delo* (5):21-25; 1977.

7979 ^{14}C-GLYCINE AND ^{35}S-METHIONINE INCORPORATION IN THE PROTEINS OF HEPATIC AND GASTRIC MUCOSA CELLS IN EXPERIMENTAL TREATMENT OF ULCERATIVE LESIONS OF THE STOMACH WITH SPERM OIL. (Rus.) Sarkisyan, E. L.; Budantseva, S. I.; Kalinichenko, N. I. (I. P. Pavlov Medical Inst., Ryazan, USSR). *Farmakol. Toksikol.* 40(2):196-200; 1977.

7980 ROLE OF CAUDATE NUCLEI IN STOMACH RESPONSE TO PROLONGED PAIN STIMULATION. (Ukr.) Grechishkina, A. P. (Medical Inst., Voroshilovgrad, USSR). *Fiziol. Zh.* 22(4):499-504; 1976.

7981 EFFECT OF QUATERON ON THE ACTIVITY OF MITOCHONDRIAL MONAMINOXIDASES IN VARIOUS PARTS OF THE NEURODYSTROPHIC STOMACH. (Rus.) Mirzoyan, S. A.; Virabyan, T. L. (Yerevan Medical Inst., Yerevan, USSR). *Farmakol. Toksikol.* 40(2): 193-196; 1977.

See also, 7908, 7909, 7945, 7956, 8068, 8104, 8105, 8106, 8146, 8162, 8171, 8180, 8181, 8183, 8492, 8499.

SECRETION AND METABOLISM

Pancreas

7982 CHRONIC AND ACUTE STUDIES INDICATING ABSENCE OF EXOCRINE PANCREATIC FEEDBACK INHIBITION IN DOGS. (Eng.) Sale, J. K.; Goldberg, D. M.; Fawcett, A. N.; Wormsley, K. G. (Royal Hosp., Sheffield, England). *Digestion* 15(6):540-555; 1977.

Experiments were carried out to determine whether the proposed feedback control of pancreatic enzyme secretion could be demonstrated in dogs. The chronic administration of raw soybean flour (24% of diet) containing active trypsin inhibitor reduced the pancreatic output of trypsin and chymotrypsin in response to cholecystokinin. Dogs stimulated by a meat meal showed no consistent alteration in the output of trypsin and chymotrypsin when given additional duodenal infusions of trypsin and chymotrypsin, canine pancreatic juice, or ovalbumin trypsin inhibitor. When the pancreas was stimulated by the intraduodenal infusion of amino acids in two dogs, no consistent change was seen when trypsin alone, trypsin together with trypsin inhibitors, or trypsin together with canine pancreatic juice was infused concurrently into the duodenum. These results indicate that feedback control of pancreatic enzyme secretion does not exist in dogs.

7983 INTERACTION OF SYNTHETIC 10-TYROSYL ANALOGUES OF SECRETIN WITH HORMONE RECEPTORS ON PANCREATIC ACINAR CELLS. (Eng.) Gardner, J. D.; Conlon, T. P.; Beyerman, H. C.; van Zon, A. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, NIH, Bethesda, MD 20014). *Gastroenterology* 73(1): 52-56; 1977.

To determine the structural requirements for various peptides to interact with hormone receptors, four synthetic secretin analogs (10-tyrosine; 4-alanine, 10-tyrosine; 3-glutamine, 10-tyrosine; and 3-glutamic acid, 10-tyrosine) were tested for their ability to interact with hormone receptors on dispersed acinar cells from guinea pig pancreas. [10-Tyrosine]secretin inhibited the binding of ^{125}I vasoactive intestinal peptide (VIP) to the same extent as native secretin. Thus, substituting tyrosine for leucine in position 10 of porcine secretin makes the peptide structurally more like porcine VIP, but it does not make the peptide more VIP-like in terms of its ability to interact with the high-affinity VIP receptor. Although VIP has alanine in position 4, substituting alanine for glycine in position 4 of [10-tyrosine]secretin made the peptide functionally less VIP-like in that it reduced the ability of the peptide to inhibit ^{125}I VIP binding. Each of the four analogs interacted with the high-affinity secretin receptor to increase cellular accumulation of cyclic AMP. The 10-tyrosine analog was approximately one-tenth as potent as secretin. In [10-tyrosine]secretin, adding one methyl group to the side chain of the amino acid in position 4 (replacing glycine by alanine) or interposing a methyl group in the acidic side chain of the residue in position 3 (replacing aspartic acid by glutamic acid) reduced the apparent affinity of the peptide for the high-affinity secretin receptor by 15- or 40-fold, resp. These results illustrate how changes in the amino-terminal region of secretin, which in terms of peptide structure might appear to be relatively trivial, can produce substantial changes in the apparent affinity of secretin for its receptors.

7984 INDEPENDENT SECRETION OF DIFFERENT DIGESTIVE ENZYMES BY THE PANCREAS. (Eng.) Rothman, S. S. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Am. J. Physiol.* 231(6): 1847-1851; 1976.

Pancreatic amylase, chymotrypsinogen, trypsinogen, and total protein levels were determined in the secretion collected from the cannulated duct of anesthetized rabbits during the perfusion of the upper duodenum with a balanced salt solution with or without 5 mM glucose. While glucose did not increase overall digestive enzyme secretion, it did change the proportions of the enzymes in secretion. In addition, non-0,0 intercepts were observed when the output of one enzyme was plotted against that of another (an enzyme-pair plot). There were also changes in the variance of the slope and intercept of enzyme-pair plots and an increase in the variance around the slope of an enzyme-pair plot, concurrent with a decrease in the variance around the slope of a plot for another enzyme pair that contained a common member. These observations suggest that different digestive enzymes can be secreted independently of each other.

7985 REGULATION OF AMYLASE RELEASE FROM DISPERSED PANCREATIC ACINAR CELLS. (Eng.) Gardner,

J. D.; Jackson, M. J. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *J. Physiol. (Lond.)* 270(2):439-454; 1977.

Factors influencing the release of amylase from dispersed pancreatic acinar cells were studied in the guinea pig pancreas. In the basal, unstimulated condition, cells released 2-3% of the total amylase present in 30 min. The rate of amylase release was stimulated 50-70% by C-terminal octapeptide of cholecystokinin (CCK-OP, maximally effective concentration, 3 x 10^{-10} M), carbamylcholine (maximally effective concentration, 10^{-5} M), secretin (maximally effective concentration $>10^{-6}$ M), vasoactive intestinal peptide (VIP, maximally effective concentration, 10^{-8} M), and cyclic AMP and guanosine 3',5' monophosphate (cyclic GMP), as well as their dibutyryl derivatives (maximally effective concentrations, 10^{-3} M). The responses to CCK-OP or carbamylcholine were potentiated by secretin, VIP, or dibutyryl cyclic AMP. The responses to secretin or VIP were potentiated by CCK-OP, carbamylcholine, or dibutyryl cyclic GMP. There appear to be two pathways for the regulation of amylase release from pancreatic acinar cells. One pathway can be stimulated by cholecystokinin or cholinergic agonists, and the response to these stimuli is mediated by cyclic GMP; the other pathway can be stimulated by secretin or VIP, and the response to these stimuli is mediated by cyclic AMP.

7986 LACK OF ADAPTATION OF PANCREATIC COLIPASE IN RATS AND MICE. (Eng.) Vandermeers-Piret, M. C.; Vandermeers, A.; Wijns, W.; Rathe, J.; Christophe, J. (Free Univ. Brussels Medical Sch., 1000 Brussels, Belgium). *Am. J. Physiol.* 232(2): E131-E135; 1977.

To study the regulation of pancreatic colipase in lipid and carbohydrate metabolism, a new automated potentiometric method for the determination of colipase was developed. The method takes advantage of the reactivation of purified lipase in the presence of bile salt and at pH 6.5. High-fat and high-starch diets induced an opposite regulation of lipase and amylase in the rat pancreas. The level of colipase, however, was not influenced by nutrition. During fasting and in alloxan diabetes, the specific activity of lipase almost doubled, that of amylase decreased sharply (from 234 ± 15 to 101 ± 5 pmol/mg protein during fasting; to 80 ± 9 pmol/mg protein in alloxan diabetes), and colipase was not affected in the rat pancreas. In obese hyperglycemic mice with hyperinsulinism and moderate diabetes, there was also no regulation of pancreatic colipase. Thus, at variance with a number of hydrolases, there was no dietary or hormonal adaptation of colipase. However, this was probably without any bearing on intraluminal lipolysis. In fact, comparison of lipase and colipase activities in the pancreas and small intestine suggests that colipase concentration is not a limiting factor of intraluminal lipolysis.

7987 AMINO ACID TRANSPORT IN THE RAT EXOCRINE PANCREAS. I. TRANSPORT OF NEUTRAL AMINO ACIDS AND THEIR UTILIZATION IN PROTEIN SYNTHESIS. (Eng.) Bieger, W.; Peter, S.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Cell Tissue Res.* 180(1):31-44; 1977.

In an effort to determine the significance of extracellular and intracellular amino acid pools for incorporation into proteins, the transport and utilization of three neutral amino acids in protein synthesis was studied in the rat, using isolated pancreatic lobules incubated *in vitro*. The extracellular and intracellular amino acid pools in this process were analyzed by removing the extracellular pool (labeled with inulin) by a cold-wash procedure. This procedure was especially useful in short-term experiments. Double-labeling experiments indicated a predominant utilization of the intracellular amino acid pool during protein synthesis. The advantage of studying isolated pancreatic lobule preparations compared to tissue fragments or slices was emphasized by fine structural analysis. Using freeze-etching techniques on the same preparations, differences described earlier in the distribution of membrane particles between luminal and lateral plasma membranes were confirmed, as was the occurrence of abundant gap junctions on both membrane faces.

7988 CONDITION OF THE EXOCRINE FUNCTION OF THE PANCREAS IN AGEING OF MAN. (Rus.) Valenkevich, L. N. (Leningrad Inst. Pediatric Medicine, Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 21(9):11-15; 1976.

7989 PARTICIPATION OF PANCREATIC RIBONUCLEASE IN DIGESTIVE PROCESSES. (Rus.) Adigamov, L. F.; Solovieva, G. I.; Lebedev, D. A. (Inst. Nutrition, USSR Acad. Sciences, Moscow, USSR). *Vopr. Pitan.* (4):20-25; 1976.

7990 EFFECT OF LYMPH DRAINAGE FROM THE THORACIC DUCT ON ACUTE PANCREATITIS IN ANIMAL EXPERIMENTS. (Ger.) Konstantinov, B.; Jantschulev, J. (Wissenschaftlich-praktischen Institut fur Notfallmedizin "N. I. Pirogov," Totlebenstrasse 21, Sofia, Bulgaria). *Z. Exp. Chir.* 10(2):84-89; 1977.

7991 AUTOAGGRESSION IN CHRONIC PANCREATITIS. (Ger.) Templin, B. U.; Harms, L.; Nizze, H.; Schutt, Chr. (Institut fur Physiologische Chemie, der Wilhelm-Pieck-Universitat, Lenialle 70, DDR-25 Rostock, E. Germany). *Dtsch. Gesundheitswes.* 32(12):569-572; 1977.

See also, 8125, 8182, 8267, 8272, 8279, 8401.

Hepatobiliary Tract

7992 AN IMPROVED METHOD FOR THE ISOLATION OF HEPATOCYTES FROM LIVER SLICES: SELECTIVE REMOVAL OF TRYPAN BLUE-DYEABLE CELLS.

(Eng.) Bellemann, P.; Gebhardt, R.; Mecke, D. (Physiologisch-chemisches Institut der Universitat, Hoppe-Seyler-Strasse 1, D-7400 Tubingen, W. Germany). *Anal. Biochem.* 81(2):408-415; 1977.

An improved nonperfusion method for the isolation of hepatic parenchymal cells using a modified technique of collagenase/hyaluronidase digestion with liver slices is described. The yield of viable cells was considerably increased (30 x 10^6 cells/g liver) by bubbling all solutions with carbogen (95% O_2 and 5% CO_2) and by adding 100 mg% of glucose to all buffers used. Trypan blue-dyeable cells were selectively removed by a short trypsin-deoxyribonuclease incubation following the isolation procedure yielding a conspicuously high (>96%) viability index. The hepatocytes were ultrastructurally normal, and the cell suspension preserved their hormone sensitivity, as confirmed by insulin stimulation of the oxidative glucose metabolism. This simple method for isolating large numbers of viable cells may potentially be important for use with small liver pieces, such as biopsy samples, and it is suitable for maintaining hepatocytes in primary monolayer cultures to study enzyme regulation at the cellular level *in vitro*.

7993 A NOVEL PHYSIOLOGICAL ROLE OF LIVER GLUTATHIONE AS A RESERVOIR OF L-CYSTEINE.

(Eng.) Higashi, T.; Tateishi, N.; Naruse, A.; Sakamoto, Y. (Osaka Univ. Medical Sch., Fukushima-ku, Osaka 553, Japan). *J. Biochem. (Tokyo)* 82(1):117-124; 1977.

To verify the presence of more than one pool of glutathione in the liver, rats were fed a diet containing L-[^{35}S]cysteine. After chasing and exhaustion of the ^{35}S-label, a second diet containing L-[3,3-^{3}H]cystine was given. Subsequent starvation of the rats revealed differential decay of the ^{35}S and the ^{3}H incorporated into liver glutathione; the ^{3}H (incorporated later) disappeared rapidly on starvation, while a large portion of the ^{35}S (incorporated earlier) remained in the glutathione and did not disappear. A concomitant increase of ^{3}H-label in hepatic proteins during starvation indicated that cysteine derived from glutathione was probably incorporated into proteins. Analysis of the decay curve of the ^{35}S-labeled cysteine moiety of liver glutathione under normal feeding conditions revealed at least two types of glutathione with different apparent biological half-lives of 1.7 and 28.5 hr. Precipitous decay of ^{35}S-glutathione in the initial phase of starvation was accompanied by a rise in incorporation of ^{35}S into proteins. To prove the existence of the mobilization of the cysteine moiety of liver glutathione, rats were fed a gelatin-diet containing ^{35}S-cysteine followed by a tryptophan-fortified diet. Ingestion of the tryptophan diet induced a decrease in accumulated glutathione and increase of ^{35}S-label in hepatic and serum proteins, especially in serum albumin. There appear to be at least two pools of glutathione, one of which is labile and the other stable in a metabolic sense. The cysteine moiety of the labile liver glutathione is mobilized for protein synthesis when the amount of cysteine becomes rate-limiting. Otherwise, cysteine continues to be stored in liver glutathione. The stable pool of glutathione must serve for many reactions requiring sulfhydryl compounds in the liver.

7994 THE ROLE OF IRON IN THE REGULATION OF HEPATIC TRANSFERRIN SYNTHESIS.

(Eng.) Morton, A. G.; Tavill, A. S. (Dept. Biochemistry, Univ. Edinburgh Medical Sch., Teviot Place, Edinburgh EH8 9AG, Scotland). *Br. J. Haematol.* 36(3): 383-394; 1977.

The role of iron supply in the regulation of hepatic transferrin synthesis by the isolated perfused livers from male Sprague-Dawley rats was studied using nutritional iron deficiency as the experimental model. Nutritional iron deficiency (ID) caused a severe anemia when experimental and control animals were compared (hemoglobin, 5.0 ± 0.3 and 15.7 ± 0.4 g/dl for ID and control rats, resp.) and was associated with low plasma iron (8 ± 1 versus 41 ± 3 μM, $p<0.001$), raised plasma total iron-binding capacity (TIBC, 182 ± 7 versus 122 ± 7 μM, $p<0.001$), and reduced hepatic ferritin iron concentration (4.4 ± 0.5 versus 1.8 ± 0.2 μmol/10 g liver weight, $p<0.001$). The elevated plasma TIBC was accompanied by a significant increase in the transferrin release rate of ID animals as compared to controls (1.99 ± 0.26 versus 0.83 ± 0.06 mg/hr/10 g liver weight, $p<0.01$), whereas there was no significant change in the albumin release rate. The increased transferrin release was equated with enhanced *de novo* synthesis as evidenced by the inhibitory effect of cycloheximide (rate of transferrin release reduced to 25%) and by measurements of intrahepatic protein pools before and after perfusion that indicated a linear appearance of protein during the course of perfusion. Refeeding with iron (250 mg/kg diet for 24-48 hr before sacrifice) restored hepatic ferritin iron to the control level and increased total plasma iron beyond the control level ($p<0.01$-0.02) but did not significantly change the hemoglobin level or the transferrin release rate, although the latter was reduced towards normal. Transfusional correction (5-6 ml of a 0.5 packed cell volume of rat red cells given twice) of the anemia did not correct the plasma iron, plasma TIBC, or hepatic ferritin iron levels as compared with controls, nor was the transferrin release rate normalized (1.93 ± 0.21 and 0.71 ± 0.05 mg/hr/10 g liver weight, $p<0.001$). Phenobarbitone treatment (1 g/l in drinking water for 21 days before sacrifice and simultaneous with the respective diets) produced a marked fall in total hepatic iron concentration (4.5 ± 0.4 versus 11.8 ± 1.5 μmol/10 g liver weight for 10 and control animals, resp.,

$p<0.02$) but no improvement in hemoglobin, total plasma iron, or plasma TIBC concentrations, and it promoted a specific enhancement of transferrin release in both control and iron deficient livers. The concentration of liver iron stores appears to be a major regulatory factor in the control of hepatic transferrin synthesis.

7995 EFFECT OF A PITUITARY PEPTIDE ON LIVER TISSUE RESPIRATION. (Eng.) Landaburu, R. H.; De Lamo, R. (Wayne State Univ., Sch. Medicine, Detroit, MI 48201). *Proc. Soc. Exp. Biol. Med.* 155(3):377-381; 1977.

The capacity of a pituitary peptide to stimulate the liver was investigated in tissue respiration studies. Peptide concentrates stimulated oxygen uptake of rat liver slices by 20-40%. The stimulating effect appeared to be specific for the liver. The response of liver tissue was used to study the releasing mechanism of the peptide from the hypophysis. Cortisol (5×10^{-6} M) increased liver slice oxygen uptake only when pituitary tissue was included in the mixture. Epinephrine (2×10^{-7} M) produced the same results only when pituitary and hypothalamus tissue were included. The results support the conclusion that the pituitary peptide is a specific distinct substance that can be released from the hypophysis by cortisol or as a consequence of hypothalamus stimulation by epinephrine.

7996 STUDIES ON THE EFFECTS OF E. coli ENDOTOXIN ON CANALICULAR BILE FORMATION IN THE ISOLATED PERFUSED RAT LIVER. (Eng.) Utili, R.; Abernathy, C. O.; Zimmerman, H. J. (First Medical Sch., Naples, Italy). *J. Lab. Clin. Med.* 89(3):471-482; 1977.

This study was designed to determine the basic mechanisms underlying endotoxin-mediated cholestasis. The isolated liver from male CD rats was perfused without added taurocholate. After 30 min of perfusion, *E. coli* endotoxin (1 or 2 mg/100 ml) was added to the perfusate followed 15 min later by a 20-mg bolus of BSP. Bile and perfusate samples were taken over the next 45 min, and BSP clearance in the bile salt-independent bile flow (BSIF) was assessed. At 1 mg/100 ml, endotoxin decreased BSP excretion, expressed as total BSP, by 38% and increased the half-life of BSP in the recirculating perfusate by 26%. At 2 mg/100 ml, endotoxin caused a rapid decrease in biliary output as well as a slight decrease in bile salt excretion. Since the bile salt concentration in the bile increased simultaneously, it was concluded that the decreased bile flow was mainly due to a reduction in BSIF.

7997 SERUM BILE ACID ANALYSIS: A RAPID, DIRECT ENZYMATIC METHOD USING DUAL-BEAM SPECTROPHOTOFLUORIMETRY. (Eng.) Siskos, P. A.; Cahill, P. T.; Javitt, N. B. (New York Hosp.-Cornell Medical Center, New York, NY). *J. Lipid Res.* 18(5): 666-671; 1977.

The direct quantitative measurement of total bile acids in serum was achieved using an enzymatic fluorescent method with a dual-beam spectrophotofluorimeter. Using a 3α-hydroxysteroid dehydrogenase, oxidation of bile acids with NAD is completed in 200 sec, the observed NADH fluorescence being proportional to the concentration of serum bile acids. This method is rapid (8 min/individual sample), has an intrinsic sensitivity of ± 1 μM of total bile acids, and requires no sample preparation and less than 0.8 ml of serum. Paired data analysis using enzymatic fluorescence and gas-liquid chromatographic methods gives a correlation coefficient of 0.99 for 34 samples over the range 2-530 μM.

7998 EFFECT OF TYPE AND AMOUNT OF DIETARY FAT AND 1,2-DIMETHYLHYDRAZINE ON BILIARY BILE ACIDS, FECAL BILE ACIDS, AND NEUTRAL STEROLS IN RATS. (Eng.) Reddy, B. S.; Mangat, S.; Sheinfil, A.; Weisburger, J. H.; Wynder, E. L. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, NY 10595). *Cancer Res.* 37(7):2132-2137; 1977.

The effect of the source (corn oil or lard) and the quantity (5% or 20%) of dietary fat in combination with 1,2-dimethylhydrazine (DMH) administration on the composition of biliary bile acids, fecal bile acids, and neutral sterols was studied in rats exposed to a given dietary regimen for two generations prior to s.c. treatment with DMH (10 mg/kg body weight once a week for 20 weeks). Biliary excretion of total bile acids as well as cholic acid, β-muricholic acid, ursodeoxycholic acid, and deoxycholic acid was higher in rats fed a diet containing 20% corn oil or lard than it was in rats fed diets containing 5% corn oil or lard ($p<0.05$). Treatment of animals with DMH produced an increase in biliary total bile acids, cholic acid, hyodeoxycholic acid, and deoxycholic acid irrespective of diets ($p<0.05$). High-fat (corn oil or lard at 20% level) intake was associated with an increased excretion of fecal neutral sterols and bile acids. The excretion of deoxycholic acid, lithocholic acid, and 12-ketolithocholic acid was increased in rats fed high-fat diets. The source of fat had no major influence on the excretory pattern of cholesterol metabolites and bile acids. DMH-treated animals excreted higher levels of fecal coprostanol, coprostanone, deoxycholic acid, lithocholic acid, and 12-ketolithocholic acid than did controls. The results suggest that high dietary fat levels increase the hepatic synthesis and/or metabolism of cholic acid, β-muricholic acid, ursodeoxycholic acid, and deoxycholic acid and thereby increase the biliary levels of these bile acids.

7999 HEPATIC ENZYMES, THEIR INDUCTION AND USEFULNESS IN PREDICTING MAXIMAL SERUM BILIRUBIN LEVELS IN PREMATURE NEWBORN INFANTS. (Eng.) Bartels, H.; Fenner, A.; van der Merwe, W.; Barbalatt, S.; Wolfsdorf, J. (Dept. Pediatrics, Univ. Kiel, Frobelstrasse 15, D-2300 Kiel, W. Germany). *Eur. J. Pediatr.* 125(2):97-102; 1977.

The effectiveness of phenobarbitone and nikethamide in lowering the serum bilirubin level(s) (SBL) in neonatal hyperbilirubinemia of nonhemolytic origin was investigated along with the usefulness of serum hepatic enzyme activity measurements in predicting maximum SBL. Twenty-two infants were given nikethamide (100 mg/kg/day, p.o., 6 divided doses) from the age of 6 hr for 4 days and phenobarbitone (10 mg/kg/day, p.o., 2 divided doses) for 3 days. Twenty-two infants were not treated, and they served as controls. During the first week of life, mean maximum SBL in control infants were achieved by day 5, but the levels in the treated group showed a constant decline from day 3 onward. The mean SBL for the two groups were significantly different from day 3 onward. In controls, nine total SBL were between 12 and 18 mg%, but only one such level (12.7 mg%) was recorded in the treated group. From day 4 onward, the difference between the means was ≥ 4 mg%. A significant correlation ($p<0.05$) was found between the day 1 serum γ-glutamyl transferase (SGGT) level and the mean SBL. A significant correlation was also found between birth weight and mean SBL ($p<0.05$). When the ratio of the log of SGGT activity (day 1) to birth weight was calculated, the significance of the correlation with mean SBL increased ($p<0.01$). No infant with a log SGGT/birth weight ratio of <0.9 on the first day of life achieved an SBL of >12 mg%, but all but two infants with ratios >1.1 on day 1 eventually reached mean SBL >12 mg%.

8000 HEPATIC SECRETION AND TURNOVER OF SERUM PHOSPHATIDYLCHOLINE-CHOLESTEROL ACYLTRANSFERASE IN MALE AND FEMALE RATS.

(Eng.) Soler-Argilaga, C.; Russell, R. L.; Goh, E. H.; Heimberg, M. (Univ. Missouri, Sch. Medicine, Columbia, MO 65201). *Biochim. Biophys. Acta* 488(1):69-75; 1977.

Hepatic secretion and turnover of serum phosphatidylcholine-cholesterol acyltransferase (LCAT) were studied in male and female Sprague-Dawley rats. When serum LCAT activity was measured in fasted and fed male and female rats under conditions designed to reduce the influence of the serum substrate on LCAT activity, this activity (nmol cholesterol esterified/ml serum/hr) was higher in the serum of fed rats (42.1 ± 1.2 and 38.8 ± 1.4 for males and females, resp.) than in the serum of rats fasted for 24 hr (29.2 ± 1.7 and 30.0 ± 1.4, resp.). The differences between sexes were not significant. Total LCAT activity (nmol cholesterol esterified/3-hr incubation) released by perfused isolated livers from fasted rats increased linearly with perfusion time and was significantly ($p<0.01$) higher from female livers than from male livers, with the respective values being 70+ versus 60 at 90 min of perfusion. When LCAT activity was expressed per gram liver, the differences were amplified ($p<0.001$). Perfused livers from fasted male rats pretreated with colchicine (CC, 0.5 mg/100 g i.p.) 3 hr prior to perfusion showed a significantly ($p<0.001$) reduced rate of LCAT output with respect to livers from non-CC-treated males (<10 nmol cholesterol esterified/3-hr incubation at 90 min of perfusion). Pretreatment of fasted rats with CC (0.5 mg, i.p.) resulted in a progressive decrease of serum LCAT activity 0.5, 1, 2, and 4 hr later. The half-life for LCAT activity decay was 13.2 ± 2.5 hr for males and 6.9 ± 0.9 hr for female rats. The fractional turnover rate of about 0.05 hr for males and 0.10 hr for females suggests that the LCAT inactivation rate, or disappearance of LCAT from the serum compartment, was higher in female rats. When CC was added to the serum enzyme at concentrations that might have been reached *in vivo* after drug injection, LCAT activity was unaffected, indicating that CC did not inhibit the enzyme directly.

8001 DISSOLUTION KINETICS OF CHOLESTEROL IN SIMULATED BILE. I: INFLUENCE OF BILE ACID TYPE AND CONCENTRATION, BILE ACID-LECITHIN RATIO, AND ADDED ELECTROLYTE.

(Eng.) Kwan, K. H.; Higuchi, W. I.; Molokhia, A. M.; Hofmann, A. F. (Coll. Pharmacy, Univ. Michigan, Ann Arbor, MI 48109). *J. Pharm. Sci.* 66(8):1094-1101; 1977.

Compressed pellets of cholesterol monohydrate crystals in simulated bile served as a model system for an *in vitro* study of the kinetics of gallstone dissolution as affected by bile acid type and concentration, bile acid:lecithin molar ratio, and electrolytes. The four bile acids were cholyltaurine, cholylglycine, chenodeoxycholyltaurine, and chenodeoxycholylglycine. Bile acid:lecithin molar ratios in bile samples from normal subjects and gallstone patients vary over a wide range, but the ratios produced by 23.2 mM bile acid-6.4 mM lecithin and 46.4 mM bile acid-12.8 mM lecithin were considered representative. The electrolytes used were sodium chloride (0.1-0.5 M) and calcium chloride (0.025-0.10 M). The pH of the simulated bile was maintained at 7.40 by 0.01 M sodium phosphate. The dissolution kinetics of a nonionic, inert solid such as the gallstone is affected by diffusion-convection mass-transfer resistance and interfacial resistance. For almost all the experimental conditions, interfacial resistance was the dominant rate-determining factor in the dissolution of the synthetic gallstone. Comparison of the variables used in this study with those of published reports of human bile samples leads to the conclusion that interfacial resistance dominates over diffusion-convection resistance under certain *in vivo* conditions.

8002 CHOLESTEROL GALLSTONE DISSOLUTION RATE ACCELERATORS. I: EXPLORATORY INVESTIGATIONS

(Eng.) Kwan, K. H.; Higuchi, W. I.; Molokhia, A. M.; Hofmann, A. F. (Coll. Pharmacy, Univ. Michigan, Ann Arbor, MI 48109). *J. Pharm. Sci.* 66(8):1105-1108; 1977.

Various compounds that might function as dissolution accelerators for cholesterol gallstones were studied. The dissolution rates of cholesterol monohydrate pellets in synthetic bile (116 mM sodium cholate, 32 mM lecithin) containing the tested agent at various concentration levels were determined. In the absence of any dissolution rate accelerator, the dissolution kinetics for cholesterol were previously found to be interfacial resistance-controlled, and the rates were approximately 20 times less than the diffusion-controlled rates in the present experiments. Primary, secondary, and tertiary amines and quaternary ammonium compounds were effective accelerators. When the alkyl chain lengths were long enough and/or when the agent concentrations were high enough, the dissolution rates generally approached diffusion-controlled rates. Steroidal amines generally had good activity. Anionic and nonionic surfactants had little or negative activity.

8003 EFFECT OF CHOLESTEROL FEEDING AND ESTROGEN TREATMENT ON SYNTHESIS OF FATTY ACIDS IN LIVER.

(Eng.) Srinivasan, K.; Pynadath, T. I. (Dept. Chemistry, Kent State Univ., Kent, OH 44242). *Atherosclerosis* 27(4):407-417; 1977.

The changes in fatty acid (FA) synthesis in the liver mitochondria, microsomes, and cytoplasm of control rabbits and rabbits fed a diet containing 1% cholesterol to induce atherosclerosis were investigated. Since estrogen inhibits atherosclerosis, some of the cholesterol-fed rabbits were given 1.4 mg estradiol benzoate, s.c., on alternate days. Animals were sacrificed at the beginning of the study and at the end of 3, 6, and 9 weeks. FA synthesis was determined by the incorporation of [1-^{14}C]acetyl coenzyme A or [2-^{14}C]malonyl coenzyme A into long-chain FA under optimal conditions. Atherosclerosis was graded by the degree of aortic involvement, and it increased steadily in cholesterol-fed rabbits over the 9-week study. Cytoplasmic FA synthesis is decreased markedly with increase in atherosclerosis. Mitochondrial FA synthesis was not affected, and there was a small decrease in microsomal FA synthesis. In rabbits given estrogen and cholesterol, cytoplasmic FA synthesis decreased during the first 3 weeks, and then increased, so that at the end of 9 weeks, rate was almost the same as that of controls. After a brief lag period, estrogen apparently counteracts the inhibitory effect of atherosclerosis on cytoplasmic FA synthesis in the liver. Liver FA synthetase is possibly one of the enzyme systems through which estrogens exert their atherosclerosis-retarding effect.

8004 EFFECT OF ETHYNYLESTRADIOL ON BILIARY EXCRETION OF BILE ACIDS, PHOSPHATIDYLCHOLINES, AND CHOLESTEROL IN THE BILE FISTULA RAT.

(Eng.) Kern, F., Jr.; Eriksson, H.; Curstedt, T.; Sjovall, J. (Univ. Colorado Medical Center, 4200 East Ninth Ave., Denver, CO 80220). *J. Lipid Res.* 18(5):623-634; 1977.

The effects of ethynylestradiol (EE, 1 mg/kg/day) on endogenous bile acids, their capacity to conjugate and excrete i.v. infused cholic acid, the concentrations of biliary cholesterol and lecithin, and the individual molecular species of phosphatidylcholine were determined in bile fistula of male and female Sprague-Dawley rats. Eleven endogenous bile acids were identified by gas-liquid chromatography/mass spectrometry, but several minor bile acids, primarily muricholates, could not be completely characterized. After 5 days of EE treatment, the percentage of cholic acid decreased and the percentage of 6β-hydroxylated bile acids, including several monounsaturated species, increased; there was also a decrease in bile acid-independent bile flow. Cholic acid infusion (1.28 μmol/min/100 g) caused cholestasis in control animals but, after EE treatment, cholestasis developed at 0.43 μmol/min/100 g, indicating a lowered threshold for bile acid-induced cholestasis. In the EE-treated rats, there was a slight increase in excretion of unconjugated endogenous bile acids, and a striking impairment of conjugation of i.v. administered cholic acid. An increased concentration of biliary phospholipids in untreated male rats was one of the few sex-related differences observed. Both phospholipid and cholesterol concentrations in the bile were higher in the EE-treated animals. The molar percentage of cholesterol was always 1-2%, but it was slightly higher in treated animals, especially males. EE treatment also affected biliary phospholipid, causing a marked increase of phosphatidylcholine species containing palmitic and oleic acid residues and a decrease of species containing stearic and linoleic acid residues. Infusion of EE alone or with cholic acid caused no increase in biliary excretion of long chain polyunsaturated species. Some of these EE-induced changes in biliary bile acid and lipid excretion are probably peculiar to the rat, but others, such as the increase in molar percentage of cholesterol and cholestasis, may be relevant to disorders in man, especially cholesterol gallstones and idiopathic cholestasis of pregnancy.

8005 ENERGY METABOLISM AND THE CONTROL OF HEPATIC GLYCOGEN TURNOVER BY HORMONES.

(Ger.) Jakob, A. F. (Kantonsspital Zurich, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Fortschr. Med.* 95(31):1923-1926; 1977.

The relationship between energy metabolism and hormonal regulation of hepatic glycogen turnover was studied in perfused rat liver *in vitro*. Cyanide and iodine acetate potentiated glycogen metabolism additively. The glucagon-stimulated production of cyclic AMP (cAMP) was inhibited by iodine acetate. Therefore, activation by inhibitors appears to be cAMP-independent. The acceleration of glycogenolysis paralleled the reduction of tissue ATP levels caused by oxidative phosphorylation and/or glycolysis. These findings suggest a relationship between the increased energy metabolism and enhanced glycogen metabolism. Enhanced glycogenolysis is based on the conversion of phosphorylase b into a; this conversion occurs during activation by inhibitors. It can be assumed that the increase in cellular phosphorylase a is due not only to stimulated activation but also to an inhibition of inactivation. The effect of cyanide and iodine acetate could thus be explained as a result of the inhibition of phosphorylase phosphatase. In the presence of epinephrine, stimulation of both the α and β receptors had a glycogenolytic effect, but the effect of the α-adrenergic component was more pronounced. The β-receptor-mediated effect and that of cAMP were identical, but the α-adrenergic effect occurred by an unknown mechanism. Additional research is necessary to clarify the epinephrine effect on hepatic metabolism.

8006 VASOPRESSIN AND CANINE HEPATIC ARTERIAL BLOOD FLOW. (Eng.) Kerr, J. C.; Reynolds, D. G.; Swan, K. G. (New Jersey Medical Sch., 100 Bergen St., Newark, NJ 07103). *J. Surg. Res.* 23(3):166-171; 1977.

The effects of logarithmically increasing doses of vasopressin (VP), injected via the hepatic artery, on hepatic arterial blood flow (HABF) in dogs were investigated to determine the possible ischemic hazard to the liver by this agent. At 5 x 10^{-5} to 5 x 10^{-2} U/kg, VP produced a dose-dependent diminution in HABF. Control values of HABF (294 ± 32 ml/min), arterial pressure (AP, 126 ± 3 mm Hg), and portal venous pressure (PVP, 8.4 ± 1.0 mm Hg) were not changed significantly by the injection of 5 x 10^{-5} U/kg VP. However, 5 x 10^{-2} U/kg VP reduced HABF by 199 ± 43 ml/min, increased AP by 13 ± 2 mm Hg, and reduced PVP by 1.8 ± 0.2 mm Hg. When VP was infused intra-arterially at a concentration of 5 x 10^{-3} U/kg/min, it reduced HABF to 206 ± 30 ml/min within 1 min; however, HABF gradually returned to near control values (258 ± 24 ml/min) at 5 min. During infusion, AP increased by 10 mm Hg at 6 min and remained elevated throughout the infusion. The PVP was reduced to 6.0 ± 0.9 mm Hg at 9 min. These observations indicate that VP is a potent constrictor of the hepatic artery when it is administered intra-arterially. However, this vasoconstrictor effect is transient; it is characterized by autoregulatory escape, which promptly restores the HABF to control values within minutes. Assuming that the human hepatic artery will respond similarly, it is suggested that the clinical use of VP to control upper gastrointestinal bleeding is unlikely to pose any threat of significant ischemia to liver. The suggested clinical dose for man is 5 x 10^{-3} U/kg/min.

8007 INFLUENCE OF NORETHINDRONE ON DRUG-METABOLIZING ENZYMES OF FEMALE RAT LIVER IN VARIOUS B-VITAMIN DEFICIENCY STATES. (Eng.) Wade, A. E.; Evans, J. S. (Sch. Pharmacy, Univ. Georgia, Athens, GA 30602). *Pharmacology* 15(4):289-301; 1977.

The activities of four drug metabolizing female rat liver enzymes, cytochrome P-450 (CP-450), NADPH cytochrome c reductase (NADPH-CcR), ethylmorphine *N*-demethylase (EMD), and aniline hydroxylase (AH), were measured in female Sprague-Dawley rats fed diets high or deficient in vitamin B and given the oral progestational contraceptive, norethindrone (NE). Rats were fed laboratory chow or synthetic diets deficient in or containing 20 μg/g thiamine, 50 μg/g riboflavin, or 50 μg/g pyridoxine, and they were given 1.0 or 10 mg/day NE by p.o. intubation. After 21 days, the animals were weighed and killed, their livers were weighed, and the enzyme kinetics were measured. Regardless of diet, NE caused loss in body weight and a relative gain in liver weight. In all animals, NE produced either no change or a slight depression of CP-450 and no change or an increase in NADPH-CcR and EMD activity. NE induced AH activity in all rats except those on diets deficient in thiamine or riboflavin. The results demonstrate that B vitamins affect the drug metabolizing enzyme system of the liver with and without administration of NE.

8008 MECHANISM OF OESTROGEN AND PROGESTERONE EFFECTS ON LIPID AND CARBOHYDRATE METABOLISM: ALTERATION IN THE INSULIN:GLUCAGON MOLAR RATIO AND HEPATIC ENZYME ACTIVITY. (Eng.) Mandour, T.; Kissebah, A. H.; Wynn, V. (St. Mary's Hosp., London W.2, England). *Eur. J. Clin. Invest.* 7(3): 181-187; 1977.

To investigate whether altered insulin and glucagon secretion participate in the metabolic changes associated with the intake of female gonadal steroids, the effects of 17β-estradiol (E) and progesterone (P) on the hepatic portal vein blood levels of insulin and glucagon were determined in ovariectomized Wistar rats. To relate the changes in secretory ability of the pancreatic alpha and beta cells to the altered hepatic activity associated with steroid intake, the simultaneous status of both the rate-limiting enzymes and the metabolic intermediates of hepatic lipogenesis and gluconeogenesis were determined following stimulation of glucagon secretion with alanine (1 mmol/kg). Plasma triglycerides increased and plasma glucose fell in fasting rats given E, but not in those given P. E-treated rats had reduced levels of both insulin and glucagon in portal vein blood samples; the insulin/glucagon molar concentration ratio increased indicating a relatively greater decrease in glucagon. P increased portal vein insulin and glucagon but did not alter the insulin/glucagon molar ratio. Glucagon secretion after alanine was enhanced in rats treated with P, whereas E suppressed the glucagon-secreting activity of the pancreas. E increased the activities of the liver lipogenic enzymes, acetyl coenzyme A carboxylase and fatty acid synthetase, and decreased the activity of the gluconeogenic rate-limiting enzyme phosphenol-pyruvate carboxylkinase (PEPCK). When gluconeogenesis intermediates (e.g., phosphenol pyruvate, pyruvate, and glucose-6-phosphate) in the liver were measured, it was evident that gluconeogenesis was inhibited at the PEPCK level. P did not alter the lipogenic or gluconeogenic enzyme activities in the liver. In ovariectomized rats, E reduces the activity of both alpha and beta cells of the pancreas and increases the relative insulin/glucagon molar ratio in portal vein blood. The observed changes in liver enzymes, plasma triglycerides, and glucose could be secondary to this effect.

8009 LACK OF HEPATIC ENZYMATIC ADAPTATION TO LOW AND HIGH LEVELS OF DIETARY PROTEIN IN THE ADULT CAT. (Eng.) Rogers, Q. R.; Morris, J. G.; Freedland, R. A. (Dept. Physiological

Sciences and Animal Science, Univ. California, Davis, CA 95616). *Enzyme* 22(5):348-356; 1977.

The activities of three urea-cycle enzymes and several nitrogen catabolic, gluconeogenic, and lipogenic enzymes were measured in the liver of adult cats fed a commercial kibble or a 17.5% or 70% protein-purified diet, or starved for 5 days. Dietary protein level did not significantly affect hepatic enzyme activities except for tyrosine transaminase activity. It was significantly lower ($p<0.05$) in cats fed the low-protein diet than in cats fed the high-protein diet (0.07 ± 0.03 μmol/min/g liver for the 17.5% protein diet versus 0.22 ± 0.04 for the 70% protein diet). The effects of starvation were insignificant and minimal in comparison with the starvation-induced changes in hepatic enzyme activity reported previously in the rat. These results indicate that the cat may have only minimal capabilities for enzyme adaptation compared with those found in many herbivores and omnivores. They may explain the unusually high protein requirement of cats in comparison with many other animals.

8010 EFFECT OF AFLATOXIN B_1 ON HEPATIC POLYRIBOSOMES AND PROTEIN SYNTHESIS IN THE RAT.

(Eng.) Sidransky, H.; Verney, E.; Murty, C. N.; Sarma, D. S. R.; Reid, M. (George Washington Univ. Medical Center, 2300 I St., N.W., Washington, DC 20037). *Chem. Biol. Interact.* 18(1):69-82; 1977.

The effect of aflatoxin B_1 (AFB_1) on protein synthesis was studied in rat liver. The effect of AFB_1 (6.0 mg/kg) on hepatic polyribosomes (free and membrane-bound), protein synthesis *in vitro*, and initiation factor activity of rats within 3-12 hr was investigated. AFB_1 rapidly led to disaggregation of free and membrane-bound polyribosomes and to the inhibition of *in vitro* protein synthesis by both populations of polyribosomes. It had little or no effect on the activities of initiation factors. Defective ribosomes, particularly the 60S ribosomal subunits, of both types of polyribosomes were observed after treatment. Comparative studies on the effects of AFB_1 and actinomycin D revealed progressive disaggregation by both hepatic free and membrane-bound polyribosomes after AFB_1 but only of the free polyribosomes after actinomycin D. The results are compatible with the suggestion that the action of AFB_1 on the inhibition of protein synthesis is at two levels, at the translational level as an early effect and also at the transcriptional level as a later effect.

8011 INHIBITION OF PROTEIN SYNTHESIS BY ETHANOL IN ISOLATED RAT LIVER PARENCHYMAL CELLS.

(Eng.) Morland, J.; Bessesen, A. (Inst. Medical Biology, Univ. Tromso, N-9001 Tromso, Norway). *Biochim. Biophys. Acta* 474(2):312-320; 1977.

The effects of ethanol on protein metabolism were studied in isolated rat liver hepatocytes. The cells (0.8×10^6-5.0×10^6/ml) were incubated at 37 C in the absence or in the presence of 50 mM ethanol. The incorporation of L-[U-^{14}C]valine and L-[3,5-$^3H_2$] tyrosine into both stationary cell protein and proteins released into the medium was reduced by ethanol incubation. This effect was not caused either by reduced uptake of labeled valine or by diminished specific radioactivity of the precursors; the effect was present in amino acid-free media, suggesting that the possible effects of ethanol on uptake of other amino acids is an unlikely explanation of the reduced incorporation. Instead, ethanol probably affects the protein synthesizing machinery of the liver cells. No effects of ethanol were found when liver cell proteins were prelabeled with L-[U-^{14}C]-valine and the radioactivity remaining in the protein after inhibition of further protein synthesis with cycloheximide (5 μg/ml) was measured. In other prelabeling experiments performed without cycloheximide, ethanol did not affect the amount of radioactive valine remaining within and released from liver protein. It is concluded that ethanol reduces hepatocyte protein synthesis without affecting protein degradation. Hepatocytes appear more sensitive to this effect of ethanol than do intact liver preparations, when the present observations are compared with previous results.

8012 DETERMINATION OF PROTEIN SYNTHESIS ELONGATION FACTOR ACTIVITY IN LIVER BIOPSY SPECIMENS FROM NORMAL AND CIRRHOTIC RATS.

(Eng.) Gressner, A. M.; Greiling, H. (Medical Faculty, Rheinisch-Westfalische Technische Hochschule, Goethestrasse 27-29, 51 Aachen, W. Germany). *Digestion* 15(4):348-352; 1977.

The polypeptide-chain elongation promoting activity (elongation factors 1 and 2) was determined in the 100,000 x *g* cytosol fraction of liver biopsy specimens obtained from six normal and six thioacetamide-induced cirrhotic rat livers. The activity of elongation factors 1 and 2 was tested by their capacity to support the ribosome-dependent poly(U)-directed polymerization of ^{3}H-phenylalanine. Enzyme activity was reduced significantly (by 50% based on tissue wet weight; by 60%, based on DNA concentration) in the cirrhotic liver fractions. Thioacetamide did not inhibit the incorporation of phenylalanine by normal rat liver ribosomes; at 0.0-13.4 μmol thioacetamide, incorporation was 258-243 pmol phenylalanine/100 pmol ribosomes. Because of the cellular heterogeneity in liver cirrhosis, the lowered activity of the elongation factors cannot be ascribed to a single cell type, i.e., the hepatocyte. Further cell-type differentiated analyses are recommended.

8013 UPTAKE AND DEGRADATION OF CHOLESTEROL ESTER-LABELLED RAT PLASMA LIPOPROTEINS IN PURIFIED RAT HEPATOCYTES AND NONPARENCHYMAL LIVER CELLS.

(Eng.) Drevon, C. A.; Berg, T.; Norum, K. R. (Sch. Medicine, Oslo Univ., Blindern, Oslo, Norway). *Biochim. Biophys. Acta* 487:122-136; 1977.

This preliminary study was designed to evaluate whether purified rat hepatocytes and nonparenchymal liver cells are able to take up and degrade cholesterol ester from plasma lipoproteins. Male Wistar rats were inoculated i.v. with 0.5-1.0 ml of plasma containing $[^3H]$cholesterol-labeled cholesterol ester. Collagenase perfusions of the liver were started 5, 15, 45, and 60 min later, and purified hepatocytes and nonparenchymal cells were prepared by differential centrifugation. Labeled free cholesterol and cholesterol ester were measured in purified cells, blood, and liver homogenates (blood samples were withdrawn immediately before the initiation of perfusion). Labeled total cholesterol accumulated rapidly in the liver during the first 5 min after injection, but thereafter, hepatic uptake occurred at a slower rate. After 5 and 60 min, the uptake corresponded to 4.5% and 10%, resp., of the injected labeled lipoproteins. The liver contained 58% labeled free cholesterol (% of labeled total cholesterol) after 5 min and 71% after 1 hr. The amount of total cholesterol was almost 1.5 times higher in purified hepatocytes than in nonparenchymal cells. These data indicate that the hepatic intake of cholesterol ester-labeled lipoproteins was considerable and that both hepatocytes and Kupffer cells participate in this uptake.

8014 EVIDENCE THAT A SEPARATE PARTICLE CONTAINING B-APOPROTEIN IS PRESENT IN HIGH-DENSITY LIPOPROTEINS FROM PERFUSED RAT LIVER.

(Eng.) Fainaru, M.; Felker, T. E.; Hamilton, R. L.; Havel, R. J. (Hadassah Medical Sch., Jerusalem, Israel). *Metabolism* 26(9):999-1004; 1977.

High-density lipoproteins (HDL, 1.075 g/ml<density< 1.175 g/ml) from perfusates of Long-Evans rat liver, unlike those from rat blood plasma, contained protein with the properties of B-apolipoprotein. This protein remained near the origin upon electrophoresis in polyacrylamide gels containing sodium dodecyl sulfate, had β electrophoretic mobility in agarose gel, was insoluble in tetramethylurea, and precipitated with antisera to the B-apoprotein isolated from low-density lipoprotein. The B-apolipoprotein in HDL from rat liver perfusates bound to concanavalin-A Sepharose and thus could be separated from the characteristic HDL, the chemical and physical properties of which are otherwise preserved. These observations suggest that in addition to the discoidal lipoproteins, another particle that contains B-apoprotein exists in the HDL of rat liver perfusates.

8015 THE EFFECT OF DIETARY AMINO ACID IMBALANCE ON SOME RAT LIVER LIPIDS.

(Eng.) Popescu, A.; Croitorescu, L.; Farcasiu, M. (Inst. Medicine and Pharmacy, Bd. Petru Groza S., Bucharest, Rumania). *Rev. Roum. Biochim.* 14(1):51-54; 1977.

The influence of two types of dietary amino acid imbalance on total hepatic lipids, triglycerides, and cholesterol levels were studied in rats. The first diet consisted of gelatin (12%) and casein (8%). The second type of imbalance was induced by feeding a diet containing 0.36% threonine and 8% casein. The first diet induced a decrease in all hepatic lipids studied, as well as growth retardation. The second diet did not influence the liver lipid concentration and produced a lower growth retardation. The nature of a dietary amino acid imbalance affects the liver lipid concentration as well as growth rate.

8016 EFFECT OF DIETARY COMPOSITION ON HEPATIC LIPID ACCUMULATION OF RATS WITH CHRONIC ETHANOL INTAKE.

(Eng.) Chen, N. S. C.; Chen, N. C.; Johnson, R. J.; McGinnis, J.; Dyer, I. A. (Dept. Animal Sciences, Washington State Univ., Pullman, WA 99163). *J. Nutr.* 107(6):1114-1119; 1977.

Diets higher in carbohydrate, fat, or protein (diets 1, 2, and 3, resp.) were formulated isoenergetically with or without ethanol to study their effects on the accumulation of hepatic total lipids in Sprague-Dawley rats fed for 8 weeks. Ethanol ingestion (20% *ad libitum* for 1 week, 30% for 7 weeks) did not affect body weight gain of rats fed diet 1, but diets 2 and 3 resulted in decreased weight gain compared to pair-fed controls. These body weight changes between control and ethanol groups were significant 2 weeks after the treatment was started ($p<0.05$ for diet 2, $p<0.01$ for diet 3). Ethanol administration did not change hepatic weights of rats fed diet 1, but increased hepatic weights of rats fed diets 2 and 3 ($p<0.05$ in both cases). Higher protein alone in the diet increased liver weight. Ethanol intake increased the hepatic total lipid content of rats fed diets 2 and 3 ($p<0.05$ in both cases), but it did not affect those fed diet 1 compared to their pair-fed controls. Weight gain, liver weight, and hepatic total lipids consistently showed that rats consuming 39% wheat starch as carbohydrate were not adversely affected by ethanol ingestion, but those groups fed higher fat or higher protein with ethanol were adversely affected.

8017 LIPID ACCUMULATION IN THE LIVER OF RATS FED A LYSINE-DEFICIENT DIET.

(Eng.) Aoyama, Y.; Kondo, H.; Ashida, K. (Lab. Nutritional Biochemistry, Nagoya Univ., Furo-cho, Chikusa, Nagoya, Japan). *Nutr. Rep. Int.* 14(6):641-655; 1976.

The mechanism responsible for the development of fatty livers in young rats fed a lysine-deficient diet was investigated. A basal diet (amino acid mixture, 7.17%; salt mixture, 4.0%; $NaHCO_3$, 0.14%; vitamins, 0.85%; choline-Cl, 0.15%; corn oil, 5.0%; sucrose, 82.43%) or a lysine-deficient (LD) diet (lysine in amino acid mixture lowered 50%) was fed to male Donryu rats for 10, 20, or 30 days. Liver lipid values were higher in rats on the LD diet than in those on the basal diet at 10 and 20 days, but at 30 days, the values were similar. Similar effects were noted when 5% lard or 5% safflower oil was substituted for corn oil in the LD diet. Rats were fed basal or LD diets for 10-14 days, and incorporation of radioactive acetate (3.5 μCi/0.7 ml 0.9% NaCl/100 g) into liver and body lipids (except blood and liver) and respiratory CO_2 were measured. Total radioactivity of liver and body lipids tended to be lower in rats on LD diets, indicating that increased lipid synthesis was not responsible for the fatty livers. The protein content of the β-lipoproteins and the triglyceride content of the sera were lower in LD-fed rats than in rats on the basal diet, leading to the conclusion that decreased transport of lipids from the liver into the blood might be responsible for excessive liver lipid accumulation in rats on LD diets.

8018 HEPATIC EFFECT OF TWO HYPOLIPIDEMIC DRUGS IN RATS.

(Eng.) Magnusson, G.; Magnusson, O. (Astra Lakemedel AB, Res. and Development Lab., 151 65 Sodertalje, Sweden). *Exp. Pathol.* 13(2/3): 180-187; 1977.

The effects of the hypolipidemic agents 3,9-di-3-pyridyl-2,4,8,10-tetraoxaspiro-5,5-undecane (compound A) and 2-(4-dibenzofuranyloxy)-2-methylpropionic acid (compound B) on hepatic microbody proliferation and catalase synthesis were investigated in male Sprague-Dawley rats. The animals were treated p.o. with one of these drugs or with clofibrate for 10 weeks, the daily doses being 250, 300, and 300 mg/kg, resp. All three drugs caused hepatomegaly with a normal microscopic appearance in the liver cells. In rats given compound A, part of some liver cells contained numerous membranes of smooth endoplasmic reticulum. The hepatocytes of the rats treated with compound B or clofibrate showed a marked increase in microbody profiles and elevated catalase activity in comparison to the control animals. The catalase activity in compound B-treated animals was 130% higher than that of controls and about 40% higher than that of the clofibrate-treated animals ($p < 0.001$ and $p < 0.01$, resp.). Neither the microbodies nor the catalase activity were affected by compound A. Hypolipidemic effects were demonstrated with all three compounds, the most potent activity being shown by compound B. The increase in microbodies observed following compound B and clofibrate treatment, but not after compound A treatment, may be due to the fact that compound B is structurally related to clofibrate.

8019 SHORT-TERM HORMONAL CONTROL OF HEPATIC CARBOHYDRATE AND LIPID CATABOLISM.

(Eng.) Hems, D. A. (St. George's Hosp., Medical Sch., Cranmer Terrace, London SW 17 0RE, England). *FEBS Lett.* 80(2):237-245; 1977.

A review is presented of the range of hormones (e.g., glucagon, adrenaline, vasopressin, angiotensin II, and insulin) that can exert rapid catabolic effects on carbohydrate (glycogen metabolism) and lipid metabolism (glyceride metabolism) in the liver. Several of these hormones, e.g., α-adrenergic agonists, vasopressin, oxytocin, and angiotensin II, do not act via the cyclic-monophosphates of adenosine or guanosine; cations may be implicated in the response mechanisms to these hormones. The range of catabolic hormone effects on liver contributes to the multiple rapid alterations required during stress or adaptation. Resolution of the mechanisms underlying the effects of hormones on liver cells should provide insight into regulatory responses in cell membranes and perhaps into endocrine disorders (e.g., diabetes and obesity).

8020 EFFECT OF FASTING AND FEEDING A HIGH-SUCROS FAT-FREE DIET ON THE SYNTHESIS OF HEPATIC GLYCEROLIPIDS IN VIVO AND IN ISOLATED HEPATOCYTES.

(Eng.) Groener, J. E. M.; Van Golde, L. M. G. (Lab. Veterinary Biochemistry, State Univ. Utrecht, Biltstraat 172, Utrecht, Netherlands). *Biochim. Biophys. Acta* 487:105-114; 1977.

Mechanisms involved in the regulation of triacylglycerol (TG) and phospholipid (PL) biosynthesis in the liver were studied in male Wistar rats. The animals were divided into four groups: group 1 was fed a regular diet *ad libitum*, group 2 was fasted for 24 hr, group 3 was fasted for 48 hr, and group 4 was fasted for 48 hr and then refed a high-sucrose, fat-free diet (58.5% sucrose, 16.5% cellulose, 21.1% proteins, salts, and vitamins) *ad libitum* for 24 hr. Next, rats were inoculated i.v. with 2-^{3}H-glycerol (0.25 mCi); after 5 min, the livers were removed, lipids were extracted, and total TG and diacylglycerols (DG) were isolated by thin-layer chromatography. To evaluate whether the features of hepatic lipid synthesis observed *in vivo* are preserved in enzymatically isolated hepatocytes, hepatocytes from the livers of 24-hr-fasted rats were incubated with variety of labeled precursors. Quantitaitve estimations of the amounts of individual lipid classes in the livers of rats kept in different nutritional states showed changes that might be correlated with the different rates of synthesis of the various lipids; 48-hr fasting resulted in a slight decrease of phosphatidylethanolamine (PEA; 61.5 U, compared to 72.5 U in group 1) and an almost 70% reduction of DG and TG. Refeeding increased the content of DG and TG above control values, but decreased PEA content further (49.7 U). Similar changes were detected *in vitro*.

8021 EARLY ALTERATIONS INDUCED BY CARBON TETRACHLORIDE IN THE LIPIDS OF THE MEMBRANES OF THE ENDOPLASMIC RETICULUM OF THE LIVER CELL: I. SEPARATION AND PARTIAL CHARACTERIZATION OF ALTERED LIPIDS.

(Eng.) Benedetti, A.; Casini, A. F.; Ferrali, M.; Comporti, M. (Istituto di Patologia Generale, Universita di Siena, Via Laterino 8, 53100 Siena, Italy). *Chem. Biol. Interact.* 17(2):151-166; 1977.

Carbon tetrachloride induced alterations in the fatty acids of liver microsomal lipids were studied. Thin-layer chromatography of fatty acid methyl esters prepared from liver microsomal lipids of CCl_4-treated rats revealed a component, spot D, with an Rf value (0.66) lower than that (0.80) of the methyl esters, spot M. The spot D lipids showed a marked diene conjugation absorption, but those of spot M showed no absorption of conjugated dienes. Studies with ^{14}C-labeled CCl_4 indicated that compounds in spots D and M contained 28% and 42% of the label, resp. However, the specific activity of spot D [68,475 disintegrations/min (dpm)/mg] was about 1,000 times greater than that of spot M (73.8 dpm/mg). The spot D lipids showed no response when they were analyzed by gas-liquid chromatography with an electron capture detector (ECD), but those of spot M exhibited a response similar to that of unfractionated fatty acid methyl esters. The lack of the ECD response for spot D compounds is probably due to the fact that they cannot be eluted from the column.

8022 MODIFICATION OF CARBON TETRACHLORIDE HEPATOTOXICITY BY CHEMICALS. (Eng.)

Suriyachan, D.; Thithapandha, A. (Faculty Science, Mahidol Univ., Bangkok 4, Thailand). *Toxicol. Appl. Pharmacol.* 41(2):369-376; 1977.

The chemical modification of carbon tetrachloride hepatotoxicity in male New Zealand mice is reported. Hepatic injury induced by CCl_4 (0.5 ml/kg, i.p.), was prevented by phenazine methosulfate (2 mg/kg, i.p., 5 doses at 0.5-hr intervals). *In vitro*, at a concentration of 1×10^{-2} M, this compound noncompetitively inhibited NADPH-cytochrome C reductase by 53%. However, cobaltous chloride (60 mg/kg, s.c., daily for 2 days), which decreased the microsomal cytochrome P-450 content of mouse liver to approximately half of its normal value and reduced ethylmorphine *N*-demethylase and aminopyrine *N*-demethylase activities from control values of 3.40 ± 0.30 and 31.76 ± 2.48, resp., to 1.72 ± 0.24 and 20.63 ± 2.05 nmol formaldehyde formed/mg protein/min, resp., offered no protection against CCl_4-induced liver damage. Cobaltous chloride also slightly reduced aniline hydroxylase activity from a control value of 6.15 ± 0.26 to 4.95 ± 0.26 nmol of *p*-aminophenol/mg protein/20 min and impaired the *in vivo* oxidative metabolism of hexobarbital, as evidenced by a prolongation of sleeping time from a control value of 39 ± 4 to 66 ± 10 min. However, cobaltous chloride had no effect on the rate of reduction of cytochrome P-450 by NADPH. 2-Diethylaminoethyl-2,2-diphenylvalerate (50 mg/kg, i.p.) also failed to protect against CCl_4 hepatotoxicity, although it inhibited the hydroxylation of a number of substrates. This inhibitor, a type I compound, enhanced cytochrome P-450 reduction by NADPH from a control value of 8.21 ± 0.74 to 18.87 ± 0.52 nmol reduced/min/mg protein. These findings are compatible with the hypothesis that cytochrome P-450 is the critical site for CCl_4 activation.

8023 STUDIES ON THE EFFECT OF 3,4-DEHYDROPROLINE ON COLLAGEN METABOLISM IN CARBON TETRACHLORIDE-INDUCED HEPATIC FIBROSIS. (Eng.)

Kerwar, S. S.; Oronsky, A. L.; Choe, D.; Alvarez, B. (Lederle Lab., Pearl River, NY 10965). *Arch. Biochem. Biophys.* 182(1):118-123; 1977.

The effect of 3,4-dehydroproline on collagen metabolism was studied in rats in which hepatic fibrosis was induced by chronic treatment with carbon tetrachloride (0.1 ml/100 g, s.c., twice weekly). The amount of collagen and the specific activity of prolyl hydroxylase were greatly enhanced; prolyl hydroxylase activity in the CCl_4-treated rats ranged between 1.5- and 2.5-fold greater than that in controls. When the fibrotic animals were treated with DL-3,4-dehydroproline (100 mg/kg, i.p.) for 5 consecutive days, the specific activity of liver prolyl hydroxylase was greatly decreased 4.26 ± 0.14 counts per min (cpm)/mg protein $\times 10^{-3}$ and approached the activity observed in the livers of normal rats (3.36 ± 0.14 cpm/mg $\times 10^{-3}$). Although CCl_4 did not affect prolyl hydroxylase activity of the lung, the administration of dehydroproline caused a significant ($p<0.01$) decrease in enzyme activity. Collagen extracted from normal and fibrotic rat livers was analyzed by chromatography on carboxymethylcellulose. Normal rat liver was found to contain α_1 and α_2 chains with chromatographic properties similar to type I collagen of calf skin. Fibrotic liver contained Type I collagen as well as collagen with chromatographic properties similar to Type III. The increase in the latter type of collagen was more pronounced in the livers of fibrotic animals.

8024 TRANSAMINASES OF HEPATIC TISSUE CULTURE CELLS AND THE EFFECT OF CARBON TETRACHLORIDE ON THEIR LEAKAGE. (Eng.)

Watanabe, S.; Hioki, M.; Mohri, T.; Kitagawa, H. (Faculty Pharmaceutical Sciences, Univ. Chiba, Yayoi-cho, Chiba-shi, Chiba, Japan). *Chem. Pharm. Bull. (Tokyo)* 25(5):1089-1093; 1977.

The effect of CCl_4 on the leakage of GOT and GPT from hepatic tissue culture cells (rat hepatoma origin) was studied. The addition of 10 mM CCl_4 to the medium followed by 48 hr of incubation enhanced the leakage of both enzymes into the medium, with the leaking ratio (transaminase activity in medium/transaminase activity in cell) for GOT and GPT being 1.9 and 4.8, resp. Treatment of the cells with 1 or 10 mM CCl_4 for 96 hr also enhanced the leakage of GOT (GPT was not assayed). The increased leaking ratios appeared to be due to an increase in cell membrane permeability to the enzymes and not to a promotion of synthesis or cellular accumulation. Studies of the fluid phase concentration of CCl_4 with time using a model system that consisted of water enclosed in culture bottles indicated that this concentration decreased rapidly with time and that the addition of 10 and 1 mM CCl_4 to the culture medium represented exposure of the cells to 0.2 and 0.02 mM, resp., over most of the incubation period.

8025 LONG-TERM EXPOSURE OF RATS TO HEXACHLOROBENZENE (HCB): INFLUENCE ON PORPHYRIN EXCRETION IN THE URINE AND ON CYTOCHROME P-450 ACTIVITY IN THE LIVER. (Ger.)

Goerz, G.; Krieg, Th.; Bolsen, K.; Lissner, R. (Univ.-Hautklinik Dusseldorf, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Arch. Dermatol. Res.* 259(2):199-206; 1977.

The influence of hexachlorobenzene (HCB, 0.05% of the diet) on urinary porphyrin excretion and hepatic cytochrome P-450 activity was studied in female Wistar rats. Urinary porphyrin excretion remained normal during the first 54 days of treatment, after which the porphyrin, 5-aminolevulinic acid, and porphobilinogen excretions increased sharply and in parallel from day 57 onward. However, the O-dealkylating activity of the liver, determined by the O-dealkylation of 7-ethoxycoumarin, increased significantly as early as day 2 and it exceeded the initial value by over 20 times on day 80. The inhibition of cytochrome P-450 activity by metyrapone, naphthoflavone, tetrahydrofuran, or CO/O_2 did not have the typical inhibition pattern of phenobarbital- or benzopyrene-induced cytochrome P-450. When the animals became porphyric on about day 55, no qualitative changes in the cytochrome P-450 pattern were demonstrable. The relationship between the hepatic enzyme induction and porphyria following HCB administration still remains unclear.

8026 EXPERIMENTAL PORPHYRIAS AS MODELS FOR HUMAN HEPATIC PORPHYRIAS.

(Eng.) DeMatteis, R.; Stonard, M. (Medical Res. Council Lab., Woodmansterne Rd., Carshalton, Surrey, England). *Semin. Hematol.* 14(2):187-192; 1977.

The similarity of experimental models of hepatic porphyrias to the human disease is discussed. In rats, a small dose of 3,5-diethoxycarbonyl-1,4-dihydro-collidine (DDC) produces a biochemical reaction similar to that of variegate-type human acute porphyria in its latent phase. Hexachlorobenzene (HCB) induces a porphyria that closely resembles human chronic hepatic porphyria. Barbiturates and other lipid-soluble drugs can exacerbate the effects of DDC in animals, as they do in patients with genetic porphyria. The role of Fe in the exacerbation of human chronic hepatic porphyria may be elucidated by studies of animals treated with HCB.

8027 LIGHT AND ELECTRON MICROSCOPIC STUDY OF HEMORRHAGIC HEPATITIS INDUCED BY TRIMETHYLLYSINE AND D-GALACTOSAMINE.

(Eng.) Tompa, A.; Lapis, K.; Szende, B. (Semmelweis Medical Univ., Ulloi ut 26, H-1085 Budapest VIII, Hungary). *Exp. Pathol. (Jena)* 13(2/3):118-129; 1977.

The effect of prior treatment with ε-aminotrimethyllysine (TML) on D-galactosamine (DGA)-induced hepatitis in mice was investigated. Previous studies have shown that TML stimulates hepatocyte proliferation in the same way as partial hepatectomy. On the other hand, DGA does not cause hepatitis in newborn or partially hepatectomized animals (i.e., in the regenerating liver). CFLP female mice were given 10 mg/kg TML of 1 g/kg DGA, or TML followed 10 days later by DGA. The mice were killed 18, 24, 48, and 72 hr posttreatment, and their livers were weighed and examined ultrastructurally. The livers of TML-treated mice were similar to those of controls; those of DGA-treated mice showed necrosis, inflammation, and some regeneration. Animals sacrificed 18-24 hr after TML + DGA had severe hemorrhagic hepatitis; there was less liver damage in mice sacrificed at 48-72 hr. The expected result of the administration of both drugs was that TML pretreatment would protect mice against DGA-induced hepatitis, but the pretreatment had the opposite effect. It is proposed that the cell proliferation caused by TML differs from the regeneration induced by partial hepatectomy.

8028 PROTECTIVE EFFECT OF AMMONIUM IONS AND L-NORVALINE ON GALACTOSAMINE INDUCED LIVER INJURY.

(Eng.) Pausch, J.; Wohleb, B.; Gerok, W. (Medizinische klinik der Universitat Freiburg, Hugstetter Strasse 55, D-7800, Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(5):595-597; 1977.

The effect of ammonium ions and of L-norvaline on galactosamine-induced liver injury was investigated in Wistar rats. The animals received a single i.p. injection of galactosamine (1.85 mmol/kg) 4 hr after receiving the first of eight doses of i.p. ammonium acetate (3.7 mmol/kg). In other experiments, the animals received 5.0 mmol/kg L-norvaline, i.p., at 4 hr and 2 hr before galactosamine administration. The aspartate aminotransferase, alanine aminotransferase, and glutamate dehydrogenase levels in galactosamine-treated controls were 404 ± 234, 505 ± 295, and 181 ± 125 U/l, whereas the levels were 143 ± 58, 85 ± 51, and 24 ± 15 U/l in ammonium plus galactosamine-treated animals and 50 ± 13, 25 ± 6, and 11 ± 6 U/l in L-norvaline plus galactosamine-treated animals. The results indicate that both L-norvaline and ammonium acetate protect against galactosamine-induced liver injury.

8029 ACTIVATION OF α-METHYLDOPA, PARACETAMOL AND FUROSEMIDE BY HUMAN LIVER MICROSOMES.

(Eng.) Dybing, E. (Dept. Environmental Toxicology, Natl. Inst. Public Health, Oslo 1, Norway). *Acta Pharmacol. Toxicol.* 41(1):89-93; 1977.

Experiments were carried out in human liver microsome to determine whether enzyme pathways for the metabolic activation of α-methyldopa, paracetamol, and furosemide are present in humans as well as in laboratory animals. The human liver microsomes were found to have a cytochrome P-450 content of 0.52 nmol/mg protein and a cytochrome b_5 content of 0.25 nmol/mg, i.e., approximately 50-70% of the levels found in laboratory animals. NADPH cytochrome c reductase activity was 95 nmol/mg protein/min. When radiolabeled α-methyldopa, paracetamol, and furosemide were incubated with the microsomes in the presence of NADPH, these compounds were converted to intermediates that bound irreversibly to microsomal protein. The addition of superoxide dismutase (15 μg/ml) or ascorbic acid (1 mM) totally blocked the activation of α-methyldopa. The amounts of drug bound covalently to protein for α-methyldopa, paracetamol, and furosemide were 1.16, 0.55, and 1.68 nmol/mg microsomal protein/10 min, resp. These studies show that enzyme pathways responsible for the metabolic activation of α-methyldopa, paracetamol, and furosemide exist in human liver microsomes.

8030 THE BIOSYNTHESIS OF GLYCOSAMINOGLYCANS IN NORMAL RAT LIVER AND IN RESPONSE TO EXPERIMENTAL HEPATIC INJURY. (Eng.) Gressner, A. M.; Pazen, H.; Greiling, H. (Klinisch-Chemisches Zentrallaboratorium der Med. Fakultat der RWTH, Goethestrasse 27-29, D-5100 Aachen, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(7):825-833; 1977.

The synthesis of glycosaminoglycans in slices from normal and thioacetamide (50 mg/kg)-injured rat liver was studied. The rates of incorporation of [^{14}C]glucosamine into specific types of glycosaminoglycans varied markedly; nearly 90% was incorporated into a fraction containing predominantly heparan sulfate and far less if any heparin; about 9.5% was incorporated into chondroitin 4- and 6-sulfate, and only 0.2% of the radioactivity was found in hyaluronic acid. The rate of synthesis of a fraction having several of the characteristics of keratan sulfate comprised only 0.3% of the synthesis of total glycosaminoglycans. No [^{14}C]hexosamine was incorporated into dermatan sulfate. Following acute hepatic injury, the synthesis of glycosaminoglycans was stimulated by 80-100%, and the proportions of various types of these molecules changed. If calculated on the basis of the specific activity of the precursors of glycosaminoglycans, which was found to be strongly reduced in injured liver, the maximum enhancement of total glycosaminoglycan synthesis was 6.6-fold 5 days after the onset of liver injury.

8031 INFLUENCE OF SAMPLING ON DRUG KINETICS IN LIVER PERFUSION. (Eng.) Timmer, C. J.; Wijnand, H. P. (Scientific Development Group, Organon Intl. B. V., Oss, Netherlands). *J. Pharmacokinet. Biopharm.* 5(4):335-358; 1977.

A mathematical treatment of the influence of sampling on drug kinetics in liver perfusion is presented. Based on the derived equations, a Fortran IV computer program (PERFUS) was developed, by which the time course of drug concentrations can be simulated for any sampling scheme. The simulations show that the withdrawal of large samples from the reservoir, i.e., greater than 5% of the reservoir volume, results in substantially biased parameters for drugs that are rapidly distributed and/or metabolized. For the fitting of empirical data, a Fortran IV computer program is presented, based on BMDX85 nonlinear least squares by Gauss-Newton iterations. This program (PERFIT) estimates model parameters corrected as if no sampling had occurred, no matter how distorted the drug disappearance curve may be as a result of sampling or due to degeneration of the two-compartment model into a one-compartment model.

8032 ALTERATION OF HEPATIC MICROSOMAL ENZYME SYSTEMS AND THE LETHAL ACTION OF NON-STEROIDAL ANTI-ARTHRITIC DRUGS IN ACUTE AND CHRONIC MODELS OF INFLAMMATION. (Eng.) Sofia, R. D. (Dept. Pharmacology and Toxicology, Wallace Lab., Cranbury, NJ 08512). *Agents Actions* 7(2):289-297; 1977.

The effect of chronic inflammation due to adjuvant-induced polyarthritis (AIP) on the rat hepatic microsomal enzyme systems was measured indirectly by sodium hexobarbital anesthesia and zoxazolamine paralysis. In addition, drug toxicity studies with meseclazone, acetylsalicylic acid, phenylbutazone, and indomethacin were performed in the polyarthritic rats. Polyarthritis was induced by s.c. injection of 0.1 ml of a 0.5% suspension of heat-killed *Mycobacterium tuberculosis* into the hind paw. Carrageenan edema, a model of acute inflammation, was induced in another group of rats by injection of a 1.0% solution of calcium carrageenan in the hind paw. In the AIP rats, hexobarbital sleeping time was increased by 168.9% and zoxazolamine-induced paralysis was extended by 50.2% on day 14 after injection. Neither of these indications of a depressed hepatic microsomal enzyme system were observed in the carrageenan edema rats. In AIP rats, the LD$_{50}$ values for acetylsalicylic acid, phenylbutazone, and indomethacin decreased as the inflammation became more severe. The LD$_{50}$ of meseclazone, a new nonsteroid anti-inflammatory agent, was not altered in either the AIP or carrageenan edema rats. Chronic inflammation also appears to affect the central nervous system, since sleeping time was increased in AIP rats given sodium barbital, a barbiturate that is excreted without undergoing metabolism in the liver.

8033 CHELATING AGENTS AND HEPATIC DRUG METABOLISM IN THE RAT. (Eng.) Torronen, R.; Alakuijala, P.; Marselos, M. (Dept. Physiology, Univ. Kuopio, SF-70101 Kuopio 10, Finland). *Arch. Int. Pharmacol.* 226(1):11-20; 1977.

The effects of chelating agents on hepatic drug metabolism were studied in male rats, and hepatic Cu, Zn, and Mg contents were measured to detect possible alterations. One week of treatment with dimercaprol (50 mg/kg/day) decreased Cu content and suppressed NADPH-cytochrome *c* reductase, but it enhanced *p*-nitroanisole demethylase and uridine diphosphate (UDP)-glucuronosyltransferase activities. CaNa$_2$EDTA (200 mg/kg/day) decreased the content of Cu and Zn and enhanced the activities of *p*-nitroanisole demethylase and UDPglucose dehydrogenase. Penicillamine (100 mg/kg/day) decreased the Cu level in the total hepatic homogenate and increased the Cu level in the microsomes. The same alterations were observed with Mg, which also accumulated in the microsomes after penicillamine treatment. The microsomal content of Zn was significantly decreased. The *O*-demethylation of *p*-nitroanisole was enhanced, but no other changes in the drug metabolizing enzymes were detected. These results suggest that treatment of rats with chelating agents at doses comparable to those used in humans does not bring about toxic effects as far as the hepatic trace elements and microsomal drug metabolism are concerned. The changes in the trace elements do not correlate with those of the drug metabolizing enzymes.

8034 EXPERIMENTAL HEPATIC INJURY: THE SEQUENTIAL CHANGES IN DRUG METABOLIZING ENZYME ACTIVITIES AFTER ADMINISTRATION OF ACETAMINOPHEN.

(Eng.) Willson, R. A.; Hart, F. E. (Div. Gastroenterology, Univ. Washington, Seattle, WA 98195). *Res. Commun. Chem. Pathol. Pharmacol.* 16(1):59-71; 1977.

Because of the poor correlation reported in liver diseases between *in vitro* drug enzyme activities and standard liver function tests or the degree of necrosis, the sequential changes in the *in vitro* drug metabolizing enzyme activities were investigated in experimental liver injury. Experimental hepatic necrosis was induced in phenobarbital-pretreated rats by the administration of acetaminophen (1,200 mg/kg) in dimethyl sulfoxide (DMSO), i.p. The cytochrome P-450 content and the specific activities of aminopyrine demethylase, aniline hydroxylase, and bilirubin glucuronyl transferase diminished over the 3-day study period, as compared with control animals. The reductions, however, were generally modest, not uniform for all the enzymes assayed, and correlated poorly with histologic necrosis and standard liver function tests. It is concluded that in acute liver disease, changes in the hepatic *in vitro* drug metabolizing enzyme capacity may not be closely related to cellular necrosis, *per se*, and the degree of change in enzyme activities will vary from one enzyme system to another. These findings may explain, in part, the often inconsistent alterations in the disposition and elimination of drugs described in associated liver disease.

8035 PORTACAVAL TRANSPOSITION AND SUBSEQUENT PARTIAL HEPATECTOMY IN THE RAT: EFFECTS ON LIVER ATROPHY, HYPERTROPHY AND REGENERATIVE HYPERPLASIA.

(Eng.) Guest, J.; Ryan, C. J.; Benjamin, I. S.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Br. J. Exp. Pathol.* 58(2): 140-146; 1977.

Body and liver weights were measured before and after portacaval transposition (PCT) plus left adrenalectomy (A) in Sprague-Dawley rats, and their regenerative hyperplastic responses were measured after partial hepatectomy (PH) performed 3 weeks after PCT. Rats undergoing PCT + A gained significantly less ($p< 0.001$) body weight 3 weeks after surgery (initial and final weights, 210.2 ± 6.9 and 265.3 ± 29.5 g, resp.) than did rats undergoing sham PCT + A (initial and final weights, 210.2 ± 6.7 and 289.5 ± 26.9 g, resp.). Loss of body weight at 3 weeks after PH was significant in rats undergoing PCT + A ($0.05>p>0.025$) and in rats undergoing sham PCT PCT + A ($0.01>p>0.005$). At 3 and 6 weeks after PCT + A, the relative liver weights (% of body weight) were 3.29 ± 0.19 and 2.88 ± 0.23, resp., in nonhepatectomized rats 399 ± 0.32 and 3.64 ± 0.13, resp., in nonhepatectomized rats undergoing sham PCT + A; these differences were significant ($0.005> p>0.001$). Immediately after PH, there were no significant differences in the relative weight of the liver remnant between rats undergoing PCT + A and those undergoing sham PCT + A or A alone. However, the relative liver weight 3 weeks after PH was significantly less in rats undergoing PCT + A (2.47 ± 0.42%) than in rats undergoing sham PCT + A (3.47 ± 0.37%) or in rats undergoing A alone (3.35 ± 0.46%), but it did not differ significantly from the expected relative liver weight found in nonhepatectomized rats 6 weeks after PCT + A (2.88 ± 0.23%). Despite the atrophic changes occurring in the liver of rats undergoing PCT + A, there was no change in the DNA activity ratio of the liver (either in timing or magnitude) in the first 36 hr after partial hepatectomy. This observation suggests that regenerative hyperplasia following PH is not impaired by the diversion of portal blood factors.

8036 EFFECTS OF PARTIAL HEPATECTOMY ON EXTRARENAL ERYTHROPOIETIN PRODUCTION IN RATS.

(Eng.) Anagnostou, A.; Schade, S.; Barone, J.; Fried, W. (Univ. Illinois Coll. Medicine, Chicago, IL). *Blood* 50(3):457-462; 1977.

The effects of partial hepatectomy (50-60%) on extrarenal erythropoietin production were studied in female Sprague-Dawley rats. Rats were either partially hepatectomized or sham-operated. At intervals of from 5 min to 7 days later, both kidneys were removed and the animals were then exposed to hypoxia (0.4 atmospheres of air) for 7.5 hr. Immediately afterward, plasma was collected, and its erythropoietin titer was assayed. Rats that were partially hepatectomized on day 2, 3, or 4 prior to nephrectomy and hypoxia had significantly higher plasma erythropoietin levels (average levels of 0.41 0.17, and 0.16 erythropoietin U/ml plasma, resp.) than sham-operated controls (average, 0.04 erythropoietin U/ml plasma), but rats hepatectomized 5 min, 1 day, or 7 days prior to nephrectomy and hypoxia did not. The average wet liver weight of the sham-operated rats was 5.9 g; 1 day posthepatectomy it had fallen to 3.1 g, and 4 days posthepatectomy it had regenerated to 6.0 g. The erythropoietin titers of nonhepatectomized rats undergoing partial splenectomy (66%) 3 or 4 days prior to nephrectomy and hypoxia and of nonnephrectomized rats undergoing partial hepatectomy 3 or 4 days prior to hypoxic exposure did not differ significantly from those of sham-operated controls. These results are consistent with the conclusion that extrarenal erythropoietin production is enhanced in association with a rapid regeneration of hepatic cells.

8037 REGENERATION OF RAT LIVER IN THE PRESENCE OF ESSENTIAL OILS AND THEIR COMPONENTS.

(Eng.) Gershbein, L. L. (Northwest Inst. Medical Res., 5656 W. Addison St., Chicago, IL 60634). *Food Cosmet. Toxicol.* 15(3):173-181; 1977.

The effects of several essential oils, flavorings, spices, and plant materials on liver regeneration were determined over a 10-day period in partially hepatectomized rats given s.c. injections of high levels of essential oils, terpenes, or aromatic compounds daily for the first 7 days or fed *ad libitum* for 10 days on diets supplemented with oils, spices, and botanicals. The amount of tissue regenerated was increased significantly by the oils of anise, fennel, tarragon, parsley seed, celery seed, and oleoresin; by nutmeg, mace, cumin, and sassafras; and by the aromatic principles 4-allylanisole, 4-propenylanisole, *p*-isopropylbenzaldehyde, safrole, and isosafrole. Most of the essential oils were ineffective in total doses up to 3,000 mg/kg because they contained a high percentage of terpenes, which proved inert. Many of the agents effective by the s.c. route were also active when added to the diet, although a possible exception was tarragon oil (0-50%). Azulenes (e.g., *Matricaria chamomila* L. oils and guaiazulene) stimulated regeneration when given by injection, but Haitian vetivert oil, and the alcohol mixture vetiverol, and guaiene, in massive doses, did not. However, these last three agents, as well as the blue chamomile oils and ground *Matricaria* flowers, stimulated liver regeneration when given in the diet. Several of the test agents also increased the wet and dry liver weight expressed relative to body weight, in intact rats, whether given s.c. or p.o.

8038 FIBRINOLYSIS AND LIVER REGENERATION. (Eng.) Rixon, R. H.; Walker, P. R.; Whitfield, J. F. (Div. Biological Sciences, Natl. Res. Council Canada, Ottawa, Canada K1A 0R6). *J. Cell. Physiol.* 92(1):13-21; 1977.

Plasmin and plasminogen activator proteases were investigated as potential blood-borne mediators of the hepatectomy-induced proliferation of hepatocytes in male Sprague-Dawley rats. Partial (68%) liver resection, which activated the proliferation of the remaining hepatocytes, also doubled the level of circulating plasminogen activator within 30 min. However, this level was greatly depressed 2 hr after partial resection, with the depression lasting 8-10 hr before a return to normal levels 2-4 hr before the remaining hepatocytes began to synthesize DNA. This sequence of changes in the fibrinolytic potential of the blood was not abolished by prior thyroparathyroidectomy that inhibits the initiation of hepatocyte DNA synthesis and prevents the secretion of calcium homeostatic hormones, another early systemic consequence of partial liver resection. Since the early rise in plasminogen activator activity did not cause the appearance of active (free) circulating plasmin and since injection of the fibrinolysis and protease inhibitors ε-aminocaproic acid (30 mg/100 g/injection) and Trasylol (2,500 kallikrein-inhibiting U/100 g/injection) into the rats before and within 80 min after partial hepatectomy did not prevent hepatocytes from initiating DNA synthesis, it is unlikely that plasmin or its activator protease are blood-borne initiators of hepatocyte proliferation.

8039 EFFECTS OF Salmonella enteritidis ENDOTOXIN ON THE EXCRETORY FUNCTION OF THE ISOLATED PERFUSED RAT LIVER. (Eng.) Utili, R.; Abernathy, C. O.; Zimmerman, H. J. (I Facolta di Medicina, Universita di Napoli, Via Cotugna 1, Napoli 80135, Italy). *Proc. Soc. Exp. Biol. Med.* 155(2):184-188; 1977.

The effects of lipopolysaccharide (LPS) from *Salmonella enteritidis* on the excretory function of isolated perfused rat liver (IPRL) were studied. The addition of 40 and 60 μg/ml LPS extracted with trichloracetic acid (Boivin type) to the perfusate reduced bile flow from a control value of 1.40 ± 0.03 to 1.15 ± 0.02 and 1.05 ± 0.05 μl/min/g liver, resp. ($p<0.01$). Boivin LPS also significantly ($p<0.01$) reduced the rate of indocyanine green (ICG) excretion from a control value of 5.43 ± 0.16 to 3.75 ± 0.24 and 3.47 ± 0.30 μg/min/g liver, resp. The ICG concentration in the bile was also increased, but ICG uptake from the perfusate was not affected. The addition of 40 μg/ml Boivin LPS decreased bile flow (from 1.30 ± 0.02 to 1.14 ± 0.01 μl/min/g bile acid liver, $p<0.05$), and bile acid excretion (70.3 ± 2.7 versus 54.0 ± 0.8 μmol/min/g liver, $p<0.05$). However, bile acid concentration in the bile was unchanged. When BSP was infused into the IPRL 15 min after the addition of 20 μg/ml LPS extracted with phenol-water (Westphal type), bile flow was significantly ($p<0.01$) reduced from a control value of 1.85 ± 0.05 to 1.48 ± 0.08 μl/min/g liver. BSP excretion was also significantly ($p<0.05$) reduced from 20.1 ± 1.1 to 15.4 ± 1.0 μg/min/g liver. The BSP transport maximum was reduced by 23% ($p<0.05$), but the BSP concentration in the bile was unchanged. Since two LPS preparations were used, it is suggested that the effects were due to a biological property of the endotoxin and not to contaminants produced by extraction. LPS had no effect on the perfusate flow rate or on the rate of aspartate aminotransferase release by the IPRL. Thus, inhibition of hepatic excretory pathways is a biological activity of LPS, and the data are consistent with the theory that impairment of hepatic excretion by bacterial endotoxins might play a role in the pathogenesis of the cholestatic jaundice in gram-negative bacterial infections.

8040 ROLE OF ZINC IN THE ABATEMENT OF HEPATOCELLULAR DAMAGE AND MORTALITY INCIDENCE IN ENDOTOXEMIC RATS. (Eng.) Sobocinski, P. Z.; Powanda, M. C.; Canterbury, W. J.; Machotka, S. V.; Walker, R. I.; Snyder, S. L. (U.S. Army Medical Res. Inst. Infectious Diseases, Fort Detrick, Frederick, MD 21701). *Infect. Immun.* 15(3):950-957; 1977.

The effectiveness of Zn against *Salmonella typhimurium* endotoxin-induced mortality and hepatocellular damage was studied in male Fischer-Dunning rats. Pretreatment 1 hr prior to i.p. challenge with endotoxin with $ZnCl_2$ (0.4-2.0 mg/100 g body weight, i.p.) resulted in 80-100% survival, compared with 10% survival in untreated control rats, 24 hr after endotoxin treatment. At >2.0 mg/100 g, $ZnCl_2$ was toxic and provided diminished protection. I.v. administration of Zn did not provide protection. When Zn was given after endotoxin, its ability to enhance survival was greatly reduced as a function of time after endotoxin. Plasma ornithine carbamoyltransferase activity was measured and liver sections were examined histologically to determine the extent of liver damage. Endotoxin absorption from the peritoneal cavity and hepatic uptake were studied by using ^{51}Cr-labeled endotoxin. Zn pretreatment (1.6 mg/100 g) significantly reduced the ^{51}Cr-labeled endotoxin content of blood (314 ± 58 counts/min [cpm]/ml) and liver (427 ± 109 cpm/g), compared to untreated controls (1,137 ± 131 cpm/ml and 2,547 ± 360 cpm/g, resp.; $p<0.001$). It also prevented endotoxin-induced elevations in plasma ornithine carbamoyltransferase activity ($p<0.01$) and hepatic tissue necrosis. It is suggested that the protection afforded by i.p. Zn is due to its ability to diminish absorption of the toxin from the peritoneal cavity and subsequent hepatic uptake.

8041 EFFECT OF ANOXIA AND ATP DEPLETION ON THE MEMBRANE POTENTIAL AND PERMEABILITY OF DOG LIVER.

(Eng.) Lambotte, L. (Univ. Louvain, Lab. Experimental Surgery, 1200-Brussels, Belgium). *J. Physiol. (Lond.)* 269(1):53-76; 1977.

The mechanisms responsible for the depolarization of the hepatocytes secondary to anoxia were studied in the isolated perfused dog liver. The role of the inhibition of the sodium pump following exhaustion of the energy reserves and of the modifications of membrane permeability was elucidated. Anoxia was compared with ouabain and with a reduction of the cellular ATP level with respect to induction of depolarization. Membrane potentials were measured with microelectrodes. Potassium, sodium, and chloride were determined in plasma samples and liver tissues. The extracellular space was measured with tritiated inulin or by an electrical impedance method. Adenine nucleotides were also measured in liver biopsies. The fall in membrane potential produced by the administration of 0.1 mM ouabain was greater than the effect of the redistribution of sodium potassium ions; this suggests that the sodium pump is functioning electrogenically, at least in part. The administration of 10 mM dinitrophenol, which caused a 74% fall in the ATP level in 15 min, also produced a depolarization that corresponded to stopping an electrogenic pump. A partial reduction in the level of ATP brought about by hypoxia, by 10 mM antimycin, or by 20 mM fructose resulted in a hyperpolarization that may be attributed to an elevation of potassium permeability (P_K), since it was concomitant to a loss of K from the liver. The change in membrane permeability was not related to a rise in the free calcium in the cells. The administration of 10 mM amobarbitone produced an immediate depolarization that was independent of the progressive reduction in the ATP level. The depolarization was attributed to a direct effect of amobarbitone that reduced the membrane permeability for potassium ions. The depolarization observed in ischemic anoxia was greater than that produced by ouabain for the same variation in ion concentrations. In addition to a likely inhibition of the electrogenic sodium pump, changes in membrane permeability inducing a rise in the P_{Na}/P_K ratio must also occur. After ischemic anoxia for 24 hr at 3 C, the ratio of P_{Na}/P_K rose to 0.68, which indicates that the selective character of membrane permeability was abolished. The augmentation in cell volume produced by anoxia might result in an opening of membrane pores, which could entail the augmentation of sodium permeability; the latter would be responsible in part for the depolarization produced by anoxia. According to the severity and length of oxygen deprivation an increase in P_K, a cessation of the sodium pump activity, and finally an increase in P_{Na} will occur.

8042 EFFECT OF ISCHAEMIA ON THE ENZYME ACTIVITY OF THE HEPATIC TISSUE.

(Eng.) Kupcsulik, P.; Stekker, K.; Nemeth, M. (Semmelweis Univ. Medical Sch., Budapest, Hungary). *Res. Exp. Med.* 170(3):259-270; 1977.

The lactate and pyruvate levels, as well as acid (AcP) and alkaline phosphatase (AlkP), lactate dehydrogenase (LDH), glucose-6-phosphate dehydrogenase (G6PD), glutaminic acid-oxalacetic acid transaminase (GOT), and aldolase levels of rat liver homogenates were measured at 24 C and 38 C during a 120-min ischemic period to determine whether the method is a sensitive indicator of ischemic lesions, whether the overall enzyme activity of the hepatic tissue or intracellular distribution of hepatic enzymes activities is the main susceptible indicator of ischemic lesions, and whether there is a time in the investigated ischemic period when typical, perhaps irreversible, changes could be detected. All the above-mentioned enzymes except GOT and aldolase were studied histochemically; microscopically visible enzyme-histochemical changes in hepatic tissue were also determined. During ischemia, the total lactate level rose significantly at 38 C ($p<0.001$-0.01), whereas the amount of membrane-bound lactate fell both at 24 C ($p<0.001$-0.01) and 38 C ($p<0.001$-0.01). The lactate to pyruvate ratio rose significantly after 100 min at 24 C ($p<0.01$) and was significantly higher at all time points at 38 C ($p<0.001$-0.01). The significant decrease in total aldolase activity at both 24 C ($p<0.001$-0.05) and 38 C ($p<0.001$-0.02) indicates a breakdown of aerobic glycolysis and the simultaneous start of lactic acid fermentation. The G6PD total activity increased simultaneously at both 24 C ($p<0.02$-0.05) and 38 C ($p<0.01$-0.02), pointing to the beginning of a pentose phosphate "shunt." During the later stages of ischemia, there were changes in AlkP, AcP, and LDH total activities, but these were not consistently significant and were more pronounced at 38 C than at 24 C. The membrane-bound activities of AlkP, AcP, and LDH all increased significantly ($p<0.001$-0.05) in the later stages of ischemia at both 24 C and 38 C. Fractionated study of the liver homogenate improved the assessability of enzyme determinations. However, no direct answer can be given to the time when irreversible lesions begin to develop. Quantitative testing of the liver homogenate and enzyme histochemical observation of the hepatic tissue might be a suitable method for the assessment of ischemic liver lesions.

8043 TREATMENT OF EXPERIMENTAL MURINE AMYLOIDOSIS WITH DIMETHYL SULFOXIDE. (Eng.) Kedar, I.; Greenwald, M.; Ravid, M. (Sackler Sch. Medicine, Tel Aviv Univ., Tel Aviv, Israel). *Eur. J. Clin. Invest.* 7(2):149-150; 1977.

The effect of dimethylsulfoxide (DMSO) on experimental amyloidosis was tested. DMSO (0.5 ml of 1.32 M/day) was administered i.v. for 60 days to 20 mice with casein-induced amyloidosis. Partial or total disappearance of amyloid deposits occurred in all treated animals. The urine of these animals contained a substance from which amyloid fibrils could be synthesized. A control group of mice with casein-induced amyloidosis that was given saline injections showed massive amyloid deposition in the liver and in the spleen at the end of the experiment. Neither the urine of these mice nor the urine of normal control mice treated with DMSO contained substances from which amyloid fibrils could be synthesized. The results indicate that DMSO treatment of mice with amyloidosis results in a breakup of amyloid fibers into small subunits that are excreted in the urine.

8044 A MICROPUNCTURE STUDY OF SALT AND WATER RETENTION IN CHRONIC EXPERIMENTAL CIRRHOSIS. (Eng.) Lopez-Novoa, J. M.; Rengel, M. A.; Rodicio, J. L.; Hernando, L. (Dept. Nephrology, Fundacion Jimenez Diaz, Madrid 3, Spain). *Am. J. Physiol.* 232(4):F315-F318; 1977.

The importance of increased sodium resorption in rats with chronic hepatic cirrhosis was studied using micropuncture techniques. Cirrhosis was induced by the administration of phenobarbital and carbon tetrachloride. The animals retained salt and water after loading and showed edema and ascites. Salt and water balance, clearance, and micropuncture tests were performed. Five or six weeks after the induction of liver injury, the rats were unable to excrete salt and water loads promptly. Urine flow and sodium concentration were significantly less in cirrhotic rats with edema and ascites than in the normal controls. The glomerular filtration rate was slightly lower in the right, nonmicropunctured kidney but was the same in the left. The nephron glomerular filtration rates of surface nephrons were equal in both the experimental and control rats. The fractional proximal resorption rate was notably greater in cirrhotic rats, as was the total proximal nephron resorption rate. It cannot be demonstrated from this study that increased proximal resorption alone might account for diminished sodium and water excretion. The authors believe that major evidence is provided of the importance of proximal resorption in this phenomenon.

8045 THE CIRCULATION IN LIVER TISSUE AND EXPERIMENTAL LIVER METASTASES BEFORE AND AFTER EMBOLIZATION OF THE LIVER ARTERY. (Eng.) Lindell, B.; Aronsen, K. F.; Rothman, U.; Sjogren, H. O. (Univ. Lund, Malmo General Hosp., S-21401 Malmo, Sweden). *Res. Exp. Med. (Berl.)* 171(1):63-70; 1977.

Simultaneous measurement of cardiac output (CO) distribution with ^{86}Rb- and ^{57}Co-tagged microspheres in rats implanted with sarcoma cell tumors (intraportal injection of sarcoma cells) enabled the quantitation of arterial and portal tumor circulation. Total liver circulation was reflected by the ^{86}Rb measurements, whereas the ^{57}Co-tagged spheres indicated arterial circulation to the liver. The portal circulation was taken as the difference between the total liver and arterial circulations. Portal circulation was increased in small tumors (0-2 mm) compared with that in the liver, with the CO fraction (%/g) being 0.66 ± 0.20 for liver tissue and 0.97 ± 0.30 for tumor tissue. However, portal circulation in medium- and large-sized tumors ($\geq$2 mm) was decreased compared with that in normal liver tissue (CO fraction values of 0.30 ± 0.14 and 0.81 ± 0.31, resp.). When tumor growth became massive, even the total liver circulation was reduced, as measured by a ^{133}Xe washout that showed a half-time of 44 ± 14 sec for livers with small and medium tumors and 102 ± 22.5 sec for livers with massive tumors. Xe washout was prolonged in livers with small and medium tumors when the liver artery was embolized by degradable microspheres. The preembolization half-time of 44 ± 14 sec was increased to 98 ± 43 sec. All liver tumors showed increased arterial circulation, with the ^{57}Co-sphere fraction (%/g) being 0.78 ± 0.65 for tumor tissue and 0.49 ± 0.22 for normal liver tissue. Arterial hyperperfusion was changed into ischemia when the liver artery was occluded through embolization with degradable microspheres.

8046 THE EFFECT OF PORTACAVAL SHUNT ON PLASMA LIPIDS AND LIPOPROTEINS IN SWINE. (Eng.) Nestruck, A. C.; Lussier-Cacan, S.; Bergseth, M.; Bidallier, M.; Davignon, J.; Marcel, Y. L. (Institut de Recherches Cliniques de Montreal, 110 avenue des Pins ouest, Montreal, Quebec H2W 1R7, Canada). *Biochim. Biophys. Acta* 488(1):43-54; 1977.

8047 REPAIR IN VIVO OF LIVER DEOXYRIBONUCLEIC ACID DAMAGED BY HYCANTHONE AND RELATED COMPOUNDS. (Eng.) Sarma, D. S. R.; Zubroff, J.; Rajalakshmi, S. (Univ. Toronto Medical Sch., Toronto, Ontario M5S 1A8, Canada). *Mol. Pharmacol.* 13(4): 719-725; 1977.

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See also, 7915, 7934, 7979, 8098, 8103, 8108, 8110, 8113, 8296, 8298, 8310, 8370, 8385, 8398, 8399, 8419, 8427, 8432.

Intestine

8083 AMINO ACID METABOLISM OF DOG JEJUNUM BEFORE AND DURING ABSORPTION OF KETO ANALOGUES.

(Eng.) Weber, F. L., Jr.; Maddrey, W. C.; Walser, M. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Am. J. Physiol.* 232(3):E263-E269; 1977.

The proportion of keto analogues that disappear from the intestinal lumen and appear in the mesenteric venous blood as the unchanged keto acid or as its corresponding amino acid was determined. The keto analogues of the essential amino acids, leucine (L), valine (V), and isoleucine (IL), were infused into the lumen of the intact dog jejunum and the unchanged keto acids, the corresponding amino acids, or ammonium and urea were subsequently measured in mesenteric blood. Control experiments measured jejunal uptake and mesenteric vein release of 24 amino acids plus ammonium and urea. The keto analogues of L, V, and IL, infused for 1 hr at initial concentrations of 10 mM, disappeared from the lumen at a rate of 20.2 ± 1.6, 18.6 ± 2.0, and 15.7 ± 2.8 μmol/cm/hr, resp. Significant amination of keto analogues occurred in the gut wall since 8% of L, 15% of V, and 17% of IL keto analogues appeared as the corresponding amino acid in the mesenteric blood. The remainder of the absorbed keto analogues of V and IL appeared unchanged in the blood; however, 34% of the keto analogue of L did not appear and was probably catabolized by the gut wall. The results justify the oral administration of keto analogues of essential amino acids in patients with clinical disorders such as uremia and portal systemic encephalopathy where protein restriction is necessary.

8084 ACTIVATION AND RELEASE OF PROTEOLYTIC KININ-FORMING ENZYMES FROM RAT JEJUNAL LOOPS PERFUSED WITH HYPEROSMOLAR GLUCOSE SOLUTIONS.

(Eng.) Worthington, K. K.; Cuschieri, A. (Dept. Surgery, Liverpool Univ., Liverpool, England). *Gut* 18(4):279-283; 1977.

Loops of rat jejunum were perfused *in vivo* for 1 hr with de Jalon solutions (de Jalon 1, 259.6-de Jalon 4, 1,358.4 mOsm) of increasing glucose concentration (2.77-1,000 mM) to study the activation and release of proteolytic kinin-forming enzymes. The esterolytic activity of the perfusate and of the extracted loop was measured using benzoyl arginine ethyl ester as substrate. The enzymes LDH, isocitrate dehydrogenase, and acid phosphatase were measured in the perfusate to estimate the degree of cellular damage. There was a significant depletion of kallikrein from the intestine (De Jalon 2 perfused, 46.84 ± 23.29 ImU/ml; normal unperfused 98.90 ± 42.68 ImU/ml) and a raised level in the perfusate (28.01 ± 27.6 ImU/ml) during the hyperosmolar perfusions. However, no further increase in the release of proteolytic activity was found when the osmolarity of the perfusate was increased from 530 to 1,350 mOsm. The release of kallikrein into the perfusate was rapid, occurring in the first 20 min of the perfusion, whereas cellular damage as indicated by LDH (De Jalon 1 perfused, 57.04 ± 48.89 and De Jalon 4 perfused, 229.22 ± 175.32 ImU/ml) occurred only after 40 min of perfusion. Therefore, the effect of hyperosmolar solutions on the release of proteolytic enzymes is specific and may not be ascribed directly to cellular damage. It is concluded that hyperosmolar intestinal contents can act as a mechanism for the release of intestinal kinin-forming enzymes such as kallikrein into the circulation and suggest this mechanism is involved in the syndrome of vasomotor dumping after gastric surgery.

8085 INFLUENCE OF THE THYROID AND ADRENAL GLANDS ON THE GROWTH OF THE INTESTINE OF THE SUCKLING RAT, AND ON THE DEVELOPMENT OF INTESTINAL ALKALINE PHOSPHATASE AND DISACCHARIDASE ACTIVITIES.

(Eng.) Yeh, K. Y.; Moog, F. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *J. Exp. Zool.* 200(3):337-348; 1977.

The stimulatory effects of thyroxine or cortisone treatments on the functional maturation of rat intestinal mucosa were studied in normal, thyroidectomized (6 days of age), and adrenalectomized (14 days) rats. The rats were given daily i.p. injections of either thyroxine (1 μg/g body weight) or cortisone acetate (50 μg/g) from 19 to 22 days and were sacrificed at 24 days. Thyroidectomized animals gained less body weight and small intestinal weight than controls by 24 days (32.9 ± 2.4 g versus 60.9 ± 2.6 g and 868 ± 38 mg versus 2.282 ± 140 mg total weight at 24 days, resp.); neither thyroxine nor cortisone therapy altered this result. The villi did not increase in height beyond the 6-day stage. Crypt depth in thyroidectomized animals (11.8 ± 0.5 cells), which was 64% of the control value (19.1 ± 0.4), was increased to 14.7 ± 0.4 and 14.2 ± 0.4 cells by cortisone and thyroxine, resp. ($p<0.001$ in both cases). The mitotic index was increased from 2.69 ± 0.16 to 3.44 ± 0.12% by thyroxine compared to a control value of 4.05 ± 0.13% ($p<0.001$ in both cases). Duodenal alkaline phosphatase was increased from 89 ± 6.8 μmol phenylphosphate (PhP)/mg protein/hr to 390 ± 31 and 612 ± 65 μmol PhP/mg/hr by cortisone and thyroxine, resp.; the latter was comparable to the control value of 502 ± 43 μmol ($p<0.05$) for all differences. Subnormal sucrase and maltase activities in thyroidectomized rats were more than doubled by both thyroxine and cortisone. Thyroxine and cortisone increased the carbohydrate content (PAS-staining material) in brush borders of thyroidectomized rats to normal levels. Body weight and small intestinal weight were lowered in adrenalectomized animals at 24 days than in control animals (46.5 ± 0.8 g and 1,432 ± 18 mg versus 59.0 ± 2.0 g and 2,353 ± 80 mg, resp); cortisone raised both body and intestinal weights (49.1 ± 1.6 g, $p>0.1$ and 1,820 ± 78, $p<0.001$), but thyroxine caused additional depressions. Cortisone increased villus height from 72.2 ± 1.7 to 81.6 ± 6.9 cells ($p<0.005$) and raised the mitotic index from 2.63 ± 0.10 to 3.30 ± 0.12% ($p<0.005$), whereas thyroxine was ineffective. Cortisone and thyroxine failed to increase subnormal crypt depths in adrenalectomized rats, but cortisone did increase the PAS-stainability of the brush borders. Duodenal alkaline phosphatase levels in adrenalectomized animals were increased to slightly greater than control values by both cortisone and thyroxine. Maltase activity was increased from 8.28 ± 0.57 to 19.49 ± 1.40 and 14.72 ± 1.13 μmol substrate/mg/hr by cortisone and thyroxine, resp., as compared to a control value of 21.60 ± 0.84 ($p<0.001$). Sucrase activity was increased from 1.56 ± 0.14 to 4.22 ± 0.31 and 2.33 ± 0.28 μmol substrate/mg/hr by cortisone and thyroxine, resp., as compared to a control value of 4.34 ± 0.31. Thyroxine was able to restore plasma adrenocorticosteroid levels to normal in thyroidectomized rats, but could not affect corticoid levels in hypophysectomized rats. These results demonstrate that the intestinal epithelium of the rat is able to respond to each hormone tested in the absence of the other.

8086 EFFECTS OF ANIONIC SURFACTANTS ON HAMSTER SMALL INTESTINAL MEMBRANE STRUCTURE AND FUNCTION: RELATIONSHIP TO SURFACE ACTIVITY. (Eng.) Gullikson, G. W.; Cline, W. S.; Lorenzsonn, V.; Benz, L.; Olsen, W. A.; Bass, P. (Sch. Pharmacy, 425 N. Charter St., Madison, WI 53706). *Gastroenterology* 73(3):501-511; 1977.

The relationship of the surface properties of a group of anionic surfactants to their effects on intestinal water transport was studied. Water transport was determined using everted hamster jejunal sacs. Dose-response inhibition of water transport (60-80% maximum inhibition, $p<0.05$) was obtained with two long-chain detergents (sodium dodecyl sulfate and dioctyl sodium sulfosuccinate), a fatty acid (ricinoleate), and dihydroxy bile salts (deoxycholate, chenodeoxycholate, and taurodeoxycholate), whereas no activity was seen with trihydroxy bile salts (cholate, glycocholate, and taurocholate, all at 8 mM) or a triketo bile salt (16 mM dehydrocholate). This effect on water transport paralleled the abilities of these compounds to lyse the erythrocyte, a membrane model. Both biological effects were related to the surface properties of the agents, as determined by critical micelle concentration and surface tension reduction. The effects of deoxycholate on the small intestine, *in vivo*, showed that alterations in intestinal permeability correlated with effects on fluid absorption. Concentrations of deoxycholate that induced secretion also increased ($p<0.05$) intestinal permeability to inulin, dextran, and albumin, and the rate of cell exfoliation. These changes were accompanied by both biochemical and histological alterations: exfoliation (DNA release), membrane effects (sucrase release), and shortened villi. Electron microscopy revealed extensive alteration ($p<0.005$) of the brush border membrane with a decrease in binding of lanthanum and the development of permeability to tracer in villus tip cells. Taurocholate (16 mM concentration), which did not alter water transport, also did not affect intestinal permeability or the brush border membrane. It is suggested that surface properties of anionic surfactants cause changes in absorptive cell membranes that result in intestinal secretion.

8087 INTESTINAL BRUSH BORDER ALKALINE PHOSPHATASE IN THE RAT AFTER PROXIMAL SMALL BOWEL RESECTION. (Eng.) Urban, E. (Audie Murphy Veterans Admin. Hosp., 7400 Merton Minter Blvd., San Antonio, TX 78284). *Proc. Soc. Exp. Biol. Med.* 155(1):99-104; 1977.

The effect of proximal small bowel resection on intestinal brush border alkaline phosphatase (AP) activity in the remaining duodenum, midgut, and ileum was studied in male albino Sprague-Dawley rats. Enzyme activity was measured 6-7 weeks after the rats were subjected to resection of 50 cm of the proximal intestine and anastomosis of remaining intestine or sham-operation. Studies of mucosal mass after resection revealed significant mucosal growth in the duodenum of the resected rats compared with controls (25.2 ± 1.5 mg/cm gut length versus 35.2 ± 3.6 mg/cm in controls and resected rats, resp.); similar results were found for the midgut (20.3 ± 2.2 mg/cm versus 28.7 ± 2.8 mg/cm in control and resected rats, resp.). In the duodenum, AP activity per gram of mucosa decreased, but the increased mucosal mass compensated for the loss so that total AP activity per cm of intestine did not change. In the midgut, AP activity, measured per gram of mucosa and per cm of intestine, increased. In the ileum, AP activity did not increase compared to sham-operated rats. Duodenal brush border alkaline phosphatase may be important for postresection transport adaptation.

8088 HARMALINE INTERACTION WITH SODIUM-BINDING SITES IN INTESTINAL BRUSH BORDER SUCRASE. (Eng.) Mahmood, A.; Alvarado, F. (Laboratoire de Physiologie Comparee, Universite de Paris-XI, Centre Universitaire d'Orsay, 91405 Orsay, France). *Biochim. Biophys. Acta* 483(2):367-374; 1977.

The effect of harmaline (3.3-12.8 mM) on Na^+-activated rabbit brush border sucrase was studied at pH 6.8. The reaction kinetics revealed harmaline to be a fully competitive inhibitor of the substrate, sucrose. It is hypothesized that harmaline (charged positively in the physiological pH range 5.2-9) might compete with an allosterically related sodium-binding site that has been postulated to be involved in the activation of sucrase by alkali metal ions. Because of its size, harmaline, when bound to the metal site, could at least partially overlap with the substrate site, thereby behaving as if it were an authentic, fully competitive inhibitor of the substrate. Alkali metals (Na^+, K^+, Li^+) can completely reverse the inhibition caused by harmaline, thereby further confirming the hypothesis.

8089 SUBCELLULAR DISTRIBUTION OF THIAMINE-PYROPHOSPHOKINASE AND THIAMINE-PYROPHOSPHATASE ACTIVITIES IN RAT ISOLATED ENTEROCYTES. (Eng.) Cusaro, G.; Rindi, G.; Sciorelli, G. (Istituto di Fisiologia umana dell'Universita, Via Forlanini 6, 27100 Pavia, Italy). *Int. J. Vitamin Nutr. Res.* 47(2):99-106; 1977.

The intracellular distribution of thiamine pyrophosphokinase (TPKase), which phosphorylates thiamine, and of thiamine pyrophosphate (TPPase), which dephosphorylates thiamine pyrophosphate, was studied in rat enterocytes. Cellular fractionation was carried out in isolated small intestinal cells. TPKase activity was localized mainly (96-98%) in the supernatant fraction, and only minor amounts were found in mitochondria and microsomes. TPPase activity was present only in the particulate fractions (especially in the microsomes). The fact that TPKase is localized in the cytosol indicates that this enzyme probably does not play a role as a carrier for active intestinal transport of thiamine.

8090 GLYCOPROTEIN SYNTHESIS, TRANSPORT, AND SECRETION BY EPITHELIAL CELLS OF HUMAN RECTAL MUCOSA: NORMAL AND CYSTIC FIBROSIS. (Eng.) Neutra, M. R.; Grand, R. J.; Trier, J. S. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *Lab. Invest.* 36(5):535-546; 1977.

The synthesis, transport, and secretion of glycoprotein by rectal epithelium from four normal volunteers, six patients with cystic fibrosis, and six of their disease-free siblings were studied by autoradiography of rectal biopsies pulse-labeled with ^{3}H-glucosamine and maintained in organ culture for various intervals of up to 24 hr. Within any one biopsy sample, the movement of labeled mucus in goblet cells varied widely among cells. Even with individual cells, labeled mucous granules often did not move in concert toward the apical cell surface. The average transport time in the cells of the cystic fibrosis patients and their siblings did not differ significantly from those of the adult controls. The carbohydrate composition of glycoprotein secretions of rectal epithelial cells was investigated by comparing autoradiographs of ^{3}H-glucosamine-labeled biopsies with those labeled with ^{3}H-fucose, ^{3}H-*N*-acetylmannosamine, and ^{35}S-sulfate. The patterns of incorporation of these four precursors into normal goblet and columnar cells suggested that both cell types may alter the quantity and composition of newly synthesized glycoproteins as they migrate, mature, and senesce. Incorporation patterns in cystic fibrosis biopsies were indistinguishable from those of sibling or adult controls. With the techniques used, no abnormalities of epithelial glycoprotein production were detected in cystic fibrosis rectal mucosa.

8091 MORPHOMETRIC AND AUTORADIOGRAPHIC INVESTIGATION OF THE SMALL AND LARGE INTESTINAL MUCOSA OF RATS WITH CHRONIC EXPERIMENTAL RENAL INSUFFICIENCY. (Eng.) Lohrs, U.; Arnholdt, H. (Pathologisches Institut der Universitat Munchen, Thalkirchner Strasse 36, D-8000 Munchen 2, W. Germany). *Beitr. Pathol.* 159(4):325-342; 1976.

The changes of the small and large intestinal mucosa of rats with surgically induced chronic renal insufficiency were analyzed. The rate of the physiological cell regeneration was inhibited in renal insufficiency, and this was correlated with the degree of insufficiency. The generation time was extended up to 40% in the ileum and up to 50% in the large intestine in the animals with the highest degree of renal insufficiency. This extension was mainly due to a prolongation of the postmitotic G$_1$-phase. At the same time, the total number of crypt epithelia and regenerative cells in the enlarged crypts increased. The enlargement of the regenerative crypt population is interpreted to be an adaptive compensation of the inhibition of the cell production by prolongation of the mitotic cycle. Differentiated surface epithelial cell damage was not detected. The results of this study, as well as those of previous studies, suggest the following hypothesis for the development of uremic enterocolitis: an initial decrease in the cell production rate occurs as a result of a prolonged mitotic cycle in renal insufficiency. When this decrease is not compensated for by an increase in the number of regenerative cells, as after uremic toxemia of sudden onset, erosive or ulcerative mucosal changes or simple mucosal atrophy will occur.

8092 ASSESSMENT OF THE SPECIFICITY OF ENZYMATIC REACTIONS USING MIXED SUBSTRATES: INCORPORATION OF ALKYLGLYCEROLS IN THE IONIC ALKOXYLIPIDS OF THE RAT'S INTESTINAL MUCOSA. (Eng.) Reichwald, I.; Mangold, H. K. (Bundesanstalt fur Fettforschung, Piusallee 68, D-4400 Munster, W. Germany). *Nutr. Metab.* 21(Suppl. 1):198-201; 1977.

8093 THE METABOLISM OF PHENOLIC OPIATES BY RAT INTESTINE. (Eng.) Rance, M. J.; Shillingford, J. S. (Reckitt and Colman Pharmaceutical Div., Dansom Lane, Hull HU8 7DS, England). *Xenobiotica* 7(9):529-536; 1977.

8094 THE INTESTINAL PROLIFERATION. (Eng.) Zajicek, G. (Hebrew Univ.-Hadassah Medical Sch., Jerusalem, Israel). *J. Theor. Biol.* 67(3): 515-521; 1977.

8095 INTESTINAL RESPONSES TO HYPEROSMOLAR GLUCOSE INFUSION IN DOGS. (Eng.) Fukushima, T.; Ishiguro, N.; Kito, F.; Suda, T.; Yamagishi, T.; Muraki, T.; *et al.* (Dept. Surgery, Yokohama City Univ., Yokohama, Urafune-cho, Yokohama 232, Japan). *Gastroenterol. Jpn.* 12(2):30-38; 1977.

8096 INTESTINAL METABOLISM OF PLASMA FREE FATTY ACIDS. (Ger.) Gangl, A. (Ordinariat fur Medizinische Computerwissenschaften und fur

Gastroenterologie, Garnisongasse 13, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 88(24): 813-816; 1976.

8097 THE EFFECT OF A THERMAL FACTOR ON THE ACTIVITY OF DIFFERENT ENZYMES OF THE SMALL INTESTINAL MUCOSA. (Rus.) Rakhimov, K.; Demidova, A. I. (Dept. Physiology, Uzbek SSR Acad. Sciences, Tashkent, USSR). *Patol. Fiziol. Eksp. Ter.* (3): 58-59; 1976.

8098 JEJUNOILEAL BYPASS IN THE TREATMENT OF EXPERIMENTAL OBESITY IN THE RAT. (Ita.) Ottolenghi, A.; Faccioli, G.; Baggio, E.; Armellini, F.; Bettili, G. (Istituto di Clinica Medica Generale e Terepia Medica, Universita di Padova, Padua, Italy). *Chir. Patol. Sper.* 24(3):155-162; 1976.

See also, 7902, 7904, 7923, 7924, 7956, 7967, 7986, 8068, 8085, 8099, 8100, 8101, 8102, 8119, 8194, 8207, 8232, 8497.

GENERAL

8099 HYPERSENSITIVITY REACTIONS IN THE SMALL INTESTINE. III. THE EFFECTS OF ALLOGRAFT REJECTION AND OF GRAFT-VERSUS-HOST DISEASE ON EPITHELIAL CELL KINETICS. (Eng.) MacDonald, T. T.; Ferguson, A. (Univ. Glasgow, Dept. Bacteriology and Immunology, Glasgow, Scotland). *Cell Tissue Kinet.* 10(4):301-312; 1977.

Allograft rejection of fetal intestine and graft-versus-host (GvH) disease were used to study the effects of cell-mediated immune reactions on epithelial cell kinetics in the mouse small intestine. In heterotopically transplanted isografts, the cell production rate per crypt was similar to that in normally sited small intestine of the same age. However, there was a sixfold increase in the rate of cell production per crypt during allograft rejection and a threefold increase during GvH disease. Animals with GvH disease developed villus atrophy and had fewer crypts per villus than littermate controls. At the age of 19 days, cell production was 97.5 cells/villus/hr in animals with GvH disease, compared with 54.6 cells/villus/hr in controls. These results indicate that the pathological entity of "partial villus atrophy" evolves in two distinct phases. Phase 1, a state of increased cell turnover with crypt hyperplasia but villi of normal length, precedes the development of phase 2, true villus atrophy.

8100 INTESTINAL STIMULATION OF THE SERUM ANTIBODY RESPONSE AGAINST Escherichia coli O83 ANTIGEN IN HEALTHY ADULTS. (Eng.) Jodal, U.; Ahlstedt, S.; Hanson, L. A.; Lidin-Janson, G.; Akerlund, A. S. (Inst. Medical Microbiology, Guldhedsgatan 10, S-413 46 Goteborg, Sweden). *Int. Arch. Allergy Appl. Immunol.* 53(6):481-489; 1977.

The levels and avidities of *Escherichia coli* O83 antibodies were studied after colonization experiments in 11 healthy subjects. The ingestion of *E. coli* O83 bacteria preceded by 2 g of $NaHCO_3$ resulted in the bacteria appearing as a transient strain in the stool in 6 of the 11 subjects. No rise in serum, urine, or parotid fluid antibody levels against the crude O antigen from *E. coli* O83 bacteria was detected using the enzyme-linked immunosorbent assay (ELISA) or the indirect hemagglutination (IHA) technique. In contrast, a serum antibody response was registered in four subjects with the ammonium sulfate precipitation (ASP) technique. The rise in antibody level was accompanied by an increase in relative average antibody avidity. Significantly lower levels of serum antibodies against the *E. coli* O83 and O6 antigens were recorded using the ASP technique, as compared with those for O2, O4, and O75 antigens. The results indicate that determinations of serum antibody levels with the ELISA and the IHA techniques are not affected by minor changes in the intestinal bacterial flora and should therefore be used for diagnostic purposes.

8101 EFFECT OF INTRALUMINAL OXYGEN ON ENDOTOXIN ABSORPTION IN EXPERIMENTAL OCCLUSION OF THE SUPERIOR MESENTERIC ARTERY. (Eng.) Shute, K. (St. Thomas' Hosp., London, England). *Gut* 18(7): 567-570; 1977.

The effect of intraluminal oxygen administration during ischemia on the absorption of bacterial endotoxin after release of an experimental occlusion of the superior mesenteric artery (SMA) was studied in male Wistar rats. The presence and level of endotoxin in the rat plasma was assayed by determining the mortality rate following injection of plasma with and without 12.5 μg of actinomycin D i.p. into Swiss mice (the drug enhances the lethal effect of endotoxin by up to 225,000 times). Seven percent of mice injected with rat plasma taken after SMA without oxygen occlusion died. Sixty-five percent of those mice injected with this plasma and actinomycin D were dead at 48 hr. The mortality in this group was significantly higher than the mortality of those mice given this plasma alone ($p<0.001$) or of mice given control plasma (no occlusion or oxygen) and actinomycin D ($p<0.001$). Fifty-five percent of mice given actinomycin D and this plasma heated to 70 C died. Seventy percent of those given autoclaved plasma and actinomycin died. The mortalities in these two groups were not significantly different from the mortality of mice given unheated post-SMA occlusion plasma and actinomycin D. However, only 23% of mice given actinomycin D and post-SMA occlusion plasma from oxygen-treated rats died. This latter mortality is significantly lower than the 65% mortality of mice given actinomycin D and plasma from untreated rats ($p<0.001$). The results indicate that intraluminal oxygen during ischemia somehow decreases the amount of endotoxin absorbed into the superior mesenteric vein blood following the release of the SMA occlusion.

8102 RESISTANCE OF GERMFREE RATS TO INDOMETHACIN-INDUCED INTESTINAL LESIONS. (Eng.)

Robert, A.; Asano, T. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI 49001). *Prostaglandins* 14(2):333-341; 1977.

The effect of indomethacin on the development of intestinal lesions was studied in germfree (gnotobiotic) rats and in gnotobiotic rats monocontaminated with *Escherichia coli*, and the protective effect of prostaglandins was investigated. Indomethacin (10 and 20 mg/kg) given p.o. to conventional rats produced a syndrome of intestinal lesions characterized by multiple ulcers and peritonitis within 3 days. Male germfree rats were found to be resistant to this effect of indomethacin, while female germfree rats developed very mild lesions. Germfree rats became sensitive again to such lesions when monocontaminated with *E. coli*. In such animals, however, the lesions were less severe than in conventional animals, presumably because more than one microorganism is necessary for the full syndrome to develop. These results suggest that microorganisms are necessary for the development of indomethacin-induced intestinal lesions. Secondary bile acids, absent in germfree animals, may also be necessary. The prostaglandin deficiency caused by indomethacin appears to weaken the resistance of the intestinal mucosa to microorganisms and/or their toxins. The latter may then penetrate the mucosa, damage the cells, and produce ulcers and perforations. Since 16,16-dimethyl prostaglandin E_2 (0.3 mg/kg, twice daily for 3 days, p.o.) protected against indomethacin-induced lesions, it is hypothesized that certain prostaglandins may protect the mucosa by preventing the spread of microorganisms and/or their toxin through the intestinal wall.

8103 PROMOTING EFFECT OF BILE ACIDS IN COLON CARCINOGENESIS IN GERM-FREE AND CONVENTIONAL F344 RATS. (Eng.)

Reddy, B. S.; Watanabe, K.; Weisburger, J. H.; Wynder, E. L. (Naylor Dana Inst. for Disease Prevention, American Health Foundation, Valhalla, NY 10595). *Cancer Res.* 37(9): 3238-3242; 1977.

The promoting effect of sodium cholate or sodium chenodeoxycholate on colon carcinogenesis was studied in female F344 germ-free and conventional rats. Both germ-free and conventional rats received intrarectal instillations of *N*-methyl-*N*'-nitro-*N*-nitrosoguanidine (MNNG) for 2 weeks (total dose, 8 mg) and then intrarectal doses of sodium cholate or sodium chenodeoxycholate (20 mg/dose) 3 times a week for 46 weeks; other groups received MNNG for 2 weeks and vehicle thereafter for 46 weeks or bile acids alone for 48 weeks. Sodium cholate or sodium chenodeoxycholate increased MNNG-induced adenocarcinomas and adenomas in germ-free rats, whereas in conventional rats these bile acids induced more adenomas. Conventional rats treated with MNNG plus sodium cholate or MNNG plus sodium chenodeoxycholate had a higher incidence ($p<0.05$) of colon tumors than did those given MNNG alone; germ-free rats that received MNNG plus sodium cholate or MNNG plus sodium chenodeoxycholate had a higher but not significant ($p>0.05$) frequency of colon tumors than did those given MNNG alone. No tumors were detected in the colons of germ-free and conventional rats given sodium cholate or sodium chenodeoxycholate alone. It is concluded that sodium cholate and sodium chenodeoxycholate have a promoting effect in MNNG-induced colon carcinogenesis in rats.

8104 MECHANISMS UNDERLYING GASTRIC MUCOSAL DAMAGE INDUCED BY INDOMETHACIN AND BILE-SALTS, AND THE ACTIONS OF PROSTAGLANDINS. (Eng.)

Whittle, B. J. R. (Wellcome Res. Lab., Langley Court, Beckenham, Kent BR3 3BS, England). *Br. J. Pharmacol.* 60(3):455-460; 1977.

The mechanisms by which sodium taurocholate potentiates the formation of gastric mucosal erosions induced by indomethacin was investigated in the rat. Systemic administration of indomethacin (10-20 mg/ml) lowered resting mucosal blood flow but had no effect on the acid back-diffusion across the mucosa. Gastric perfusion of taurocholate in acid solution increased acid back-diffusion and lowered the potential difference. This was accompanied by an increase in mucosal blood flow, which may represent a protective mechanism in the mucosa. The administration of indomethacin during 2 mM acid-taurocholate perfusion reduced this elevated mucosal blood flow without any further change in acid back-diffusion. The results suggest that although a decrease in mucosal blood flow or an increase in acid back-diffusion can lead to a low incidence of erosions; a combination of both produces extensive mucosal damage. The (15S)-methyl analogue of prostaglandin E_2 (5 μg/kg/hr) reduced erosion formation induced by 20 mg/kg indomethacin and 2 mM acid-taurocholate administration. This protective action of the prostaglandin analogue may be linked to changes in gastric mucosal permeability and in mucosal blood flow.

8105 ROLE OF INTRAGASTRIC PRESSURE, pH, AND PEPSIN IN GASTRIC ULCERATION IN THE RAT.

(Eng.) Alphin, R. S.; Vokac, V. A.; Gregory, R. L.; Bolton, P. M.; Tawes, J. W., III. (A. H. Robins Res. Lab., 1211 Sherwood Ave., Richmond, VA 23220). *Gastroenterology* 73(3):495-500; 1977.

The development of experimental gastric ulcers in the rat was studied by a method of continuous gastric perfusion with artificial gastric juice to evaluate the contribution of pH, pepsin, and intragastric pressure on the pathogenesis of peptic ulcers. This method allowed the change of only one factor at a time, while the other two remained constant. The gastric mucosa of normal, 48-hr fasted rats was resistant to the ulcerogenic effects of artificial gastric juice perfused through the stomach for 6 hr without an increase in intragastric pressure (2.5 cm water). Perfusion of HCl (pH 1.3) under increasing pressure (5-12.5 cm water) produced ulceration of the corpus as well as the forestomach portion of the stomach (ulcer index 126 ± 34 at a pressure of 12.5 cm). The addition of porcine pepsin to the perfusate at a pressure of 7.5 cm water increased the incidence and severity of ulceration ($p<0.05$). The degree of gastric ulceration paralleled increases in intragastric pressure, acidity, and pepsin proteolytic activity. Inhibition of pepsin activity by a pepsin inhibitor (sodium lignosulfonate, 2.5-5.0 mg/min) protected the gastric mucosa, even at a pH of 1.3. These results demonstrate that under the experimental conditions used, HCl alone, in the absence of pepsin, does not produce ulceration of the rat stomach.

8106 GASTRIC ULCERATION ASSOCIATED WITH EXPERIMENTAL VASCULAR OCCLUSION. (Eng.)

Svanes, K.; Ulven, A. (Haukeland sykehus, Bergen, Norway). *Digestion* 15(6):517-525; 1977.

To investigate the significance of the different vascular beds of the stomach wall in the development and healing of gastric ulcers, vascular occlusion was induced in the glandular layer or in the submucosa of the cat stomach. The left gastric artery was cannulated in 17 cats, and a single dose of microspheres was injected into the artery, after which it was ligated. Microspheres with diameters of 8-10 μm induced gastric mucosal erosions that healed within 1-2 weeks. Microscopic examination revealed that there were few microspheres in the submucosa, more in the muscularis, and large numbers in the glandular layer. The muscularis mucosae was intact. After the injection of 50 ± 5 μm spheres, a large gastric ulcer developed. The ulcers healed after 4 weeks. Microscopically, the ulcer penetrated through the muscularis mucosae, and many microspheres were seen in the submucosa and serosa beneath the ulcer. The results suggest that slow healing of a gastric ulcer may be due, at least in part, to vascular occlusion in the submucosa.

8107 ESTIMATION OF THE HEPATIC BLOOD FLOW IN THE DOG WITH THE Xe^{133} AND HYDROGEN WASHOUT, Au^{198}-COLLOID UPTAKE TECHNIQUES AND WITH THE ELECTROMAGNETIC FLOWMETER. (Eng.)

Szabo, G.; Benyo, I.; Sandor, J.; Benyo, Z. (Semmelweis Univ. Medical Sch., Budapest, Hungary). *Res. Exp. Med. (Berl.)* 169(1):69-76; 1976.

To estimate hepatic blood flow, electromagnetic flow meter probes were positioned around the isolated common hepatic artery (CHA) and the portal vein (PV) of 15 anesthetized dogs weighing between 15 and 21 kg. A fluorocarbon catheter was introduced into the PV, two Pt needle electrodes were inserted 3 mm deep into the right and left hepatic lobes, and a reference probe was inserted subcutaneously into the thigh. A collimated NaI scintillation detector was placed 20 cm above the liver giving a visual field of from 1/3 to 1/2 of the anterior hepatic surface. For radiogold clearance, the detector was positioned directly over the animal's skull. Femoral artery and PV pressures were measured with Statham strain gauges. Hydrogen gas was introduced via intratracheal tube, ^{133}Xe gas in saline was injected into the mesenteric branch, and radioactive colloidal gold (^{198}Au) in dextran was injected into the femoral vein. Total hepatic blood flow (HBF) averaged 142 ± 10.4 ml/min/100 g. Nonhepatic flow was found to be 23.5% of the hepatic artery flow. Since the CHA flow rate is 30.3% of the combined flow, HBF estimations are exaggerated by approximately 7%. Inert gas measurements yielded considerably lower values for HBF than the direct method. There was good correlation between results obtained with the ^{198}Au colloid clearance method and the simultaneous combined flowmeter method ($r=0.830$, $p<0.01$); the HBF was 153 ± 13 ml/min/100 g by the former method and this was 96.5 ± 5.0% of the value by the latter method. Considering that the combined flowmeter readings are approximately 7% higher than the true HBF, ^{198}Au colloid HBF is essentially the same as the average value obtained by direct measurement. HBF estimated with the colloidal gold uptake technique showed the best agreement with the direct measurements; the technique has numerous advantages, its only drawback being the high radioactivity required in a single determination that represents a hazard to the investigator carrying out serial determinations.

8108 THE EFFECT OF TRUNCAL VAGOTOMY ON TAUROCHOLATE CHOLERESIS AND SECRETIN CHOLERESIS. (Eng.)

Jones, R. S.; Smith, B. M. (Duke Univ. Medical Center, Durham, NC 27710). *J. Surg. Res.* 23(3):149-154; 1977.

The effect of truncal vagotomy on bile secretory processes was investigated in dogs. The animals underwent cholecystectomy, chronic bile and gastric fistulas, and pyloroplasty. Taurocholate choleresis and secretin choleresis were observed before and after truncal vagotomy. Vagotomy caused minor decreases in bicarbonate output and an increase in chloride output but had no influence on bile flow, bile salt concentrations, or bile salt output. Vagotomy had no influence on secretin choleresis. The findings indicate that previously observed reductions in bile salt secretion after vagotomy are due to some mechanism other than the influence of vagotomy on hepatic bile secretion.

8109 GASTROINTESTINAL FUNCTION IN THE INFANT AND YOUNG CHILD. (Eng.)

Gryboski, J. D. (No affiliation given). *Clin. Gastroenterol.* 6(2):253-265; 1977.

8110 GLIAL AND NERVE CELL CHANGES IN RATS WITH PORTO-CAVAL ANASTOMOSIS. (Eng.) Diemer, N. H.; Klee, J.; Schroder, H.; Klinken, L. (Inst. Neuropathology, Univ. Copenhagen, 11 Frederik V's Vej, DK-2100 Copenhagen, Denmark). *Acta Neuropathol. (Berl.)* 39(1):59-68; 1977.

8111 CELL PROLIFERATION IN NORMAL, PRENEOPLASTIC AND NEOPLASTIC GASTROINTESTINAL CELLS. (Eng.) Deschner, E. E.; Lipkin, M. (No affiliation given). *Clin. Gastroenterol.* 5(3):543-561; 1976.

8112 FAILURE OF PLASMA FROM HUMAN SCHISTOSOMIASIS MANSONI PATIENTS TO PROTECT MICE FROM Schistosoma mansoni CERCARIAL CHALLENGE. (Eng.) Lewis, F. A.; Sher, A.; Colley, D. G. (Veterans Admin. Hosp., 1310 24th Ave. South, Nashville, TN 37203). *Am. J. Trop. Med. Hyg.* 26(4):723-726; 1977.

8113 THE EFFECT OF PRE-TREATMENT OF RATS WITH ANTI-CANCER DRUGS UPON THE PLASMA KINETICS OF ANTIPYRINE AND THE BILIARY EXCRETION OF PHENOLPHTHALEIN. (Eng.) Capel, I. D.; Williams, D. C. (Marie Curie Memorial Foundation, The Chart, Oxted, Surrey, RH8 OTL, England). *IRCS Med. Sci.: Cancer* 5(7):307; 1977.

8114 ESOPHAGEAL PATCH GRAFTING AS A TREATMENT FOR ESOPHAGEAL STRICTURE IN A HORSE. (Eng.) Hoffer, R. E.; Barber, S. M.; Kallfelz, F. A.; Petro, S. P. (New York State Coll. Veterinary Medicine, Cornell Univ., Ithaca, NY 14853). *J. Am. Vet. Med. Assoc.* 171(4):350-354; 1977.

8115 THE ASSOCIATION OF SELECTED CLIMATIC FACTORS WITH NATURAL ALIMENTARY PARASITES OF THE DOG. (Eng.) Becker, S. V.; Selby, L. A.; Hutcheson, D. P.; Hacker, D. V. (Coll. Veterinary Medicine, Univ. Missouri, Columbia, MO 65201). *Environ. Res.* 14(1):141-151; 1977.

8116 THE IMMUNIZATION OF MICE AND CALVES WITH GAL E MUTANTS OF Salmonella typhimurium. (Eng.) Wray, C.; Sojka, W. J.; Morris, J. A.; Morgan, W. J. B, (Central Veterinary Lab., Weybridge, Surrey, England). *J. Hyg. (Camb.)* 79(1):17-24; 1977.

8117 THE EFFECT OF ILLUMINATED HUMAN PLASMA ON CELL GROWTH. (Eng.) Engelhardt, D. L.; Santella, R. M.; Rosenkranz, H. S.; Speck, W. T. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10032). *Photochem. Photobiol.* 26(1):53-55; 1977.

8118 ANIMAL SUPPORT FOR EXPERIMENTAL RADIOLOGY. (Eng.) Davies, R. L.; Roberts, E. E.; Roberts, G. M. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff, CF4 4XN, Wales). *Lab. Anim.* 11(3):169-170; 1977.

8119 FAILURE TO DEMONSTRATE INVOLVEMENT OF PROSTAGLANDINS IN THE IMMUNE EXPULSION OF Trichostrongylus colubriformis FROM THE INTESTINE OF GUINEA PIGS. (Eng.) Rothwell, T. L. W.; Love, R. J.; Goodrich, B. S. (McMaster Lab., Glebe, New South Wales 2037, Australia). *Int. Arch. Allergy Appl. Immunol.* 53(1):93-95; 1977.

8120 VAGAL INNERVATION OF THE ANTRUM AND PYLORUS AND ITS APPLICATION IN PROXIMAL SELECTIVE VAGOTOMY. (Eng.) De Mello, J. D.; Moreira, A.; Garrido, A.; Raia, A. A. (Faculdade de Medicina, Sao Paulo, Brazil). *Chir. Gastroenterol.* 11(1):41-44; 1977.

8121 CARBOHYDRATE COMPOSITION OF HEPATITIS B SURFACE ANTIGEN. (Eng.) Shiraishi, H.; Kohama, T.; Shirachi, R.; Ishida, N. (Tohoku Univ. Sch. Medicine, Seiryomachi, Sendai, Japan). *J. Gen. Virol.* 36(1):207-210; 1977.

8122 AN EXPERIMENTAL STUDY OF SUTURE OF COLONIC WOUNDS IN THE RABBIT. (Eng.) Robbs, J. V. (Dept. Surgery, Univ. Natal, Natal, South Africa). *Surg. Gynecol. Obstet.* 145(2):235-240; 1977.

See also, 7901, 7907, 7921, 7974.

DIAGNOSTIC PROCEDURES

8123 GRAY SCALE CHOLECYSTOSONOGRAPHY: DIAGNOSTIC CRITERIA AND ACCURACY. (Eng.) Lawson, T. L. (George Washington Univ. Medical Center, Washington, DC 20037). *Radiology* 122(1): 247-251; 1976.

Preoperative fasting cholecystosonography scans were performed on 81 patients with cholecystitis symptoms and an abnormal oral cholecystogram. Ultrasonograms were compared with oral cholecystograms and surgical findings, and gallbladder diameter was measured in 51/81 patients with confirmed disease. Evidence of cholecystitis and/or cholelithiasis was found in 80/81 patients. Of all patients referred for pancreatic ultrasonography, 15 had extrahepatic biliary obstruction, 10 had pancreatic carcinoma, 2 had cholangiocarcinoma of the hepatic and common hepatic bile ducts, 2 had pancreatic metastases, and 1 had enlarged lymph nodes in the pancreatic region secondary to lymphoma. Positive diagnosis of cholelithiasis was made in 56/81 patients on the basis of internal echos, organ wall irregularities, and sonic shadows, singly or in combination. Overall diagnostic error was approximately 5%. Three false-negative diagnoses of cholelithiasis were probably due to poor technique, since stones were eventually found to be 1-3 cm in diameter. There was good correlation between cholecystosonograms and oral cholecystograms in 47 patients for whom data were available. Small single stones (7 mm) and aggregates (<7 mm) were visualized in several patients. Cholecystosonograph measurements of the gallbladder in patients with confirmed extrahepatic biliary obstruction correlated well with size found at surgery, but the use of this parameter in the diagnosis of chronic cholecystitis or extrahepatic biliary obstruction is thought to be tenuous. When dilated intrahepatic bile ducts are demonstrated, a diagnosis of extrahepatic biliary obstruction may be made.

8124 ACCURACY OF COMPUTED TOMOGRAPHY OF THE LIVER AND BILIARY TRACT. (Eng.) Levitt, R. G.; Sagel, S. S.; Stanley, R. J.; Jost, R. G. (Mallinckrodt Inst. Radiology, Washington Univ. Sch. Medicine, 150 S. Kingshighway, St. Louis, MO 63110). *Radiology* 124(1):123-128; 1977.

The accuracy of computed tomography (CT) scanning of the liver and biliary tract was investigated in 266 patients. The identification of 43 of 46 proved cases of space-occupying lesions within the liver was accomplished with CT, and in 36 cases the nature of the lesion was clarified by CT. Technical errors in the measurement of the attenuation value of the lesions were responsible for 3 of 10 erroneous diagnoses. When attenuation values fall into the overlapping range of cysts and abscesses (10-20 Hounsfield U [HU]) or of abscesses and tumors (20-30 HU less than the normal liver parenchyma), CT cannot clarify the nature of the lesion. Values for lesions smaller than 2 cm will be erroneously high or low due to partial volume averaging. Obstructive jaundice was correctly identified in 38 of 39 proved cases, and nonobstructive jaundice in 21 of 26 proved cases. In obstructive jaundice, the site or cause of the obstruction was defined by CT scanning in 30 of 39 cases. Hepatocellular disease (e.g., cirrhosis) was less accurately detected by CT, with only 10 of 22 cases in the above series being recognized.

8125 THE CLINICAL APPLICATION OF EXOCRINE PANCREATIC FUNCTION TESTS. (Eng.) DiMagno, E. P.; Go, V. L. W. (Mayo Medical Sch., Rochester, MN). *DM* 22(12):1-36; 1976.

8126 DIAGNOSTIC SIGNIFICANCE OF CARCINOEMBRYONIC ANTIGEN (CEA) CONCENTRATIONS--A STUDY OF 61 PATIENTS WITH MALIGNANCIES. (Eng.) Pick, A. I.; Shoenfeld, Y.; Zelikovski, A.; Wolloch, J.; Mintz, U. (Tel Aviv Univ. Medical Sch., Tel Aviv, Israel). *Am. J. Proctol.* 28(3):37-43; 1977.

8127 RADIOIMMUNOASSAY. (Eng.) Harvey, R. F. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):231-261; 1976.

8128 BLEEDING GASTRIC ULCER IN A NEWBORN INFANT DIAGNOSED BY TRANSUMBILICAL AORTOGRAPHY. (Eng.) Fliegel, C. P.; Herzog, B.; Signer, E.; Nars, P. (Kinderspital Basel, Romergasse 8, 4058 Basel, Switzerland). *J. Pediatr. Surg.* 12(4):589-590; 1977.

8129 ADVANCES IN DIAGNOSTIC RADIOLOGY: PROBLEMS AND PROSPECTS. (Eng.) Bragg, D. G. (Univ. Utah Medical Center, Salt Lake City, UT 84132). *Cancer* 40(Suppl. 1):500-508; 1977.

8130 A PRELIMINARY CLINICAL EVALUATION OF A NEW INTRAVENOUS CHOLECYSTOGRAPHIC MEDIUM, BC-17. (Eng.) Yamasaki, M. (Niigata Univ. Sch. Medicine, Niigata, Japan). *Acta Med. Biol. (Niigata)* 24(2):89-99; 1976.

8131 LAPAROSCOPY: A SAFER METHOD FOR LIVER BIOPSY IN THE HIGH RISK PATIENT. (Eng.) Friedman, I. H.; Wolff, W. I. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Am. J. Gastroenterol.* 67(4):319-323; 1977.

8132 PROGRESS REPORT: ULTRASOUND AND GASTROENTEROLOGY. (Eng.) Vicary, F. R. (Univ. Coll. Hosp., London, England). *Gut* 18(5):386-397; 1977.

8133 A SIMPLIFIED APPROACH TO DIAGNOSTIC RECTAL BIOPSY IN INFANTS AND CHILDREN. (Eng.) Weintraub, W. H.; Heidelberger, K. P.; Coran, A. G. (Mott Children's Hosp., Ann Arbor, MI 48109). *Am. J. Surg.* 134(2):307-310; 1977.

8134 CYCLOTRON-PRODUCED Zn-62: ITS POSSIBLE USE IN PROSTATE AND PANCREAS SCANNING AS A Zn-62 AMINO ACID CHELATE. (Eng.) Yano, Y.; Budinger, T. F. (Donner Lab., Univ. California, Berkeley, Berkeley, CA 94720). *J. Nucl. Med.* 18(8):815-821; 1977.

8135 SONOGRAPHY AS A PRELIMINARY DIAGNOSTIC TECHNIQUE IN THE ICTERIC PATIENT. (Eng.) Burger, J.; Enderlin, F. (Ratisches Kantonsspital, Chur, Switzerland). *Chir. Gastroenterol.* 10(4): 441-444; 1976.

8136 BREATH-HYDROGEN TEST AND SMOKING [Letter to Editor]. (Eng.) Tadesse, K.; Eastwood, M. (Western General Hosp., Edinburgh EH4 2XU, Scotland). *Lancet* 2(8028):91; 1977.

8137 PURPOSE AND TECHNIQUE: THE ROLE OF CYTOLOGY IN THE DIAGNOSIS OF GASTROINTESTINAL CANCER. (Eng.) Taylor, R. S. (No affiliation given). *J. Kansas Med. Soc.* 78(7): 348-352; 1977.

8138 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY--THE PAST AND PRESENT STATUS. (Eng.) Kikkawa, K. (No affiliation given). *Guthrie Bull.* 47(1):13-18; 1977.

8139 DIAGNOSTIC VALUE OF TESTS FOR ESTIMATION OF DISEASE ACTIVITY IN PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Kurdybailo, F. V.; Yakhontova, O. I.; Orlova, I. N. (Leningrad Sanitary-Hygiene Medical Inst., Leningrad, USSR). *Vrach. Delo* (12):68-71; 1976.

8140 CHOLEGRAPHIC STUDY CARRIED OUT WITH THE USE OF A NEW HEPATOTROPIC CONTRAST AGENT. (Rus.) Gottwald, G. (Semmelweis Medical Univ., Budapest, Hungary). *Vestn. Rentgenol. Radiol.* (6):66-70; 1976.

8141 BIOCHEMICAL INVESTIGATIONS IN HEPATOLOGY. (Ger.) Niederland, T. R. (III. Medizinischen Klinik der Komensky-Universitat, Bratislava-Kramare, Czechoslovakia). *Z. Gesamte Inn. Med.* 32(2):26-29; 1977.

8142 DEEP DUODENOSCOPY AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY. (Ger.) Arendt, R.; Blaschke, U.; Zubaidi, G.; Hauzeur, F. (Klinik fur Innere Medizin der Wilhelm-Pieck-Univ., Ernst-Heydemann-Strasse, 25 Rostock, E. Germany). *Z. Gesamte Inn. Med.* 31(21):888-893; 1976.

8143 PNEUMOGASTROGRAPHIC SEMIOTICS OF GASTRIC DISEASES. (Rus.) Portnoy, L. M.; Nefedova, V. O. (M. F. Vladimirsky Moscow Regional Scientific Res. Clinical Inst., Moscow, USSR). *Vestn. Rentgenol. Radiol.* (6):8-15; 1976.

8144 KNOWLEDGE OF GASTROENTEROLOGICAL ENDOSCOPY (Ger.) Koelsch, K. A. (Bezirkskrankenhauses, Max-Otten-Strasse 11/15, 301 Magdeburg, E. Germany). *Z. Gesamte Inn. Med.* 31(21):865-869; 1976.

8145 VALUE OF THE GAMMA GLUTAMYL TRANSPEPTIDASES (γ-GT) DETERMINATION IN THE DIAGNOSIS OF LIVER DISEASE. (Ger.) Brunner, H.; Schiller, G. (Ordinariat fur Gastroenterologie, Garnisongasse 13, A-1090 Wien, Austria). *Fortschr. Med.* 95(5):287-290; 1977.

See also, 8062, 8118, 8150, 8155, 8195, 8197, 8223, 8239, 8251, 8252, 8256, 8258, 8259, 8261, 8267, 8269, 8271, 8272, 8290, 8315, 8318, 8329, 8330, 8334, 8365, 8379, 8402, 8407, 8410, 8411, 8423, 8424, 8431, 8438, 8448, 8466, 8490, 8492, 8493, 8494.

GASTROINTESTINAL DISEASES

ESOPHAGUS

8146 GASTRIC ACID SECRETION IN PATIENTS WITH SYMPTOMATIC HIATUS HERNIA AND EFFECT OF A MODIFIED BELSEY MK IV REPAIR ON GASTRIC ACID SECRETION. (Eng.) Boesby, S. (Odense Univ. Hosp., Odense, Denmark). *Scand. J. Gastroenterol.* 12(4): 401-406; 1977.

Fasting, basal, and maximal (pentagastrin-stimulated) gastric acid secretion was assessed in 53 patients with radiologically verified sliding hiatal hernia without esophageal stricture. The mean values for fasting total acid (H^+) secretion, basal acid output, and peak acid output were 0.5 mEq H^+ (range, 0-2.8), 1.7 mEq H^+/hr (range, 0.01-6.3), and 23.92 mEq H^+/hr (range, 0-55.96), resp. There were no significant differences between patients with heartburn and those with heartburn and pain in terms of pH, volume, acidity, and acid output for fasting and basal acid secretions or in terms of peak acid output and volume for maximal acid secretion. A study of another 34 patients before and 3 months after a modified Belsey MK IV repair for symptomatic hiatal hernia revealed that after the repair, the mean pH of basal secretion had risen significantly ($p<0.01$) from 2.8 (range, 1.3-8.2) to 3.8 (range, 1.4-7.6), the mean volume of basal secretion had fallen significantly ($p<0.01$) from 44.0 ml (range, 2-140) to 30.0 ml (range, 2-66), the mean basal acid output had fallen significantly ($p<0.05$) from 1.9 mEq H^+/hr (range, 0.2-4.7) to 1.2 mEq H^+/hr (range, 0.04-2.93), the mean peak acid output had fallen significantly ($p<0.001$) from 22.7 mEq H^+/hr (range, 0-55.96) to 17.2 mEq H^+/hr (range, 0-49.2), and the mean volume of maximal acid secretion had fallen significantly ($p<0.001$) from 189.0 ml/hr (range, 51-384) to 145.0 ml/hr (range, 23-318). These changes are probably due to an unintentional vagotomy during the operation. Changes in gastric acid secretion should be considered in the evaluation of a surgically established barrier against gastroesophageal reflux in terms of esophageal pH.

8147 ESOPHAGEAL INTRAMURAL PSEUDODIVERTICULOSIS. (Eng.) Fromkes, J.; Thomas, F. B.; Mekhjian, H.; Caldwell, J. H.; Johnson, J. C. (Ohio State Univ. Hosp., 410 West Tenth Ave., Columbus, OH 43210). *Am. J. Dig. Dis.* 22(8):690-700; 1977.

Three cases of esophageal intramural pseudodiverticulosis (EIP) are reported, and another 22 cases from the literature are reviewed. The classic radiographic picture of EIP, which is that of collar-button-shaped outpouchings projecting in a perpendicular fashion from the luminal surface, appears to be mainly related to dilatation in the esophageal glandular ductal system. In one of the cases reported, where outpouchings were found only in the distal esophagus, histologic evidence of severe esophagitis and manometrically demonstrated aperistalsis were seen throughout the entire body of the esophagus. These observations, combined with the fact that in several cases the outpouchings developed in radiographically normal esophagi, support the theory that the inflammatory process precedes structural dilatation. The disease is usually diagnosed (56% of cases) in the sixth and seventh decades of life, although all ages may be affected. Dysphagia is a very common (84%), but not universal, symptom of the disease process. The only disease significantly associated with EIP is diabetes mellitus, which is present in 32% of such patients. Strictures of the esophagus are frequently seen (60%), and varying degrees of esophagitis are manifested endoscopically in about 50% of the cases. Esophageal motility disturbances are common (77%) and may be severe. *Candida albicans* was cultured from the esophagus in 24% of the cases, and biopsies revealed evidence of tissue invasion in 8% of these cases. It is concluded that EIP is an inflammatory disease of unknown etiology characterized by dilatation of the esophageal submucosal glandular elements.

8148 THE DEADLIEST RUPTURE: IDIOPATHIC MUSCULAR HYPERTROPHY OF THE ESOPHAGUS. (Eng.) Penka, W. E.; Edwards, W. D.; Preskorn, S. H.; Kepes, J. J. (KUMC, Coll. Health Sciences and Hosp., 39th and Rainbow Blvd., Kansas City, KS 66103). *J. Kans. Med. Soc.* 78(6):269-275; 1977.

Five cases of idiopathic muscular hypertrophy of the esophagus are presented, two of which were complicated by esophageal rupture. Antemortem diagnosis of the disorder was not established in any of the patients, although diffuse esophageal spasm and a hypertonic lower esophageal sphincter were noted in one. Gastroesophageal symptoms were present in three of five patients. The hypertrophy involved the esophagus diffusely in two patients and was limited to the distal esophagus in three. The esophageal wall thickness varied from 0.4 to 1.0 cm. Preferential hypertrophy of the esophageal inner circular muscle was noted in three patients, but both the inner circular and outer longitudinal muscles were hypertrophied in the other two. Lymphocytic inflammation involved the ganglia of Auerbach's plexus in all patients. Marked eosinophilic inflammation of the hypertrophied circular muscle layer was present in two. In all patients, both the muscular hypertrophy and the inflammation of Auerbach's plexus ended abruptly at the cardioesophageal junction, and they were not present elsewhere in the gastrointestinal tract. Two of the five cases were complicated by linear transmural tears of the left posterolateral wall of the distal supradiaphragmatic esophagus (Boerhaave's syndrome); fulminant mediastinitis resulted, and it led directly to the deaths of the patients.

8149 MALLORY-WEISS SYNDROME IN DISEASES OF THE INTERNAL ORGANS. (Rus.) Rumyantsev, V. V.; Trofimov, G. A.; Bonk, G. M. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Klin. Med.* 55(4):32-36; 1977.

ESOPHAGUS

8150 PAINFUL AND TRANSIENT SPASM OF THE CARDIO-ESOPHAGEAL SPHINCTER. (Fre.) Tavernier, C.; Divry, P.; Delafolie, A.; Regimbau, V. (Centre Hospitalier, 25, rue Pierre-de-Theilley, F 95500 Gonesse, France). *J. Radiol. Electrol. Med. Nucl.* 58(4):261-268; 1977.

8151 CONSERVATIVE SURGICAL TREATMENT OF PEPTIC STENOSIS OF THE ESOPHAGUS. (Fre.) Boutelier, Ph. (No affiliation given). *Chirurgie* 102 (8):700-707; 1976.

8152 ELECTROLYTE METABOLISM IN PATIENTS WITH CICATRICIAL ESOPHAGEAL STENOSIS BEFORE AND AFTER ESOPHAGOPLASTY. (Rus.) Makarenko, T. P.; Kharitonov, L. G.; Zharinov, E. U. (Central Inst. Advanced Medical Studies at Central Clinical Hosp. No. 1, USSR). *Sov. Med.* (4):102-104; 1977.

8153 CLINICAL CHARACTERISTICS OF INTESTINAL ESOPHAGOPLASTY IN CICATRICIAL STRICTURES OF THE ESOPHAGUS. (Rus.) Chepurnoy, G. I. (Rostov Medical Inst., Rostov, USSR). *Vestn. Khir.* 117(12): 16-21; 1976.

8154 SURGERY FOR PEPTIC ULCER OF THE ESOPHAGUS WITH EVOLUTIONARY LESIONS. (Spa.) Moreno Gonzalez-Bueno, C. (Servicio de Cirurgia del Aparato Digestivo, Fundacion "Jiminez Diaz," Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(2):111-122; 1977.

8155 EXPERIENCE WITH DYES IN THE ENDOSCOPIC DIAGNOSIS OF ESOPHAGEAL VARICES. (Spa.) Vazquez Iglesias, J. L.; Gallego Carracedo, E. (Ciudad Sanitaria de la Seguridad Social "Juan Canalejo," La Coruna, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(6):701-708; 1977.

8156 EXPERIENCE IN THE THERAPY OF ACUTE HEMORRHAGE OF ESOPHAGEAL VARICES. (Ger.) Kothe, W. (Chirurgischen Klinik, Karl-Marx-Universitat, Liebigstr. 20a, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4): 171-173; 1976.

8157 THERAPY OF CHILDREN WITH ACUTE OR IMMINENT HEMORRHAGE OF ESOPHAGEAL VARICES BY SCLEROSING OF THE ESOPHAGEAL WALL. (Ger.) Paquet, K. J.; Harler, B. (Chir. Univ. Klinik, D-5300 Bonn-Venusberg, W. Germany). *Monatsschr. Kinderheilkd.* 125(5):538-539; 1977.

8158 VALUE OF DISTAL SPLENORENAL SHUNT ACCORDIN TO WARREN IN THE TREATMENT OF ESOPHAGEAL VARICES. (Fre.) Loup, P.; Mosimann, R. (Chirurgie B, CHUV, CH-1011 Lausanne, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):525-527; 1977.

8159 POSTMORTEM DEMONSTRATION OF PORTAL VEIN COLLATERAL CIRCULATION. (Ger.) Brandt, G.; Stolte, M. (Pathologisches Institut der Universitat Erlangen-Nurnberg, Krankenhausstr. 8-10, D-8520 Erlangen, W. Germany). *Beitr. Pathol.* 159 (3):307-313; 1976.

8160 LATE RESULTS OF SURGICAL RECONSTRUCTION OF THE ESOPHAGUS FROM ILEUM AND CECUM. (Rus. Zhupan, V. F. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Klin. Khir.* (3):66-67; 1977.

8161 NOVELTY IN CLINICAL MICROSURGERY: SUBSTITUTION OF THE CERVICAL SEGMENT OF THE ESOPHAGUS BY INTESTINAL LOOP AUTOGRAFT. (Ita.) Ancona, E.; Cusumano, A.; Frasson, P.; Narne, S.; Peracchia, A.; Pesavento, G.; *et al.* (Istituto di Semeiotica Chirurgica, Universita di Padova, Padua, Italy). *Terapia* 61(442):203-209; 1976.

See also, 8114, 8137, 8462, 8478, 8488, 8495.

STOMACH

8162 GASTRIC SECRETORY AND MOTILITY STUDIES IN CHRONIC CHAGASIC PATIENTS. (Eng.) Padovan, W.; Meneghelli, U. G.; De Godoy, R. A. (Hospital das Clinicas, 14 100 Ribeirao Preto, Sao Paulo, Brazil). *Am. J. Dig. Dis.* 22(7):618-622; 1977.

Electromanometric and secretory studies were performed in 22 patients with Chagas' disease and in 12 control subjects. Gastric antrum electromanometric recordings were made under basal conditions and during stimulation with methacholine chloride (0.05 mg/kg, s.c.). Gastric secretory studies were performed with a Kay's test alone and with an augmented histamine test involving the s.c. administration of five doses of bethanechol chloride (0.025 mg/kg each). Signs of parasympathetic involvement of the stomach were exhibited by 10 of the chagasic patients. Patients were divided into two groups with respect to normal (group I) or abnormal (group II) gastric motility patterns. The mean of the maximal acid output (MAO) of each of the chagasic groups was significantly lower than that of the control group ($p<0.005$). Under the additional action of bethanechol, the MAO of control subjects did not change, but the MAO for chagasic patients increased by about 65%. As a result, the MAO of group I chagasic patients showed no significant difference from that of the control group, but the mean MAO for group II patients, although increased by the action of bethanechol, was still significantly lower than that of the control group ($p<0.005$). The mean maximal pepsin output (MPO) of each chagasic group was also significantly lower than that of the control group ($p<0.005$). Under the additional action of bethanechol, the MPO of controls and of group II patients did not change significantly; the MPO of group II patients was still significantly lower than that of controls ($p<0.005$), however, the MPO of group I patients doubled and approximated the control value. It is concluded that the parasympathetic denervation in Chagas' disease changes both acid and pepsin secretions in the same direction but, as the disease worsens, the responsiveness of pepsin secretion to cholinergic action tends to disappear earlier than that of acid secretion.

8163 PNEUMATOSIS CYSTOIDES INTESTINALIS: A CASE STUDY USING TRANSMISSION AND SCANNING ELECTRON MICROSCOPY. (Spa.) Llombart Bosch, A.; Lujan Pujante, E.; Forteza Villa, J.; Gomez Fayren, J. M. (Facultad de Medicina de Murcia, Murcia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47 (5):611-634; 1976.

A 70-yr-old man treated for inguinal and stomach hernias experienced periods of epigastric pain for 20 yr. Surgical intervention after radiological examination revealed pyloric stenosis and pyloroduodenitis with intense perivisceritis; a 2/3 gastrectomy was performed. At this time, pneumatosis cystoides intestinalis (PCI) was discovered on a 50-cm segment of the small intestine (terminal ileus) and was totally resected. The patient recovered and remains well 1.5 years after surgery. The resected PCI segment contained very small gaseous cysts (0.1-0.3 cm diameter), both isolated and confluent, arranged in linear or circular fashion and covered by a fine membrane. The histological characteristics are described for the granulomatous structures, gaseous cysts, the intestinal wall, and gastric ulcer. Fine structure is described for granular tissue, bullae, and the intestinal wall; a scanning electron microscope was used to study the same tissues, concentrating on the subserous and submucosal areas of the cystic walls.

8164 OBSERVATIONS ON THE GASTRIC MUCOSA OF RHEUMATIC PATIENTS BEFORE AND AFTER IBUPROFEN ADMINISTRATION AS STUDIED BY THE PENTAGASTRIN TEST, ENDOSCOPY, AND LIGHT AND ELECTRON MICROSCOPY. (Eng.) Vasconcelos Teixeira, A.; Abrunhosa, R.; Pocas, L. (Hosp. S Joao, Oporto, Portugal). *J. Int. Med. Res.* 5(4):243-252; 1977.

The effect of ibuprofen on the gastric mucosa in the rheumatic patients was studied in seven male patients aged 17-70 yr suffering from various rheumatic diseases. All patients received a daily dose of 1,200 mg of ibuprofen p.o. in three fractions over treatment periods ranging from 1 to 6 weeks. The values for acid secretion did not change in any patient after ibuprofen treatment. No patient exhibited any morphological alteration attributable to ibuprofen. The nucleus, mitochondria, and plasma membranes seemed unaffected by the drug treatment. In three patients, giant vacuoles were observed in the cytoplasm of the antral mucosa only in specimens obtained after ibuprofen treatment. These vacuoles were located in the immediate vicinity of the basal pole of the nucleus, occurred singly or apparently comprising a pair, were bounded by their own trilaminar membrane, and were surrounded by a layer of rough, dense cytoplasm. In their proximity, it was possible to observe much enlarged cisternae of rugose endoplasmic reticulum. Further investigation is suggested to determine the true nature of these vacuoles. It is concluded that, in the cases investigated, ibuprofen was not responsible for significant modifications of the gastric mucosa.

8165 THE MORPHOLOGY OF THE ANTRUM AND PYLORUS IN GASTRIC ULCER DISEASE. (Eng.) Liebermann-Meffert, D.; Allgower, M. (Kantonspital, CH-4031 Basel, Switzerland). *Prog. Surg.* 15:109-139; 1977.

To investigate the morphology of the antrum and pylorus in gastric ulcer disease, the terminal antrum and pylorus from 77 patients was examined at the time of surgery, and their appearances were compared with 50 control specimens. The thickness of the antropyloric wall was measured at the pylorus and in the antrum, 2.5 and 5 cm proximal to the pylorus. The increase in thickness was chiefly due to the muscle layer, but the submucosa and mucosa were also involved. The muscle hypertrophy was mostly irregular and involved different parts of the pylorus and antrum to a variable degree. Histological abnormalities of the antropyloric wall in gastric ulcer included hypertrophy of the muscle nuclei with areas where muscle fibers showed vacuolation, degeneration, and occasionally necrosis. The ganglia in these areas were reduced in number and also showed abnormal features. Mast cell and eosinophilic infiltration and areas of fibrosis and changes on the blood vessels were present. Most specimens with gastric ulcer showed severe gastritis with submucosal edema. The findings indicate that gastric ulcer is commonly associated with hypertrophy of the antropyloric wall and severe gastritis.

8166 ENDOSCOPIC AND BIOPSY FINDINGS IN GASTRIC PATHOLOGY. (Ita.) Cheli, R. (Ospedali Civili, Genova, Italy). *Minerva Med.* 68(5):331-333; 1977.

8167 AUTOIMMUNITY AND GASTRODUODENAL PATHOLOGY. (Spa.) Lechin, F. (Instituto de Medicina Experimental, Universidad Central de Venezuela, Venezuela). *Acta Gastroenterol. Latinoam.* 7(1):39-42; 1977.

8168 FUNCTIONAL STATUS OF THE STOMACH IN MAJOR DISEASES OF INTERNAL ORGANS. (Rus.) Gubergrits, A. Ia. (Donetsk Medical Inst., Donetsk, USSR). *Klin. Med. (Mosk.)* 55(2):30-35; 1977.

8169 CONTINUOUS GASTRIC ACID FORMATION AND MORPHOLOGY OF THE GASTRIC MUCOSA. (Rus.) Leja, Yu. Ya.; Chernobayeva, I. D.; Kalinka, R. F. (Riga Medical Inst., Riga, USSR). *Vrach. Delo* (9):82-85; 1976.

8170 THE QUANTITATIVE STUDY OF PROTEINS FROM HUMAN BLOOD SERUM IN NORMAL STATE AND IN SOME SURGICAL IMPAIRMENTS OF THE GASTROINTESTINAL TRACT AND LIVER TISSUE. (Rus.) Chemodurov, N. T.; Kiryukhin, I. F.; Nasarevsky, N. G. (Crimean Medical Sch., Simpheropol, USSR). *Vopr. Med. Khim.* 22(6): 750-753; 1976.

8171 CHANGES IN GASTRIC SECRETION DEPENDING ON THE ACETYLCHOLINE AND CATECHOLAMINE CONTENT IN THE GASTRIC JUICE OF CHILDREN. (Rus.) Shkurkina, L. G.; Tsukanov, I. G. (Smolensk Medical Inst., Smolensk, USSR). *Vopr. Okhr. Materin. Det.* 22(2):31-34; 1977.

8172 MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE GASTRIC MUCOSA IN PATIENTS WITH KIDNEY DISEASES OF VARYING DEGREES OF INSUFFICIENCY AND IN PATIENTS WHO UNDERWENT HEMODIALYSIS. (Ger.) Sperschneider, H.; Stein, G.; Kuhne-Held, R.; Bosseckert, H. (Medizinische Klinik, Bachstr. 18, DDR-69 Jena, E. Germany). *Dtsch. Gesundheitsw.* 31(45):2124-2129; 1976.

8173 GASTRIC INTRAMURAL ACTINOMYCOSIS: ANATOMO-CLINICAL OBSERVATION OF ONE CASE AND REVIEW OF THE LITERATURE. (Spa.) Ramon y Cajal, S.; Jr.; De La Pena, M.; Campo, C.; Ispizua, I.; Bullon, A. (Hospital Clinico de San Carlos, Universidad Complutense, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):445-452; 1977.

8174 POSSIBILITIES OF A COMPLEX DIAGNOSIS OF STOMACH CANCER AT A POLYCLINIC. (Rus.) Artemov, O. A. (Perm Medical Inst., Perm, USSR). *Sc Med.* (8):92-96; 1976.

8175 MULTIPLE ENDOSCOPIC BIOPSY OF THE GASTRIC MUCOSA FOR THE DIAGNOSIS OF INCIPIENT GASTRIC CANCER. (Spa.) Toril Illescas, M.; Huelin Benitez, J.; Perez-Olivares Jaen, J.; Moreno Lopez, J. M.; Maldonado Eloy-Garcia, J.; Juarez Fernandez, C. (Ciudad Sanitaria "Carlos Haya," Malaga, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):427-438; 1977.

8176 EXCRETION OF WATER AND ELECTROLYTES IN GASTRIC CANCER PATIENTS. (Rus.) Bodnar, G. V. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Klin. Khir.* (3):67-68; 1977.

8177 DETERMINATION OF THE PERIOD DURING WHICH GASTRIC CANCER RECURRENCES AND METASTASES ARE MOST LIKELY TO OCCUR. (Rus.) Simonov, N. N. (N. N. Petrov Scientific Res. Inst. Oncology, USSR). *Sov. Med.* (2):63-68; 1977.

8178 DETERMINING THE TIME INTERVAL DURING WHICH THERE IS A RISK OF EMERGING RELAPSES AND METASTASES OF GASTRIC CANCER. (Rus.) Simonov, N. N (N. N. Petrov Scientific Res. Inst. Oncology, USSR). *Sov. Med.* (2):100-104; 1977.

8179 CLINICAL, DIAGNOSTIC AND THERAPEUTIC ASPEC OF GASTRIC LEIOMYOMA. (Rus.) Kasman, S. R.; Penenkov, B. L.; Iakimenko, G. V. (No affiliatio given). *Vrach. Delo* (1):24-26; 1977.

See also, 7966, 7975, 7976, 7979, 8105, 8106, 8111, 8120, 8128, 8137, 8143, 8149, 8181, 8186, 8188, 8418, 8440, 8454, 8459, 8462, 8488, 8496.

Peptic Ulcers

8180 RELATIONSHIP BETWEEN UNDISSOCIATED ACIDITY OF GASTRIC JUICE AND GASTRIC PROTEIN SECRETED IN RESPONSE TO GRADED DOSES OF PENTAGASTRIN IN DUODENAL ULCER PATIENTS. (Eng.) Popiela, T.; Szafran, Z.; Szafran, H.; Komorowska, M. (Nicholaus Copernicus Medical Acad., ul. Pradnicka, 37, 31-202 Krakow, Poland). *Gut* 18(3):208-213; 1977.

A study of gastric secretion was performed in nine male patients (mean age, 36 yr; age range, 27-52 yr) with duodenal ulcers before and 1-17 months after truncal vagotomy with pyloroplasty. Free and total hydrogen ion (H^+) concentrations and total protein and pepsin levels were measured in gastric secretion collected after the stomach was emptied and following stimulation by 0.008-8.192 μg/kg/hr pentagastrin, i.v. The graded doses were applied consecutively, each dose was infused for 30 min, and 18 10-min fractions of gastric juice were collected during the infusion. After vagotomy, the free and total H^+ concentrations were lower both in the basal state and in response to pentagastrin. Undissociated acidity, representing the difference between total and free H^+ concentrations was significantly ($p<0.05$) lower but did not demonstrate a dose-response relationship. The non-pepsin protein level increased significantly in 5th to 18th gastric juice samples and total protein in 9th to 18th samples in vagotomized patients. Only pepsin protein responded to pentagastrin stimulation. No correlation was observed between undissociated H^+ concentration and non-pepsin protein level either before or after vagotomy in contrast with previous studies in healthy patients that have demonstrated a correlation.

8181 ULTRASTRUCTURES OF G CELLS AND THE MECHANISM OF GASTRIN RELEASE BEFORE AND AFTER SELECTIVE VAGOTOMY WITH PYLOROPLASTY. (Eng.) Miyagami, H.; Watanabe, Y.; Sawada, Y.; Kato, K.; Shono, K.; Kondo, K.; Kidokoro, T. (Juntendo Univ. Sch. Medicine, 2-1-1 Hongo, Bunkyo-ku, Tokyo 113, Japan). *Arch. Histol. Jpn.* 40(1):51-62; 1977.

To assess the function of the retained antrum in patients with duodenal ulcer undergoing selective vagotomy (SV) plus pyloroplasty (P), plasma gastrin was measured and biopsied gastrin (G) cells were examined in eight patients who had SV + P surgery and eight patients who had SV plus antrectomy (A). The gastrin was measured by radioimmunoassay when patients were in the basal state (after overnight fast) and then 10, 20, 30, 40, 50, 60 min after infusion of 150 ml of beef broth or after i.v. injection of insulin, 0.2-0.3 U/kg. Levels of gastrin were measured in all patients before and 1, 3, 6, 12, and 24 months after surgery. G cells were examined ultrastructurally in biopsies obtained by fiberscope before and periodically after surgery of the eight SV + P patients. Basal gastrin levels were significantly ($p<0.01$) increased one month postoperatively in SV + P patients compared to SV + A patients. The SV + P patients also demonstrated elevated gastrin levels in response to meat extract or insulin hypoglycemia. The G cells after SV + P showed no degenerative or hypofunctional changes. Six months postoperatively G cell hyperplasia was apparent in the SV + P patients. It is concluded that the response of G cells to luminal stimuli is not essentially related to the presence of an intact vagus nerve.

8182 EFFECT OF ATROPINE ON PANCREATIC SECRETION STIMULATED BY SECRETIN IN PATIENTS WITH DUODENAL ULCER. (Eng.) Geller, L. I.; Glinskaya, T. P.; Kozlova, Z. P. (Khabarovsk Medical Inst. Khabarovsk, USSR). *Ter. Arkh.* 48(12):83-87; 1976.

8183 EFFECT OF ATROPINE ON THE AUTOREGULATORY MECHANISM OF GASTRIC SECRETION INHIBITION IN PEPTIC ULCER. (Rus.) Saakyan, A. G.; Svarts, V. Ya.; Makarova, L. A. (Piatigorsk Inst. Balneology and Physiotherapy, Piatigorsk, USSR). *Ter. Arkh.* 49(2):8-11; 1977.

8184 A NEW CONTRIBUTION TO THE TREATMENT OF PEPTIC ULCER. (Fre.) Pergola, F. (Hopital Cochin, 287, rue du Fg Saint-Jacques, 75014 Paris, France). *Sem. Hop. Ther.* 53(2);101-104; 1977.

8185 CONCERNING THE CLINICAL AND OPERATIVE TREATMENT OF COMPLICATED ULCEROUS DISEASE IN CHILDREN. (Rus.) Nechiporuk, V. M.; Levkovsky, A. V. (N. I. Pirogov Vinnitsa Medical Inst., Vinnitsa, USSR). *Vestn. Khir.* 118(2):83-86; 1977.

8186 OUTPATIENT TREATMENT OF UNCOMPLICATED GASTRIC AND DUODENAL ULCERS. (Rus.) Gavrilenko, Ya. V.; Kapitanenko, A. M.; Karnaukhov, Yu. N.; Skornetsky, D. B.; Slepynin, V. I. (P. V. Mandryk 2nd Military Hosp., Moscow, USSR). *Ter. Arkh.* 49(2):12-15; 1977.

8187 ANTACID TREATMENT OF GASTRODUODENAL ULCER. (Fre.) Lambert, R.; Minaire, Y. (Hopital Edouard-Herriot, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Gastroenterol. Clin. Biol.* 1(1): 3-7; 1977.

8188 CIMETIDINE--A NEW PROMISING ULCER DRUG. (Ger.) Neidhardt, B. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95(8):527-528; 1977.

STOMACH

8189 TREATMENT OF PEPTIC ULCER WITH THE AID OF L-DOPA. (Rus.) Zavodskaya, I. S.; Sibirkin, N. V.; Egorova, G. I.; Zabrodin, O. N. (Inst. Experimental Medicine, USSR Acad. Medical Sciences, Leningrad, USSR). *Ter. Arkh.* 48(5):79-82; 1976.

See also, 7908, 7976, 8120, 8149, 8154, 8165, 8170, 8276, 8488.

SMALL INTESTINE

8190 DUODENAL ARTERIO-MESENTERIC OCCLUSION IN CHAGAS' DISEASE. (Spa.) Kunzle, J. E.; de Britto-Costa, R.; Ziliotto, A., Jr. (Servicio de Cirugia de Riberao Preto, Calle Garibaldi 1271, Riberao Preto, Sao Paulo, Brazil). *Bol. Chil. Parasitol.* 31(1/2):2-5; 1976.

All cases of arterio-mesenteric occlusion diagnosed from July 1960 to April 1975 and recorded in the Archives of the Riberao Preto Surgical Service were reviewed to verify the possibility that Chagas' disease may be a causative agent of such duodenal occlusions. Eight cases of arterio-mesenteric occlusion of the duodenum were discovered among 2,753 patients who underwent digestive tract surgery. In seven of these eight cases, the complement fixation test for Chagas' disease was positive, and signs of cardiopathy (4/7) and/or none or more of the enteropathies associated with the trypanosomiasis, namely dysphagia (2/7), esophagomegaly (3/7), intestinal constipation (2/7), and megacolon (1/7), were also observed. The only female patient demonstrated neither cardiopathy nor enteropathy. Comparing similar causal studies published in Brazil in the last 40 yr, it is suggested that Chagas' disease may be a contributing factor in the genesis of arterio-mesenteric duodenal ileus in Latin America.

8191 INFLAMMATORY CELL COUNT AND IDENTIFICATION IN CHRONIC NON SPECIFIC DUODENITIS. (Eng.) Cheli, R.; Giacosa, A. (Divisione di Gastroenterologia, Ospedali Civili di Genova, Genoa, Italy). *Endoscopy* 9(2):91-95; 1977.

Inflammatory cells were counted in duodenal biopsies from 5 patients with superficial duodenitis (SD), 4 with atrophic duodenitis (AD), and 3 with interstitial duodenitis (ID) and compared with counts in biopsies from 10 normal controls. Lymphocyte counts in the epithelium (cells/mm) were significantly ($p<0.01$) elevated in SD (91.0 ± 23.1), AD (119.0 ± 18.2), and ID (109.0 ± 14.3) with respect to controls (46.4 ± 12.7). Total cell counts in the lamina propria (cells/mm^2) were significantly ($p<0.01$) increased in SD (8,468 ± 568) and AD (13,950 ± 466) with respect to controls (5,213 ± 599), and these increases were due to significant ($p<0.01$) increases in plasma cells (5,448 ± 1,067 and 9,985 ± 1,024 for SD and AD, resp.) with respect to controls (1,823 ± 224). In the lamina propria of the ID biopsies, significant ($p<0.01$) increases in total cells were observed both in the peripheral (25,586 ± 1,216) and central (10,913 ± 896) inflammatory areas. These increases were due exclusively to increases in lymphocyte counts, which equaled the total counts in both inflammatory areas compared with a control value of 1,910 ± 279. Thus, significant increases in inflammatory cells were seen in all cases of chronic nonspecific duodenitis, with different patterns of increases being observed in the different histological conditions.

8192 ROLE OF INTESTINAL MICROFLORA IN COLONIC PSEUDO-OBSTRUCTION COMPLICATING JEJUNOILEA BYPASS. (Eng.) Barry, R. E.; Chow, A. W.; Billesdon, J. (Bristol Royal Infirmary, Bristol, England). *Gut* 18(5):356-359; 1977.

A double-blind crossover study using placebo and antibiotics effective against either aerobic or anaerobic organisms was carried out to elucidate the role of intestinal microflora in the pathogenesis of colonic pseudo-obstruction complicating jejunoileal bypass. Quantitative bacterial studies of the intestinal flora in the region of bypassed bowel were correlated with symptoms of abdominal pain and distension. Antibiotics effective against obligate anaerobes rapidly relieved the symptoms of pseudo-obstruction, and this coincided with the disappearance of these organisms from this region of bowel. Symptoms rapidly recurred when anaerobic organisms repopulated the bowel. It is concluded that obligate anaerobes may play a role in the pathogenesis of this complication.

8193 BYPASS ENTEROPATHY: AN INFLAMMATORY PROCESS IN THE EXCLUDED SEGMENT WITH SYSTEMIC COMPLICATIONS. (Eng.) Drenick, E. J.; Ament, M. E.; Finegold, S. M.; Passaro, E., Jr. (Veterans Admin. Wadsworth Hosp., Los Angeles, CA 90073). *Am. J. Clin. Nutr.* 30(1):76-89; 1977.

The natural course and treatment modalities of bypass enteropathy were assessed in 28 obese subjects. End-to-end anastomosis of 12 inches of proximal jejunum to 6 inches of distal ileum with drainage of the excluded small bowel into the sigmoid was carried out in 25 patients, and end-to-side jejunoileal anastomosis was carried out in 3. Invasion of the excluded segment by fecal flora was associated with a histologically demonstrable inflammatory response of the mucosa. The disorder was of variable severity and duration and occurred in the majority of the patients. Progression to a clinical syndrome resembling an acute abdomen occurred in about 15% of the patients. Small bowel ileus, and in some patients, obstruction of the colon were suggested by physical signs and x-ray findings. Surgical exploration in such instances demonstrated an inflammatory process of the excluded small bowel loops with severe distention of this segment and of the colon, but no organic obstruction. Pneumatosis cystoides intestinalis occurred in two patients. Exudative protein loss was documented in the severe cases. Most of the systemic sequelae are comparable to those seen with inflammatory bowel diseases. Fever, excessive weight and lean tissue loss, and the involvement of skin, blood vessels, joints, and possibly, the liver suggest an immune response as a common factor in the pathogenesis. The clinical improvement with antibiotics such as metronidazole or with restitution of normal bowel continuity indicates that the bacterial flora or their byproducts in the excluded small bowel segment are causally related to the systemic complications. Hyperoxaluria may be primarily the sequela of steatorrhea and not of the inflammatory process.

8194 MORPHOLOGICAL CHANGES OF THE ADAPTING SMALL INTESTINE UNDER VARIOUS CONDITIONS. AN EXPERIMENTAL AND CLINICAL STUDY. (Eng.) Fenyo, G. (Surgical Res. Lab., Karolinska sjukhuset, Stockholm, Sweden). *Acta. Chir. Scand.* 469(Suppl.):1-31; 1976.

Factors governing the mechanisms of intestinal adaptation and the reversibility of these changes were investigated in six experiments. Morphological changes were studied in 17 patients who underwent a jejunoileal bypass (JIB) because of severe obesity and then a second operation, mainly for cholelithiasis, persisting obesity, and cicatricial hernia. The other experiments were conducted in Sprague-Dawley rats. In the patients, the second JIB was followed by a significant elongation of the jejunal (43.69 ± 2.23 to 58.35 ± 4.27 cm, $p<0.05$) and ileal (14.13 ± 0.98 to 24.46 ± 2.23 cm, $p<0.001$) segments. Villous height also increased significantly ($p<0.001$) in the jejunum (682 ± 26 to 913 ± 62 μm) and ileum (582 ± 39 to 994 ± 85 μm), but it decreased at the top of the bypassed blind loop (682 ± 26 to 475 ± 36 μm, $p< 0.001$). These changes seem to form the basis of a concomitant functional adaptation that results in a deceleration of weight loss, leading to a period of stable weight or weight gain. A JIB in the rat resulted in significant hypertrophy of the functioning jejunal and ileal segments and the distal part of the blind loop. The top of this loop atrophied. These changes stopped 4 weeks after reestablishment of the normal intestinal anatomy, i.e., they were reversible. Continuous mechanical stimulation of isolated small intestinal segments (Thiry-Vella loops) diminished the atrophy that occurred in unstimulated segments. Shunt-operated rats fed a chemical diet (Vivasorb, lipid- and bulk-free) developed hypertrophic adaptive changes (HAC) similar to but more pronounced than those occurring in pellet-fed animals. Shunt-operated rats nourished only parenterally for 2 weeks developed HAC that were proportionally similar but more pronounced than those in pellet-fed rats. Shunt-operated rats with duodenopancreaticobiliary (DPB) diversion to the transverse colon developed HAC of the functioning jejunal and ileal segments. Thus, the presence of DPB secretions is not required for morphological adaptation.

8195 CARCINOMA OF THE SECOND AND THIRD DUODENAL SEGMENTS: ENDOSCOPIC ASPECTS. (Spa.) Garijo Forcada, J. M.; Carballal Lugris, M.; Otero Portela, J. L. (Residencia Sanitaria de la Seguridad Social, "Montecelo," Pontevedra, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(1):89-98; 1977.

8196 BENIGN DUODENAL NEOPLASM. (Pol.) Bong, A. W.; Szawdyn, J. (Oddzial Chirurgii Ogolnej, Szpital Bielanski, 01-809 Warsaw, Poland). *Przegl. Lek.* 34(3):381-383; 1977.

8197 DUODENAL ADENOMA: EVOLUTIVE MODALITIES AND ENDOSCOPIC DETECTION. (Fre.) Cornet, A.; Debesse, B.; Barbier, J. Ph.; Carnot, Fr.; Martignon, C. (Hopital Laennec, Rue de Sevres 42, 75340 Paris Cedex 07, France). *Acta Gastroenterol. Belg.* 40(1/2):27-30; 1977.

8198 LEIOMYOSARCOMA OF THE DUODENUM IN A CHILD TREATED BY EXCISION OF THE DUODENUM AND HEAD OF THE PANCREAS. (Fre.) Babut, J. M.; Bracq, H.; Ferrand, B.; Lefreche, J. N. (CHU Ponchaillou, 35011 Rennes, France). *Ann. Chir. Infant.* 18(2): 125-133; 1977.

8199 TRAITS OF THE CLINICAL PICTURE AND DIAGNOSIS OF DUODENAL DIVERTICULUM. (Rus.) Myshkin, K. I.; Skopets, M. D. (Saratov Medical Inst., Saratov, USSR). *Klin. Med. (Mosk.)* 55(4): 60-64; 1977.

8200 DISTURBANCES IN THE ACID-BASE BALANCE AND PROTEIN METABOLISM IN INTESTINAL INFECTIONS AND METHODS TO CORRECT THEM IN CHILDREN DURING THE FIRST YEAR OF LIFE. (Rus.) Gul'man, L. A. (Krasnoiarsk Medical Inst., Krasnoiarsk, USSR). *Pediatriia* (3):10-11; 1977.

8201 POLYARTHRITIS FOLLOWING Yersinia enterocolitica INFECTION. (Fre.) Kuntz, J. L.; Asch, L. (Centre Hospitalier Universitaire, 1, place de l'Hopital, B.P. 426/R5, F 67005 Strasbourg Cedex, France). *Rev. Rhum. Mal. Osteoartic.* 43(10):589-590; 1976.

8202 Yersinia enterocolitica INFECTION: OBSERVATION OF A PSEUDOTUMOROUS AND SEPTICEMIC FORM IN A CHILD WITH COOLEY'S ANEMIA. (Fre.) Kiffer, B.; Rudloft, J.; Lelievre-Gassin, C.; Buzy, P. (Centre Hospitalier de Metz, Metz, France). *Ann. Med. Nancy* (15):847-850; 1976.

8203 SYMPTOMS OF Yersina INFECTION. (Ger.) Baumgarten, R.; Miersch, H.; Fengler, J. D. (Infektionsklinik des Stadtischen Krankenhauses, Prenzlauer Bert, Nordmarkstr. 15, DDR-1055 Berlin, Germany). *Dtsch. Gesundheitsw.* 32(26):1218-1221; 1977.

8204 CHRONIC DUODENITIS. (Fre.) Frexinos, J.; Escourrou, J. (C.H.R. Rangueil, F 31054 Toulouse Cedex, France). *Gastroenterol. Clin. Biol.* 1(5):473-479; 1977.

8205 CLINICAL AND DIAGNOSTIC ASPECTS OF CHRONIC DUODENITIS IN CHILDREN. (Rus.) Baten'kova, Iu. V.; Volkova, A. A.; Rimarchuk, G. V. (Gorkii Scientific Res. Inst. Pediatrics, Ministry Public Health, Gorkii, USSR). *Pediatriia* (3): 38-40; 1977.

8206 FUNCTIONAL STATUS OF THE STOMACH AND DUODENUM IN CHILDREN WITH DUODENITIS. ENDOSCOPIC PROBING WITH RADIOACTIVE TRACER. (Rus.) Cherednichenko, A. M.; Dedlovskaia, V. I. (Sverdlovsk Medical Inst., Sverdlovsk, USSR). *Pediatriia* (3):51-53; 1977.

8207 MALTASE ACTIVITY OF THE SMALL INTESTINE IN CHRONIC ENTERITIS. (Rus.) Linevsky, Yu. V. (Donetsk Medical Inst., Donetsk, USSR). *Vrach. Delo* (1):17-19; 1977.

8208 NONSPECIFIC CHRONIC DUODENOJEJUNOILEITIS: AN ANATOMOCLINICAL ENTITY OF DISPUTED NOSOLOGY. (Fre.) Modigliani, R. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(6/7): 501-506; 1977.

8209 TERMINAL ISCHEMIC ILEITIS [Abstract]. (Fre.) Hemet, J.; Colin, R.; Geffroy, Y.; Metayer, J.; Testart, J. (No affiliation given). *Arch. Anat. Cytol. Pathol.* 25(3):214; 1977.

8210 NEONATAL CLINICAL MANIFESTATIONS OF CYSTIC DUPLICATION OF THE INTESTINE. (Fre.) Mourot, M.; Aubert, D.; Pageaut, G.; Gille, P. (Centre Hospitalier Universitaire de Besancon, Besancon, France). *Ann. Med. Nancy* (15):821-826; 1976.

8211 EXCLUSION OF THE RIGHT HEMICOLON WITH TERMINAL ILEUM IN TREATING PATIENTS WITH INTESTINAL FISTULAS. (Rus.) Vitsyn, B. A. (Novosibirsk Medical Inst., Novosibirsk, USSR). *Khirurgiia (Mosk.)* (2):102-106; 1977.

8212 HYPERTROPHY OF BRUNNER'S GLANDS. TWO UNUSUAL CASES. (Fre.) Bercu, G.; Ashner, M. (Hopital Hadassa-Rokah, Tel-Aviv, Israel). *J. Radiol. Electrol. Med. Nucl.* 58(4):313-314; 1977.

8213 ILEUS AFTER OPERATIONS ON THE BILE DUCTS. (Pol.) Korzycki, J.; Modzelewski, B. (Klinika Chirurgii Ogolnej Instytutu Chirurgii AM, ul. Kopcinskiego 22, 90-153 Lodz, Poland). *Pol. Tyg. Lek.* 32(19):719-721; 1977.

8214 INTESTINAL LYMPHANGIECTASIA (WALDMANN'S DISEASE). (Fre.) Battin, J.; Auzerie, J.; Hehunstre, J. P. (Hopital des Enfants, 168 Cours de l'Argonne, 33077 Bordeaux Cedex, France). *Med. Infant. (Paris)* 83(5):517-535; 1976.

8215 LYMPHOGENIC ENTEROPATHY. (Cze.) Benda, K.; Pelikan, L.; Dvoracek, C.; Kulhankova, J. (Radiologicky ustav, fakultni nemocnice, 775 20 Olomouc, Czechoslovakia). *Cas. Lek. Cesk.* 116(13): 391-395; 1977.

8216 THE OPERATION OF SMALL INTESTINAL "SHORT CIRCUITING" FOR OBESITY. (Rus.) Kuteshev, F. Kh.; Libov, A. S.; Sorinov, A. N. (Leningrad Inst. Pediatric Medicine, Leningrad, USSR). *Vestn. Khir.* 118(4):48-52; 1977.

8217 TREATMENT OF HYPERLIPEMIA AND PREVENTION OF SCLEROSIS BY EXCLUSION OF THE TERMINAL SECTION OF THE ILEUM. (Pol.) Michalak, J. (Klinika Chirurgii Naczyn Instytutu Chirurgii AM, ul. Staszica 16, 20-950 Lublin, Poland). *Pol. Tyg. Lek.* 32(3):113-115; 1977.

8218 RESTORATION OF INTESTINAL MOTOR ACTIVITY IN THE EARLY POSTOPERATIVE PERIOD. (Rus.) Popov, V. A.; Ryzhkov, A. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Khirurgiia (Mosk.)* (8):38-41; 1977.

8219 COMPLETE CORRECTION OF MALROTATION. (Ger.) Domres, B.; Schweizer, P.; Flach, A. (Chir. Universitatsklinik, Calwer Str. 7, 7400 Tubingen, W. Germany). *Z. Kinderchir.* 20(2):137-142; 1977.

8220 EXPERIENCES IN NEONATES AND INFANTS FOLLOWING SUBTOTAL SMALL BOWEL RESECTION. (Ger.) Bahr, R.; Niessen, K. H.; Flach, A. (Univ.-Klinik, Calwer Str. 7, 7400 Tubingen, W. Germany). *Z. Kinderchir.* 20(2):127-136; 1977.

8221 MECKEL'S DIVERTICULUM AS A SOURCE OF GASTROINTESTINAL HEMORRHAGE. (Pol.) Pawlowski, S. (Szpital im. L. Pasteura, ul. Wigury 19, 90-302 Lodz, Poland). *Wiad. Lek.* 30(12):977-978; 1977.

8222 MALIGNANT GLOMAL TUMOR OF THE JEJUNUM WITH DISTANT METASTASES. (Rus.) Rykov, V. A. (Advanced Training Medical Inst., Novokuznetsk, USSR). *Arkh. Patol.* 39(6):64-66; 1977.

8223 MORPHOLOGIC CHANGES IN THE PSEUDOTUMORAL FORM OF RODENTIOSIS. (Pol.) Tyszkiewicz, S.; Piegza, S.; Turczynski, J. (Szpital Gorniczy, ul. Sokolowskiego 4, 58-309 Walbrzych, Poland). *Pathol. Pol.* 28(1):135-139; 1977.

8224 CONTINUOUS AND INTERRUPTED INTESTINAL SUTURES: EXPERIMENTAL AND CLINICAL STUDY. (Fre.) Delaitre, B.; Champault, G.; Chapuis, Y.; Patel, J. C.; Louvel, A.; Leger, L. (Service de Chirurgie, C.H.U. Constantine, Algeria). *J. Chir. (Paris)* 112(1):43-57; 1976.

See also, 7915, 8091, 8099, 8134, 8160, 8163, 8167, 8225, 8226, 8235, 8439, 8454, 8465, 8466, 8469, 8488, 8496, 8502, 8509.

SMALL INTESTINE

Malabsorption

8225 ACRODERMATITIS ENTEROPATHICA, ZINC, AND THE PANETH CELL: A CASE REPORT WITH FAMILY STUDIES. (Eng.) Bohane, T. D.; Cutz, E.; Hamilton, J. R.; Gall, D. G. (Hosp. Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *Gastroenterology* 73(3):587-592; 1977.

The clinical, biochemical, and histological response to p.o. zinc therapy was studied in an infant with acrodermatitis enteropathica. The patient received zinc sulfate heptahydrate (150 mg/day), and clinical recovery was rapid; diarrhea ceased, dermatitis and irritability decreased, and appetite improved within 2 weeks. The plasma zinc and serum and mucosal alkaline phosphatase activities returned to normal. Light microscopy of small intestinal biopsies showed a normal mucosa. Electron microscopy of the Paneth cells initially revealed abnormal inclusion bodies that disappeared during therapy, suggesting that the abnormality is secondary to zinc deficiency, and not a primary defect. These abnormal inclusions may represent altered secretory granules and a proliferation of lysosomes.

8226 MALABSORPTION, VILLOUS ATROPHY, AND EXCESSIVE SERUM IgA IN A PATIENT WITH UNUSUAL INTESTINAL IMMUNOCYTE INFILTRATION. (Eng.) Baklien, K.; Fausa, O.; Brandtzaeg, P.; Froland, S. S.; Gjone, E. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(4):421-432; 1977.

The case of a patient with malabsorption, villous atrophy, and excessive serum immunoglobulin A is presented. The distribution of the cell population responsible for the overproduction of IgA was studied, and the transfer of IgA into various exocrine body fluids was examined. The patient presented at age 11 with gastrointestinal complaints of about 4 yr duration. The clinical symptoms disappeared in association with gluten withdrawal. During the subsequent 10 yr, however, the villous atrophy persisted, and malabsorption tests were unchanged. Moreover, his serum level of IgA remained extremely high (58-66 g/l), along with normal IgM and IgG. His IgA was mainly polymeric and showed polyclonal characteristics. Immunohistochemical investigations demonstrated that the gastrointestinal mucosa was its major production site. About 96% of the intestinal immunocytes were of the IgA class. An increased number of IgA-producing cells was also present in gastric mucosa, whereas nasal mucosa and bone marrow showed no abnormality, and peripheral blood contained a normal number of IgA-bearing lymphocytes. The polymeric IgA permeated dermal and mucosal connective tissue in high concentrations and appeared in the urine, but there was no marked elevation of secretory IgA levels in duodenal and salivary fluids. Nevertheless, staining of glandular epithelia indicated normal transport of IgA and the presence of secretory component (SC), and saliva contained IgA-associated as well as free SC. A defect in its external transport does not seem to be involved in the excessive contribution of dimeric IgA to serum. This case may bear some relation to α-chain disease or celiac disease.

8227 HYPEROXALURIA AND CALCIUM OXALATE NEPHROLITHIASIS AFTER JEJUNOILEAL BYPASS. (Eng.) Stauffer, J. Q. (Upstate Medical Center, Syracuse, NY). *Am. J. Clin. Nutr.* 30(1):64-71; 1977.

SMALL INTESTINE

Hyperoxaluria in patients with intestinal disease is discussed. Patients with ileal disease, ileal resection, and jejunoileal bypass are at increased risk of forming calcium oxalate renal calculi because of their enhanced absorption of dietary oxalate. Intraluminal solubility of oxalate is an important determinant for oxalate hyperabsorption, and it can be regulated by the intraluminal concentrations of calcium and fatty acids. Malabsorbed bile salts and fatty acids may alter intestinal permeability, leading to increased passive diffusion of oxalate. The management of hyperoxaluria includes a low-oxalate (<50 mg/day), low-saturated-fat, modest-calcium diet (750 mg/day); cholestyramine (CT) administration; the substitution of medium-chain triglycerides for saturated fats; and correction of the cause of steatorrhea. In patients with regional enteritis and bile salt diarrhea, CT not only controls the diarrhea but also reduces urinary oxalate excretion. CT has not been as effective in reducing oxalate excretion in patients who have undergone jejunoileal bypass, and it may lead to more-severe bile salt depletion in these subjects. However, selected patients with jejunoileal bypass who have recurrent calcium oxalate nephrolithiasis may obtain additional benefit from CT.

8228 CELIAC DISEASE IN CHILDHOOD: CLINICAL REVIEW OF 39 PATIENTS. (Fre.) Buts, J. P.; Morin, C. L.; Roy, C. C.; Weber, A. (Hopital Sainte-Justine, 3175, chemin Cote Sainte-Catherine, Montreal, Quebec H3T 1C5, Canada). *Union Med. Can.* 105(11):1660-1665; 1976.

8229 HEREDITARY FRUCTOSE INTOLERANCE WITH EARLY ONSET. (Fre.) Mercier, J. C.; Bourrillon, A.; Beaufils, F.; Odievre, M. (Hopital Bretonneau, 75877 Paris Cedex 18, France). *Arch. Fr. Pediatr.* 33(10):945-953; 1976.

8230 INFLUENCE OF AN ALUMINUM HYDROXIDE-CONTAIN ING ANTACID ON THE INTESTINAL ABSORPTION O IRON IN PATIENTS ON MAINTENANCE HEMODIALYSIS. (Ger.) Blumberg, A. (Kantonsspital, CH-5000 Aarau, Switzerland). *Schweiz. Med. Wochenschr.* 107(30): 1064-1066; 1977.

8231 INCIDENCE OF IMMUNE DISORDERS ON DIGESTIVE PATHOLOGY. (Fre.) Cerf, M. (Hopital Bichat, 75877 Paris Cedex 18, France). *Sem. Hop. Paris* 53(24):1457-1461; 1977.

8232 HEREDITARY FRUCTOSE INTOLERANCE. (Ger.) Thanner, F. (Univ.-Kinderklinik, Josef-Schneider-Str., D-8700 Wurzburg, W. Germany). *Monatsschr. Kinderheilkd.* 125(7):677-686; 1977.

See also, 7911, 7931, 8098, 8136, 8215, 8457, 8477, 8482, 8483.

LARGE INTESTINE

8233 A PHASE II STUDY OF TRIAZINATE (NSC 139105) IN ADVANCED COLORECTAL CARCINOMA. (Eng.) McCreary, R. H.; Moertel, C. G.; Schutt, A. J.; O'Connell, M. J.; Hahn, R. G.; Reitemeier, R. J.; *et al.* (Dept. Oncology, Mayo Clinic, Rochester, MN 55901). *Cancer* 40(1):9-13; 1977.

The therapeutic activity of triazinate, a reversible inhibitor of dihydrofolate reductase, in advanced colorectal carcinoma and its effect on various immunologic determinants were studied. Triazinate was administered to 28 patients as a single agent in a 3-day course at a maximum clinically tolerable dosage (250 mg/m^2/day i.v.). Patients were evaluated at 3 and 6 weeks and then monthly until progression was evident. The principal side-effects were dermatitis (17), stomatitis (12), diarrhea (15), nausea (13), somnolence (6), and leukopenia (12). There were two drug-related deaths, both occurring in patients with slightly elevated serum creatinine values (1.3 mg/dl) and alkaline phosphatase values that were greater than two times normal (828 and 739 U/l, resp.). Triazinate appeared to have no discernible effect upon immunologic determinants, as demonstrated by recall skin tests, dinitrochlorobenzene sensitization, lymphocyte counts, and circulating T- and B-cell counts. An objective response occurred in 5/28 patients, 1 of whom is now without evidence of malignancy after 42 weeks. The overall response rate of 18% suggests that triazinate has a definite, although limited, effect upon advanced colorectal carcinoma. Further evaluation of triazinate in advanced phase II disease and studies of its role in combined drug regimens are suggested.

8234 DIETARY FIBRE, TRANSIT-TIME, FAECAL BACTERIA, STEROIDS, AND COLON CANCER IN TWO SCANDINAVIAN POPULATIONS. REPORT FROM THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER INTESTINAL MICROECOLOGY GROUP. (Eng.) MacLennan, R. (International Agency for Cancer, 150 cours Albert Thomas, 69372 Lyon Cedex 2, France). *Lancet* 2(8031): 207-211; 1977.

Dietary intake and fecal characteristics, e.g., transit time, fecal bacteria, and fecal steroids, wer compared in population samples from Copenhagen, Denmark, and Kuopio, Finland. The two populations, which have similar Scandinavian cultures, have a fourfold difference in colon cancer incidence. The Copenhagen population (high-risk) consumed significantly ($p<0.05$) more white bread, meat, beer, wine, and spirits and less potatoes and milk. The Kuopio population had a higher intake of protein and energy ($p<0.001$) than the Copenhagen population. Dietary-fiber intake was also significantly higher ($p<0.001$) in Kuopio (30.9 g) than in Copenhagen (17.2 g). There was no difference in the frequency of defecation, although constipation was more frequent in the Copenhagen population (27% versus 12%). In spring and autumn, the mean stool weights in Copenhagen were 157 and 146 g, resp.; those in Kuopio were 175 and 211 g, resp. Bacteroids were more common and eubacteria and enterococci were less common in fecal specimens in Copenhagen. There was no difference in fecal steroid concentration between the two populations. It is suggested that the etiology of colon cancer is multifactorial and that it is not associated in a simple manner with dietary fat and neutral and acid steroids or their bacterial metabolites. Higher intakes of dietary fiber and milk in the low-incidence area suggest a possible protective effect, unrelated to mouth-anus transit time. Further studies are suggested to clarify the carcinogenic and protective effects of diet.

8235 BLUE RUBBER BLEB NEVUS SYNDROME: REPORT OF A CASE. (Eng.) Nakagawara, G.; Asano, E.; Kimura, S.; Akimoto, R.; Miyazaki, I. (Faculty Medicine, Kanazawa Univ., Kanazawa, Japan). *Dis. Colon Rectum* 20(5):421-427; 1977.

The surgical treatment of a 21-yr-old man with the blue rubber bleb nevus syndrome involving the digestive tract is reported. As a result of repeated losses of blood in the stool, the patient had severe anemia that could no longer be controlled by conservative therapy. On admission for surgery, there were 90 hemangiomas, ranging from 1-3 mm in diameter, all over the body. Five hemangiomas had been found within 75 cm of the anus by sigmoidoscopy 3 yr previously, when fluoroscopic examination of the large intestine showed no abnormality. However, the same examination at the present admission revealed a large filling defect in the central part of the transverse colon. At surgery, a giant mass of granular hemangiomas was resected from the center of the transverse colon. Hemangiomas protruding from the serous membranes of the stomach, small intestine, and colon were enucleated. Histologic examination revealed that the submucous tissue of the intestinal tract was almost entirely occupied by cavernous hemangiomas; in some areas the hemangiomas extended from the tunica muscularis to the serous membrane. The postoperative course was uneventful, and the patient is now under observation. A review of 26 reported cases of blue rubber bleb nevus syndrome reveals a correlation between the number of hemangiomas on the body surface and the number involving the digestive tract, or the severity of anemia.

8236 GANGRENE AND SPONTANEOUS PERFORATION OF THE CECUM AS A COMPLICATION OF PSEUDO-OBSTRUCTION OF THE COLON: REPORT OF THREE CASES AND SPECULATION AS TO ETIOLOGY. (Eng.) Spira, I. A.; Wolff, W. I. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Dis. Colon Rectum* 19(6):557-562; 1976.

Three cases of pseudo-obstruction of the colon in which the complications of cecal perforation and cecel gangrene supervened are presented, and the literature is reviewed. The first patient, a 71-yr-old woman, developed signs of colon obstruction while in the hospital recovering from a myocardial infarction. Gangrene of the cecum and colon and a hematoma near the celiac plexus were observed at laparotomy, but there was no evidence of mechanical obstruction or vascular occlusion. The patient died 7 days after a hemicolectomy was performed. The other two patients were men, age 52 and 62 yr, who entered the hospital because of abdominal pain and pneumonia, resp. Emergency surgery was required for these patients because of perforation of the cecum. Although signs of obstruction had preceded surgery, no evidence of mechanical obstruction was seen. The literature shows that pseudo-obstruction can complicate a variety of conditions, including normal or cesarian birth, cardiac failure, pneumonia, etc.; however, in many patients no etiological factor can be found. A discussion of possible etiological mechanisms implicates interference with the sympathetic-parasympathetic nervous system balance.

8237 IMMUNOHISTOCHEMICAL CHANGES IN MORPHOLOGICALLY INVOLVED AND UNINVOLVED COLONIC MUCOSA OF PATIENTS WITH IDIOPATHIC PROCTITIS. (Eng.) Das, K. M.; Erber, W. F.; Rubinstein, A. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *J. Clin. Invest.* 59(3):379-385; 1977.

Alterations in secretory component, IgA, IgG, and IgM were studied by immunofluorescent techniques in mucosal biopsy specimens obtained at colonoscopy from inflamed and grossly uninvolved colonic mucosa from 12 patients with idiopathic proctitis. Extra-intestinal parotid salivary secretory component and IgA, as well as serum IgA, were also measured for the sake of comparison with colonic secretory component and IgA. Significant decreases in secretory IgA were observed in sections of colonic epithelium showing gross and histological proctitis in 8 of 12 patients. Significantly decreased secretory IgA levels were also observed in the proximal uninvolved colonic mucosa from five patients. Serum and salivary IgA levels, however, were not significantly diminished from control ranges of 77-257 mg/100 ml and 0.56-2.2 mg/100 ml, resp. The depletion of colonic secretory IgA in the face of normal salivary and serum IgA in these patients suggests that a local immune defect may be pathogenetically related to idiopathic proctitis.

8238 CYTOLOGICAL DIAGNOSIS OF INFLAMMATORY PROCESSES IN THE RECTUM AND SIGMOID COLON.

(Rus.) Lazarev, I. M.; Kalinos, V. L. (Kishinev Medical Inst., Kishinev, USSR). *Lab. Delo* (4): 208-211; 1977.

8239 X-RAY DIAGNOSIS OF AN APPENDICULAR INFILTRATE. (Rus.) Ginzburg, S. N.; Babadzhanova, N. O. (Moscow Medical Stomatology Inst., Moscow, USSR). *Rentgenol. Radiol.* (2):33-38; 1977.

8240 PROBLEMS OF SURGICAL TREATMENT OF PATIENTS WITH SIGMOID ILEUS. (Rus.) Petrov, V. P. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 118(3):50-54; 1977.

8241 SIGNIFICANCE OF MORPHOLOGICAL INVESTIGATIONS FOR PRECISE DETERMINATION OF THE LIMITS OF THE LOCAL SPREAD OF RECTAL CANCER. (Rus.) Protchenko, N. V.; Rotenberg, V. I. (Oncological Science Center, Acad. Medical Sciences, USSR). *Vestn. Khir.* 118(3):69-72; 1977.

8242 A NEW CASE OF PROBABLE URTICARIA OF THE COLON. (Fre.) Tubiana, J. M.; Rouger, Ph.; Monnier, J. P.; Levy, V. G.; Chalut, J. (Hopital Saint-Antoine, 184, Faubourg Saint-Antoine, F 75571 Paris Cedex 12, France). *Ann. Radiol.* 20(2):235-237; 1977.

8243 SERUM PROTEIN PATTERN IN PATIENTS WITH COLONIC CARCINOMA. (Pol.) Bogdanikowa, B.; Zalewski, J.; Drozd, J.; Klepacki, A.; Ostrowski, L. (Bialystok Medical Acad., ul. Curie-Sklodowskiej 24a, 15-276 Bialystok, Poland). *Nowotwory* 27(1):51-57; 1977.

8244 RADIOLOGICAL ASPECTS OF INTESTINAL INTUSSUSCEPTION. (Pol.) Boron, Z.; Zeuschner, M.; Montowski, J.; Zeuschner, Z. (M. Curie-Sklodowskiej 9, 85-094 Bydgoszcz, Poland). *Pol. Przegl. Radiol. Med. Nukl.* 41(1):29-31; 1977.

8245 LEIOMYOSARCOMA OF THE RECTUM: REPORT OF ONE CASE. (Spa.) Luque Martin, A.; Lopez Vizcaya, F.; Castro del Olmo, R.; Calvo Zapata, M.; Ramirez Macias, M. (Facultad de Medicina de Sevilla, Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(5):657-664; 1977.

8246 NECROTIZING ENTEROCOLITIS FOLLOWING TOTAL HYSTERECTOMY. (Fre.) Gautier-Benoit, C.; Boucly, M. (Centre Hospitalier, F 62309 Lens, France). *J. Gynecol. Obstet. Biol. Reprod. (Paris)* 6(3):353-356; 1977.

8247 RECONSTRUCTION OF THE GASTROINTESTINAL TRACT 5 YEARS AFTER RESECTION OF THE RECTOSIGMOID. (Pol.) Gacyk, W.; Lacki, M.; Dybicki, J. (I Klinika Chirurgii Ogolnej, ul. Debniki 7, 80-212 Gdansk, Poland). *Przegl. Lek.* 34(5):509-510; 1977.

8248 ELECTRO-RESECTION OF STENOSING RECTAL CARCINOMA: TECHNIQUE AND INDICATIONS. (Ger.) Lindenschmidt, Th. O.; Hempel, D.; Zimmerm H. G. (Allgemeinen Krankenhaus, AK Barmbek, Rubenk 148, D-2000 Hamburg 60, W. Germany). *Chirurg* 48(5 343-344; 1977.

8249 A CASE OF CARCINOID TUMOR OF THE CECUM. (Spa.) Mazarro Valle, A.; del Valle Bod ga Frias, B. M. (No affiliation given). *Rev. Esp. Enferm. Apar. Dig.* 50(5):567-575; 1977.

8250 SECONDARY RETROPERITONEAL PERIURETERAL FIBROSIS FOLLOWING RECTAL SURGERY. (Ger Winkler, R.; Wagenknecht, L. V.; Schumpelick, V. (Chir. Univ.-Klinik, Martinistr. 52, D-2000 Hambur 20, W. Germany). *Chirurg* 48(4):256-261; 1977.

8251 DIAGNOSTIC VALUE OF THE TETRAZOLIUM NITROBLUE REDUCTION TEST IN ACUTE APPENDICITIS. (Pol.) Hermel, A. A. (Kliniki Chirurgii Przewodu Pokarmouego Instytutu Chirurgii Sl. AM, Chrobrego 37/61, 40-881 Katowice, Poland). *Pol. Przegl. Chir.* 49(7):679-682; 1977.

8252 CARCINOEMBRYONIC ANTIGEN DETERMINATIONS IN THE POSTOPERATIVE FOLLOW-UP OF COLORECTAL CARCINOMA. (Fre.) Segol, P. H.; Travert, G.; Davy, A.; Ollivier, J. M.; Gignoux, M. (Centre Hospitalier Regional, 14033 Caen Cedex, France). *Lyon Chir.* 73(4):289-292; 1977.

8253 TREATMENT OF INTRACTABLE RECTAL PROLAPSE BY SACRORECTOPEXY CARRIED OUT BY THE PERINEAL ROUTE: REPORT OF 84 CASES. (Fre.) Chabal, J.; Odoulami, H. (Hopital de la Croix-Rousse, 69317 Lyon Cedex 1, France). *Lyon Chir.* 73(4):263-265; 1977.

8254 RECTAL PROLAPSE: CLINICAL ASPECTS, THERAPY, AND RESULTS. (Fre.) Lombard-Platet, R.; Croizat, B.; Mathon, C.; Philippe, O. (Hopital Ed.-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(4):260-263; 1977.

8255 A NEW METHOD OF BOWEL PREPARATION. (Ger. Marti, M. C.; Pouret, J. P. (Kantonsspita CH-1200 Genf, Switzerland). *Langenbecks Arch. Chir* 343(4):275-279; 1977.

8256 HOW SAFE IS RADIOLOGY FOR THE DIAGNOSIS O COLON CARCINOMA? (Ger.) von Goumoens, E.; Nuesch, H. J.; Kobler, E.; Sauberli, H.; Deyhle P. (Departement fur Innere Medizin, Universitat Zurich, Zurich, Switzerland). *Schweiz. Med. Wochen schr.* 107(15):533-534; 1977.

8257 STUDY OF SURGERY IN 100 PATIENTS WITH ACUTE SIGMOIDITIS. (Fre.) Montant, A.; Moser, G.; Masset, F.; Fiala, J. M. (Hopital Cantonal Universitaire, CH-1211 Geneva 4, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):531-532; 1977.

8258 COLONOSCOPY AND CANCER. (Spa.) de la Santa Lopez, J. (Ciudad Sanitaria "Virgen del Rocio," Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(5):621-636; 1977.

8259 THE RADIOLOGICAL PICTURE OF PARIETAL MODIFICATIONS IN THE LARGE INTESTINE DUE TO EXTRINSIC MASSES. (Ita.) Severini, A.; Gardani, G. (Istituto Nazionale Tumori, 1 via Venezian, I-20133 Milan, Italy). *Radiol. Med.* 62(9):599-608; 1976.

8260 COMPLICATIONS OF CONGENITAL DUPLICATION OF THE SIGMOID COLON. (Fre.) Thomas, M.; Mathieu, P.; Schmitt, J. C.; Pateras, C.; Seror, J. (Hospices civils, 67005 Strasbourg Cedex, France). *Chirurgie* 102(7):500-505; 1976.

8261 USE OF ALLERGENS FROM CHEMICAL SUBSTANCES FOR THE DIAGNOSIS OF COLITIS OF CHEMICAL ETIOLOGY. (Rus.) Poliak, N. R.; Chubarova, Z. V. (All-Union Scientific Res. Inst. Hygiene, Kiev, USSR). *Vrach. Delo* (6):121-124; 1977.

8262 TRANSVERSE COLON THROMBOANGIITIS OBLITERANS OF THE [sic]. (Eng.) Sachs, I. L.; Klima, T.; Frankel, N. B. (Baylor Coll. Medicine, 1200 Moursund Ave., Houston, TX 77030). *JAMA* 238(4): 336-337; 1977.

See also, 8091, 8103, 8111, 8122, 8133, 8134, 8137, 8160, 8192, 8200, 8210, 8211, 8214, 8223, 8266, 8448, 8455, 8459, 8461, 8462, 8465, 8467, 8469, 8495, 8496, 8502, 8506, 8508, 8509, 8513.

LARGE INTESTINE

Ulcerative Colitis

8263 HISTOCOMPATIBILITY ANTIGENS IN INFLAMMATORY BOWEL DISEASE: THEIR CLINICAL SIGNIFICANCE AND THEIR ASSOCIATION WITH ARTHROPATHY WITH SPECIAL REFERENCE TO HLA-B27 (W27). (Eng.) Mallas, E. G.; Mackintosh, P.; Asquith, P.; Cooke, W. T. (Regional Transfusion Center, Birmingham, England). *Gut* 17(11):906-910; 1976.

The histocompatibility antigen (HLA) phenotypes were studied in 100 patients with ulcerative colitis (UC), 100 patients with Crohn's disease (CD), and 283 normal controls, with special reference to HLA-B27 and the phenotype of patients complicated with arthropathy. Of the 24 antigens tested, no significant difference at the 5% level was found for the HLA-A antigens in either disease group or for the HLA-B antigens in CD, compared with controls. There was, however, a significant ($p<0.05$) difference in locus HLA-B between UC and controls, even when cases of ankylosing spondylitis were excluded. Five UC patients also had ankylosing spondylitis, and four of these were HLA-B27 positive. Six UC patients had sacroileitis, three of whom were HLA-B-27 positive. Of CD patients, 2 also had ankylosing spondylitis, 1 of whom was HLA-B27 positive, and 11 had sacroileitis, 4 of whom were HLA-B27 positive. Twelve UC patients and 17 of those with CD had seronegative (enteropathic) peripheral arthropathy. Eleven CD patients with seronegative arthropathy had an HLA-A2, B12 phenotype combination, while only eight of the nonarthropathy patients had this combination ($p<0.01$). None of the UC patients had the HLA-A2, B12 combination; no patient with peripheral arthropathy had the HLA-B27 phenotype. The frequency of the HLA-B27 phenotype was 14% in UC, 6% in CD, and 6.7% in normal controls. Twelve of 14 UC patients with the HLA-B27 phenotype had total colonic involvement, while only 30 CD patients without this phenotype had total involvement ($p<0.024$). In CD, 5 of 6 B27-positive patients had total colonic involvement, while 17 B27-negative patients had it ($p<0.03$). It is concluded that the HLA-B27 phenotype may have prognostic and clinical significance in determining the extent and severity of inflammatory bowel disease, and it may play a role in differentiating the complications of this entity.

8264 HLA ANTIGENS AND ULCERATIVE COLITIS IN JAPAN. (Eng.) Tsuchiya, M.; Yoshida, T.; Asakura, H.; Hibi, T.; Ono, A.; Mizuno, Y.; Tsuji, K. (Sch. Medicine, Keio Univ., Tokyo, Japan). *Digestion* 15(4):286-294; 1977.

The relationship between the histocompatibility (HLA) antigen system and ulcerative colitis (UC) was studied in 44 Japanese patients with UC and 271 normal Japanese subjects. In the normal group, the most frequent HLA phenotypes were A-9 (60.9%), B-5 (40.6%), BW-40 (39.5%), A-2 (37.3%), A-10 (24.7%), AW-30/31 (20.7%), and BW-35 (19.2%). Compared to Caucasians, they showed significantly higher prevalences of A-9, A-10, B-5, and BW-40 and much lower prevalences of A-1, A-3, B-8, B-14, and B-18. The UC patients differed significantly from the Japanese controls in having a much higher percentage of B-5 (72.7%, $p<0.001$) and lower percentages of A-2 (27.3%), BW-35 (4.5%), BW-40 (27.3%), and AW-30/31 (0%). In the UC patients, the B-5 phenotype was significantly elevated in women (81%) and patients with colonic involvement (81%); lower prevalences were seen in men (61%) and patients with proctitis only (37.5%). The most frequent HLA haplotypes in the controls were A9-B5, AW30/31-B12, and A9-B7. The A9-B5 haplotype was not found in the UC patients. A small number of family studies yielded no significant information on the HLA haplotype in UC or on the relationship between the mixed leukocyte culture locus (which is distinct from the HLA A or B locus) and UC.

8265 OPERATIVE THERAPY OF ULCERATIVE COLITIS. (Ger.) Hollwarth, M.; Schulze, F.; Nahnsen, L. (Lehrkanzel fur Kinderchirurgie, Heinrichstr. 31, A-8010 Graz, Austria). *Z. Kinderchir.* 21(3):244-251; 1977.

8266 LIMITS OF INTERNAL TREATMENT IN ULCERATIV COLITIS AND CROHN'S DISEASE. (Ger.) Koc H. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95(31):1903-1906; 1977.

See also, 8451, 8461.

PANCREAS

8267 THE CYTODIAGNOSTIC ASPECTS OF PURE PANCREATIC JUICE OBTAINED AT THE TIME OF ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY (E.R.C.P.). (Eng.) Smithies, A.; Hatfield, A. R. W.; Brown, B. E. (Clinical Res. Center, Harrow, Middlesex, England). *Acta Cytol. (Baltimore)* 21(2):191-195; 1977.

Cytologic studies were made of the pure pancreatic juice collected at the time of endoscopic retrograde cholangiopancreatography (ERCP) from 61 patients undergoing investigation for pancreatic or biliary disease. A large number of degenerate cells were observed in the pure pancreatic juice from all 26 patients with pancreatic cancer and all 9 patients with pancreatitis. Degenerate cells were found in only 4/26 remaining patients finally judged to have no pancreatic disease, and in these 4 the number of cells was scanty. When the degenerate cells reached a final stage of what appeared to be a degenerative process, the nuclei were karyorrhectic, and dense chromatin fragments were distributed peripherally in the cell. The cytoplasm was eosinophilic, and it had a rather solid appearance. Malignant cells were found in the pure pancreatic juice of 14/26 patients who were finally diagnosed at laparotomy or autopsy to have pancreatic carcinoma. In 18 of these patients, ERCP was diagnostic for carcinoma. With the combination of ERCP plus pure pancreatic juice cytology, a diagnosis was reached in 24/26 patients with pancreatic carcinoma.

8268 BIOAVAILABILITY OF FOOD IRON-(^{59}Fe), VITAMIN B_{12}-(^{60}Co) AND PROTEIN BOUND SELENOMETHIONINE-(^{75}Se) IN PANCREATIC EXOCRINE INSUFFICIENCY DUE TO CYSTIC FIBROSIS. (Eng.) Heinrich, H. C.; Gabbe, E. E.; Bartels, H.; Oppitz, K. H.; Bender-Gotze, Ch.; Pfau, A. A. (Univ. Hosp. Eppendorf, Univ. Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Klin. Wochenschr.* 55(12): 595-601; 1977.

The absorption of heme Fe [^{59}Fe-labeled hemoglobin (Hb) and pork Fe], nonheme Fe (ferritin in hog liver), ^{60}Co-labeled vitamin B_{12}, and ^{75}Se-selenomethionine-labeled pork was measured in children with pancreatic exocrine insufficiency due to cystic fibrosis. Children with normal or mildly reduced Fe stores absorbed 5.9-13% of a 5-mg Hb-Fe dose give p.o., 6.9-14% of a 5-mg dose of p.o. administered liver-Fe, and 17-34% of a 0.7- to 2.0-mg dose of p.o. administered pork-Fe. Two children with depleted Fe stores absorbed 19% of the Hb-Fe dose in each case, 12% and 28% of the liver-Fe dose, and 23% and 30% of the pork-Fe dose. These absorption values are within the ranges of Hb-, liver-, and pork-^{59}Fe absorption described for healthy adults with normal and depleted Fe stores, resp. Three children with cystic fibrosis absorbed only 0.5-2% of a 0.50-nmol dose of p.o. administered ^{60}Co-labeled vitamin B_{12}; this malabsorption was not influenced by the simultaneous administration of a potent purified hog intrinsic factor concentrate. Adults with normal intrinsic factor secretion absorb 40-95% of a 0.50 nmol dose of ^{60}Co-labeled vitamin B_{12}. Two children with cystic fibrosis absorbed 60-71% of the ^{75}Se from a p.o. dose of 200 g ^{75}Se-selenomethionine-labeled pork, whereas normal adults absorb 76-100% of the ^{75}Se. Pancreatin did not improve the bioavailability of ^{75}Se-selenomethionine from labeled pork in cystic fibrosis patients. These preliminary results indicate that the intraluminal peptic digestion of dietary protein is adequate in pancreatic insufficiency and that pancreatin treatment will not improve protein utilization in cystic fibrosis.

8269 ECHOGRAPHY FOR THE DIAGNOSIS OF PANCREATIC PSEUDOCYSTS. (Fre.) Arnaud, J. P.; Aprahamian, M.; Macler, J.; Renaud, R.; Adloff, M. (Centre Medico-Chirurgical, 19, rue L. Pasteur, 67300 Schiltigheim, France). *Ann. Chir.* 31(6):463-470; 1977.

8270 LEFT PANCREATIC NECROSIS. (Fre.) Boutelier, P. (Hopital Bichat, 75877 Paris Cedex 18, France). *Lyon Chir.* 73(3):187-191; 1977.

See also, 7906, 8090, 8129, 8132, 8134, 8137.

PANCREAS

Pancreatitis

8271 FUNCTIONAL EXPLORATION OF CHRONIC PANCREATITIS BY DUODENAL INTUBATION. COMPARATIVE STUDY OF THE LUNDH MEAL AND DUODENAL HORMONES BASED ON A SURVEY OF LITERATURE. SECRETIN-CAERULEIN TEST CARRIED OUT BY THE AUTHORS. (Eng.) van der Hoeden, R.; Mesa, A. V.; Delcourt, A. (Institut medicochirurgical d'Ixelles, Rue J. Paquot 63, B-1050 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):509-521; 1976.

The Lundh and duodenal hormone tests for the diagnosis of chronic pancreatitis (CP) are described briefly and compared. In the Lundh test, pancreatic secretion is stimulated with a meal composed of 6% fat, 5% protein, and 15% carbohydrates. It is easy, inexpensive, and well-tolerated. In the hormone test, which is more sensitive, the pancreas is stimulated directly with secretin and pancreozymin. The use of a third, simplified test of submaximal stimulation of the pancreas with a secretin-cerulein perfusion is proposed based on experience with 34 CP patients, 17 liver disease patients, and 30 healthy controls. A duodenal intubation was performed, and secretin (1 U/kg/hr) was infused over 80 min accompanied, after 40 min, by cerulein (75 ng/kg/hr). The duodenal juice was aspirated manually every 10 min, and the volume and the concentrations and outputs of bicarbonate and amylase were measured. The differences between CP patients and controls with respect to bicarbonate and amylase output were significant ($p<0.001$). For example, the respective mean values at 70-80 min of perfusion were 1.25 and 5.40 mEq% for bicarbonate output and 2.5 and 4.3 U for amylase output. Differences in volume were less marked. Amylase and bicarbonate outputs were abnormal in 34 and 29 CP patients, resp. Use of the latter for liver disease should be restricted. Because of an increased choleretic response after secretin stimulation, the volume was higher than normal in these patients, and, as a result of low bicarbonate concentration in the bile, the net results were normal or higher output levels. This may mask a pancreatic insufficiency. To detect all stages of CP, the Lundh test should be used as a screen, followed, when indicated, by hormone stimulation with submaximal doses of secretin and cerulein.

8272 ON THE QUANTITATION OF ISO-AMYLASES IN SERUM AND THE DIAGNOSTIC VALUE OF SERUM PANCREATIC TYPE AMYLASE IN CHRONIC PANCREATITIS. (Eng.) Magid, E.; Horsing, M.; Rune, S. J. (Bispebjerg Hosp., Denmark). *Scand. J. Gastroenterol.* 12(5):621-627; 1977.

Studies were carried out in 142 normal subjects and in 95 patients with symptoms of chronic pancreatitis to assess whether the quantitative determination of serum pancreatic-type isoamylase can be used as a diagnostic test for exocrine pancreatic insufficiency. The normal appearance of serum amylase zymograms produced with an agarose electrophoresis technique is described, and the reference values from studies of the normal subjects for salivary and pancreatic type amylases are presented. In the 95 patients, exocrine pancreatic function was assessed by means of the Lundh meal test. A low serum pancreatic-type amylase value was found to indicate the presence of a reduced exocrine pancreatic function ($p=0.96$), and a normal or elevated serum pancreatic-type amylase value excluded the presence of a severe exocrine pancreatic insufficiency ($p=0.91$). An abnormal amylase fraction that may be of diagnostic significance in pancreatic disease was observed. Future studies of the occurrence of abnormal amylase isoenzymes may improve the diagnostic yield of serum isoamylase determinations.

8273 HAEMATOLOGICAL ABNORMALITIES IN ACUTE PANCREATITIS. A PROSPECTIVE STUDY. (Eng.) Murphy, D.; Imrie, C. W.; Davidson, J. F. (Radcliffe

Infirmary, Oxford, England). *Postgrad. Med. J.* 53(620):310-314; 1977.

Hematological and coagulation indices were studied in 25 patients with acute pancreatitis in the first week of their admission. Platelet counts initially fell and later returned to admission levels. Rising levels of plasma fibrinogen were recorded. The kaolin cephalin clotting time was shorter than its control in 21 patients. Eighteen patients had elevated fibrinogen degradation products, and 14 had a positive ethanol gelation test. It is suggested that, by taking into account the results in series of individual patients, a degree of intravascular coagulation may be a common feature of acute pancreatitis. In one patient (presented in detail) strong evidence for disseminated intravascular coagulation was found.

8274 CHRONIC PANCREATITIS: A CAUSE OF BILIARY STRICTURE. (Eng.) Schulte, W. J.; LaPorta, A. J.; Condon, R. E.; Unger, G. F.; Geenen, J. W.; DeCosse, J. J. (Wood Veterans Admin. Center, Wood, WI 53193). *Surgery* 82(3):303-309; 1977.

Experience with 13 patients who had a distal common duct stricture associated with chronic relapsing pancreatitis is presented. All patients, when first seen, had an elevated alkaline phosphatase level; 8 of 13 patients also had an elevated serum bilirubin level. Five of the jaundiced patients had a febrile course; a preoperative diagnosis of acute cholangitis was made in four of these. Eight of the 13 patients underwent a choledochoduodenostomy for relief of biliary obstruction; 7 of these patients are living and well, and 1 died of continued alcoholism and pancreatitis. One patient had a loop cholecystojejunostomy; decompression was inadequate, and death due to septicemia secondary to ascending cholangitis ensued. The biliary tract should be investigated in patients known to have chronic relapsing pancreatitis who also have persisting abdominal symptoms and an elevated alkaline phosphatase. If a stricture of the distal common bile duct is identified in the absence of acute pancreatitis, choledochoduodenostomy should be performed.

8275 SURGICAL TREATMENT OF CHRONIC PANCREATITI (Rus.) Utkin, V. V.; Liepinsh, M. A.; Boka, V. A. (Riga Medical Inst., Riga, USSR). *Khirurgiia* (7):89-93; 1977.

8276 POSTOPERATIVE PANCREATITIS FOLLOWING GASTRIC RESECTION FOR GASTRIC AND DUODENA ULCER. (Rus.) Teply, V. K.; Anibal, O. V. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (10):12-15; 1976.

8277 TREATMENT OF PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Kovalyov, M. M.; Govdenko P. F.; Furmanenko, N. F. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (10):7-12; 1976.

8278 CHRONIC PANCREATITIS. (Fre.) de Montalier, H.; Cassan, Ph.; Deroide, J. P.; Luccioni, P. (Hopital Bichat, 75018 Paris, France). *Rev. Med. (Paris)* 17(31):1617-1626; 1976.

8279 METABOLIC DISTURBANCES IN CHRONIC PANCREATITIS. (Fre.) Wettendorff, P. (Service de Medecine interne, IMC Ixelles, Ixelles, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):382-393; 1976.

8280 SURGICAL TACTICS IN CHRONIC PANCREATITIS. (Fre.) Kiekens, R.; Govaerts, J. P.; Cremer, M. (Guldendal 11, B-1850 Grimbergen, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):575-584; 1976.

See also, 7990, 7991, 8142, 8269, 8495.

LIVER AND BILIARY TRACT

8281 LIVER HISTOLOGY IN A 'NORMAL' POPULATION: EXAMINATIONS OF 503 CONSECUTIVE FATAL TRAFFIC CASUALTIES. (Eng.) Hilden, M.; Christoffersen, P.; Juhl, E.; Dalgaard, J. B. (Inst Forensic Medicine, Univ. Aarhus, Aarhus, Denmark). *Scand. J. Gastroenterol.* 12(5):593-597; 1977.

The liver histology of 503 consecutive victims of fatal (within 24 hr) traffic accidents submitted to medico-legal autopsy were used to determine liver histology in a "normal" population. In 370 persons no pathological changes in the liver biopsies were observed. Fatty liver was found in 120 persons, nonspecific portal inflammation in 7, alcoholic hepatitis in 6, portal fibrosis in 5, and hemopoiesis was observed in 1 person. No cases of cirrhosis, chronic aggressive hepatitis, changes compatible with chronic persistent hepatitis or viral hepatitis, or other internationally accepted morphological diagnoses were found. A few focal necroses, distributed diffusely throughout the parenchyma, were found in 15 cases, and 8 cases showed slight variation in size of nuclei and/or cells. Six livers contained Mallory bodies. Alcoholic hepatitis was shown in all livers containing Mallory bodies. A slight degree of Kupffer cell proliferation was noted in 15 cases. A significant positive correlation ($p<0.01$) between the frequency of steatosis and age groups was demonstrable. Fatty liver was found in 1% of persons below 20 yr, in 18% of those 20-40 yr, and in 39% of those >60 yr. The persons with fatty liver had a higher body weight, but obesity was not correlated to age. It is concluded that fatty infiltration in the liver is a normal observation in aged persons. The results show that morphological liver diagnosis, except fatty liver, is very seldom found in this type of material.

8282 THE PRESENCE OF HEPATIC INTRAMITOCHONDRIAL CRYSTALLINE INCLUSIONS IN ROUTINE LIVER BIOPSIES. (Eng.) Mandel, E. M.; Lewinski, U.; Gafter, U.; Weiss, S.; Freidin, N.; Djaldetti, M. (Hasharon Hosp., Petah-Tiqva, Israel). *Am. J. Med. Sci.* 274(1):61-67; 1977.

Electron microscopic examination of the liver biopsies of 33 patients with liver disease revealed the presence of intramitochondrial crystalline inclusions (IMCI) in 10. The diagnosis of the patients with IMCI included one case each of alcoholism, cirrhosis, hyperlipidemia, hyperthyroidism, iron deficiency anemia, leptospirosis, malignant melanoma, and porphyria as well as two cases of metastatic hypernephroma. A comparison of patients with and without liver IMCI revealed no significant difference in age, hepatomegaly, elevated alkaline phosphatase levels, SGOT, SGPT, and BSP retention. The nature of the IMCI is unclear, and no common feature in patients with liver IMCI could be found to explain the existence of these inclusions.

8283 PROTEIN BINDING AND KINETICS OF DRUGS IN LIVER DISEASES. (Eng.) Blaschke, T. F. (Room S-155, Stanford Univ. Medical Center, Stanford, CA 94305). *Clin. Pharmacokinet.* 2(1):32-44; 1977.

Interrelationships between liver disorders and protein binding as they affect the disposition of drugs eliminated metabolically in man are discussed. Both the type or stage of liver disease and the pharmacokinetic characteristics of the drug influence the nature and magnitude of changes in drug disposition. At least two general mechanisms may be responsible for changes in the binding of drugs in liver disease patients. The concentration of albumin, the most important plasma protein responsible for drug binding, and therefore the total number of albumin binding sites are frequently reduced in these patients, and the globulin fractions may be increased. Changes in the fraction of bound drug produced by alterations in albumin or globulin will depend on the total drug concentration, number of binding sites, and the drug dissociation constants. Even in the absence of measurable changes in albumin concentration, the binding of drugs to plasma proteins may be decreased in liver disease patients, and mechanisms similar to those causing decreased drug binding in renal insufficiency may also be operative in these patients. Drugs for which changes in plasma protein binding in liver disease have been demonstrated include propranolol, morphine, diazepam, tolbutamide, phenylbutazone, phenytoin, thiopentone, quinidine, and amylobarbitone. Changes in hepatic clearance and/or volume of distribution in various liver diseases have been observed for such drugs as pethidine, lignocaine, propranolol, tolbutamide, diazepam, clindamycin, chlorpromazine, antipyrine, amobarbitone, hexobarbitone, and chloramphenicol. At present, there is no method for predicting the drug dose requirement for a patient at a particular stage of a liver disease.

8284 GUIDELINES TO CLEARING PATIENTS WITH LIVER DISEASE FOR SURGERY. (Eng.) Leibowitz, S. (325 East 16th St., New York, NY 10003). *Mt. Sinai J. Med. N.Y.* 44(4):539-543; 1977.

Guidelines for clearing liver disease patients for surgery are presented. If clinical, historical, and laboratory findings indicate recent acute liver disease, the patient should not be cleared for surgery unless the patient's life is threatened more by a postponement of surgery than by immediate intervention. A history of past liver disease (hepatitis, cirrhosis, toxic hepatitis) per se is not a bar to proceeding with necessary surgery, but, if time allows, a thorough workup should be performed before surgery to assess any current disease activity. If the screening of a patient with a history of prior liver disease reveals no evidence of significant disease, the patient may be cleared for emergency surgery. In these cases, elective surgery should be preceded by necessary baseline studies to determine the current disease activity. When there is evidence of current liver disease, the specific diagnosis should be made before surgery. Elective surgery is not recommended for acute viral hepatitis; when there is a need for major surgery (e.g., carcinoma of the gut), surgery should be postponed as long as possible until the condition subsides. Surgery is recommended as the lesser of two evils for life-threatening conditions (ruptured viscus or uncontrollable bleeding of a duodenal ulcer) in patients with acute viral hepatitis and acute toxic hepatitis. In cases of compensated cirrhosis of the liver, the degree of surgical need determines clearance. Surgery in cases of uncompensated liver cirrhosis should be aimed at correcting accompanying disorders of the liver disease such as portal hypertension (e.g., shunt surgery; surgery is always performed as an elective procedure when the patient has been maximally prepared. Immediate surgery is only performed to stop variceal hemorrhage. When the hepatic disease is secondary to the basic illness that surgery is intended to correct, carefully considered elective surgery is recommended.

8285 THE SPECTRUM AND CAUSES OF LIVER DISEASE IN NARCOTIC ADDICTS. (Eng.) Gelb, A. M.; Mildvan, D.; Stenger, R. J. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Am. J. Gastroenterol.* 67(4):314-318; 1977.

Factors involved in the development of liver disease among 50 narcotic addicts were analyzed. Two cases were unsuitable for analysis. Among 12 active heroin users or 30 former heroin addicts maintained on methadone, 32 were heavy alcohol abusers. Six patients were on alcohol alone. Of these 38 alcohol abusers, 17 had cirrhosis, which was confirmed by biopsy in 8 patients. Two patients died of liver failure. Among all 48 patients, 9 had clinical evidence of alcoholic hepatitis, while 10 had acute viral hepatitis and 2 showed biopsy evidence of chronic viral hepatitis. Reversible liver disease was seen in both alcohol abusers and nonalcoholics. This study suggests that alcohol is a major factor in the development of irreversible liver disease in active heroin addicts and ex-addicts on methadone maintenance. It is suggested that special strategies be devised for the management of alcoholism in addicts and ex-addicts on methadone.

8286 RECENT ADVANCES IN PEDIATRIC HEPATOLOGY. (Eng.) Alagille, D. (Hopital d'Enfants, 78 rue du General-Leclerc, 94270 Bicetre, France). *Pediatr. Res.* 11(9, Part 2):994-996; 1977.

The basic knowledge acquired concerning the physiology of neonatal hyperbilirubinemia, the transmission of hepatitis B virus to fetuses and infants, the relationship between alpha-l-antitrypsin deficiency and liver disease, the enzymatic disturbances in Reye's syndrome, and the surgical progress in extrahepatic biliary atresia and in early portal hypertension is summarized. Neonatal hyperbilirubinemia is attributed to a temporary imbalance between bilirubin production and clearance, created at birth by the abrupt deprivation of the placental transfer and clearance functions. The transmission of hepatitis B to fetuses and infants and the role of alpha-l-antitrypsin deficiency in biliary and liver disease in children remains unclear. Exchange transfusion, peritoneal dialysis, hemodialysis, and procedures aimed at cerebral decompression are only used with success when initiated at the early stage of the Reye's syndrome disease. The cure of extrahepatic biliary atresia by grafting remains doubtful. Three types of surgical procedures are described: 53 infants underwent hepatic porto-enterostomy (group 1); 20 infants underwent classical porto-enterostomy and jejunostomy (group 2); and 18 infants were treated by hepatic porto-cholecystostomy (group 3). Twenty patients in group 1, six patients in group 2, and seven patients in group 3 survived. Splenorenal anastomoses in children who had bleeding due to early portal hypertension is suggested. The choice of the proper surgical treatment must take into account the efficacy and operative risks of each procedure.

8287 α_1-ANTITRYPSIN DEFICIENCY AND INFANTILE LIVER DISEASE. (Eng.) McPhie, J. L.; Binnie, S.; Brunt, P. W. (Dept. Pathology, Univ. Medical Buildings, Foresterhill, Aberdeen AB9 2ZD, Scotland). *Arch. Dis. Child* 51(8):584-588; 1976.

The genetic nature of infantile liver disease caused by α_1-antitrypsin (AA) deficiency is illustrated by case histories from two families. The disease is inherited by a simple autosomal recessive pattern; PiM is the designation of the normal α_1-antitrypsin gene, and severe deficiency with levels of AA below 50 mg/100 ml are associated with the phenotype PiZZ. The characteristic evolution of the disease, observed in the two children in one family and three children in the other, commences with mild or severe neonatal hepatitis at age 3-4 weeks. The jaundice subsides in most infants in 3 weeks to several months, but cirrhosis develops. At about age of 3-4 yr the child has symptoms of ascites or hematemesis from esophageal varices. The patients usually die of hemorrhage or hepatic coma. Diagnosis can be readily made on basis of low AA serum levels and PAS-positive globular intracytoplasmic inclusion bodies, positive for AA, within the hepatocytes. Retrospective histological analysis of 61 liver biopsies of children and adolescents performed in a 13-yr period revealed that three children (5%) had evidence of AA deficiency liver disease.

8288 HEPATOCELLULAR CARCINOMA AND CHRONIC PERSISTENT HEPATITIS. (Eng.) Shikata, T.; Yamazaki, S.; Uzawa, T. (Nihon Univ. Sch. Medicine, Ohyaguchi-Kamimachi, Itabashiku, Tokyo 173, Japan). *Acta Pathol. Jpn.* 27(3):297-304; 1977.

The pathology files of 9,000 autopsy cases were surveyed to determine the association between hepatocellular carcinoma (HC) and liver cirrhosis or liver fibrosis. There were 603 cases of liver cirrhosis an 220 cases of HC. Of the latter, 85.8% were combined with liver cirrhosis, 8.0% with liver fibrosis; the remaining 6.2% were not associated with any other liver pathology. A study was also made of the presence of hepatitis B surface antigen (HBsAg) in the 19 HC cases for which paraffin sections were available. HBsAg was detected by orcein and aldehyde-fuchsin stain on 4/10 tissue specimens of HC associated with fibrosis, on 4/6 specimens of HC plus early cirrhosis, and 0/3 specimens of HC without other liver pathology. HBsAg was only observed on the noncancerous hepatocytes. It is concluded that liver fibrosis may be caused by chronic viral hepatitis. Liver fibrosis as well as cirrhosis may be considered precancerous pathology.

8289 SEQUENTIAL LOCOREGIONAL CHEMOTHERAPY OF LIVER CANCER IN ADULTS. (Fre.) Bessot, M.; Lorenzini, Cl.; Mauuary, G.; Fays, J.; Duprez,

A. (No affiliation given). *Ann. Chir. Infant.* 17(5/6):461-470; 1976.

The results of sequential locoregional chemotherapy in 110/140 adult patients with primary (37) and secondary (103) liver tumors are presented. Chemotherapy consisted of intra-arterial perfusions of 5-fluorouracil (250 mg) or methotrexate (10 mg) on days 1-4, followed by endoxan (100 mg) and vinblastine (1 mg) between days 4 and 5, and mitomycin (125 μg) or actinomycin D (100 μg) between days 5 and 6. This course was continued for 4-8 weeks at 15- to 30-day intervals until remission. Of the 110 patients given sequential chemotherapy, 60 responded to the treatment. The results were a decrease in hepatomegaly (23 patients), amelioration on scintigraphy (16), and regression of tumor mass or of hypervascularization (21). Of these 60 patients, 12 survived 1 yr. After chemotherapy, many patients could not withstand subsequent surgery for hepatic metastases or recurrence. Two types of complications developed during treatment--chemotherapy-induced hepatic coma and accidents due to long-term catheterization. Other complications included septicemia (6), acute ulcerations caused by displacement of the catheter (3), and atheromatous projection (3).

8290 THE RADIOLOGIC INVESTIGATION OF HEPATIC TUMORS IN CHILDHOOD.

(Eng.) Miller, J. H.; Gates, G. F.; Stanley, P. (Children's Hosp. Los Angeles, 4560 Sunset Blvd., Los Angeles, CA 90027). *Radiology* 124(2):451-458; 1977.

A scheme for the evaluation of abdominal masses in children using diagnostic modalities developed since 1970 is presented. Diagnosis should begin with a conventional x-ray of the abdomen, followed by inferior vena cavagraphy and excretory urography, then gray scale ultrasonography and radionuclide scintigraphy with ^{99m}Tc, and ending with angiography. This approach was used to examine 65 children, newborn to 17 yr (not every technique was needed in each case). Examination revealed 18 benign neoplasms, 20 malignant tumors, 8 nonneoplastic hepatic masses, and 12 glycogen storage disease cases. The radiographic analyses of the most common hepatic masses of children, hepatoblastomas, hepatic cell carcinomas, small cell sarcomas, hepatic adenoma, angiomatous tumor, hepatic abscess, neonatal hematoma, congenital neuroblastoma, and involuting tumor, are tabulated. The newer techniques permit differentiation between benign and malignant lesions and demonstrate the extent and exact location of the lesion. Chemotherapy of malignant tumors can be evaluated by nuclear imaging, ultrasound, and angiography.

8291 'BIG ACTH' AND CALCITONIN IN AN ECTOPIC HORMONE SECRETING TUMOUR OF THE LIVER.

(Eng.) Himsworth, R. L.; Bloomfield, G. A.; Coombes, R. C.; Ellison, M.; Gilkes, J. J. H.; Lowry, P. J.; *et al.* (Northwick Park Hosp., Harrow, Middlesex HA1 3UJ, England). *Clin. Endocrinol.* 7(1):45-62; 1977.

Plasma and tumor tissue hormones were studied in a 16-yr-old boy with rapidly developing Cushing's syndrome that was due to the ectopic secretion of ACTH and immunoreactive β-melanocyte stimulating hormone (β-MSH)-like material from hepatic tumor deposits, possibly originating from biliary radicals. Cushing's syndrome has not previously been described in association with a primary hepatic tumor. During the 22-month course of the illness, the plasma immunoreactive ACTH and β-MSH concentrations rose logarithmically. The plasma calcitonin concentration was also elevated, but it did not change during the final 12 months. The plasma concentration of the ecotopically produced hormones underwent acute variations: after hydrocortisone treatment, the variations were inconstant. During the course of the illness, the ectopic ACTH became biologically less potent. This ineffectual ACTH was present in a large molecular weight form in the plasma, in the tumor, and in the medium in which the tumor was cultured. This "big ACTH" differed from the normal ACTH in the patient's pituitary and from authentic ACTH in its immunochemical character; the C-terminal antigenic determinant (33-39 region of ACTH) was masked in the large molecular weight form but was uncovered after extraction in neutral buffer, and this "big ACTH" was more readily extracted from the tumor at pH 7.0. The tumor tissue also contained immunoreactive β-MSH and immunoreactive calcitonin that resembled calcitonin M chromatographically.

8292 STUDIES ON ISOENZYMES IN RELATION TO CANCER. II. SERUM ALDOLASE ISOENZYME PATTERNS IN THE DIAGNOSIS OF PRIMARY HEPATOCELLULAR CARCINOMA.

(Eng.) Damle, S. R.; Talavdekar, R. V. (Tata Memorial Hosp., Parel, Bombay-400 012, India). *Indian J. Cancer* 14(2):145-150; 1977.

Aldolase isoenzyme patterns were studied by agarose gel electrophoresis in the sera of 58 patients with primary hepatoma and compared with those in sera of 192 patients with different malignant conditions and 46 patients with different liver diseases. The characteristic pattern found in the hepatoma patients consisted of a predominant muscle-type aldolase band accompanied by a band hybridized with brain-type aldolase. This pattern was not observed in the controls with other malignant diseases or in those with benign liver diseases. The presence of this atypical pattern occurred in 80% of the hepatoma patients. It is concluded that the study of aldolase isoenzyme patterns may prove to be a useful adjunct to other biochemical profiles in the diagnosis of primary hepatoma.

8293 HEPATIC TUMORS: POSSIBLE RELATIONSHIP TO USE OF ORAL CONTRACEPTIVES.

(Eng.) Klatskin, G. (Dept. Medicine, Yale Univ., 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 73(2):386-394; 1977.

A review of the literature up to September 1976 reveals 117 cases of hepatic tumors in women using oral contraceptives (O.C.) and an additional 120 cases possibly associated with O.C. use. The data on these cases are tabulated on the basis of tumor histology; type of O.C. and duration of use; presenting symptoms; hepatic function, scintiscan, and arteriographic abnormalities; and clinical course. The O.C. included almost all combinations of synthetic estrogens and progestogens in common use; however, those containing mestranol as the estrogenic component outnumbered those containing ethinyl estradiol. In patients with hepatic cell adenoma (120), the presenting complaint was usually acute abdominal pain accompanied by shock due to tumor rupture. About half of the patients with focal nodular hyperplasia (96) had asymptomatic tumors; acute pain was the most common symptom in the other half. Scintiscans and arteriography detected hepatic abnormalities in almost all reported cases; however, hepatic function was not usually altered, and tests were usually negative. Only 8/107 patients with a benign hepatic pathology died, and all deaths were attributed to rupture with hemoperitoneum (4 occurred after surgery, 3 prior to surgery, 1 after hepatic artery ligation). Five of the eight patients with malignant hepatic tumors died (1 during surgery, 1 a year after lobectomy).

8294 CURRENT CONCEPTS IN INTRAHEPATIC CHOLESTASIS. (Eng.) Schwarz, L. R.; Schwenk, M.; Greim, H. (Dept. Toxicology, Gesellschaft fur Strahlen- und Umweltforschung, Ingolstadter Landstrasse 1, D-8042 Neuherberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(3):210-215; 1977.

The pathogenesis of intrahepatic cholestasis is discussed. Drug-induced intrahepatic cholestasis appears to be primarily due to a biochemical interference with cellular functions at the molecular level. The most common drugs used to induce cholestasis experimentally are steroid hormones and lithocholate. One target of these compounds may be the lipid phase of several cell structures, such as the sinusoidal and canalicular membranes, the endoplasmic reticulum, and the mitochondria. By their capacity to interact with the lipid layer and membrane proteins, cholestatic compounds impair specific cellular functions such as carrier protein activity, hydroxylation, and mitochondrial ATP synthesis. Other targets of cholestatic compounds may be the binding proteins in the cytoplasm and, possibly, the microfilaments. The initiating event of drug-induced intrahepatic cholestasis is unknown, and it is not clear whether the increased bile acid levels in the blood are the cause or consequence of intrahepatic cholestasis.

8295 THIAMINE DEFICIENCY IN FULMINANT HEPATIC FAILURE AND EFFECTS OF SUPPLEMENTATION. (Eng.) Labadarios, D.; Rossouw, J. E.; McConnell, J. B.; Davis, M.; Williams, R. (King's Coll. Hosp. and Medical Sch., London SE5 8RX, England). *J. Vitam. Nutr. Res.* 47(1):17-22; 1977.

The response to i.v. supplementation with thiamine (thiamine hydrochloride, 100 mg b.i.d.) plus vitamins was investigated in 8/24 patients with acute hepatocellular damage leading to fulminating hepatic failure. Mean erythrocyte transketolase activity (ETA) was significantly lower in these patients than in controls (33.8 ± 2.6 and 41.8 ± 1.7 U/l, resp., $p<0.025$). In six of eight patients the *in vitro* stimulation of ETA by the added thiamine, which is converted into thiamine pyrophosphate (TPP effect), was >25%, providing evidence of TPP deficiency. The TPP effect was significantly higher ($p<0.05$) in these patients (18 ± 2.8%) than in controls (10.6 ± 2.2%). There was no correlation between urinary thiamine excretion and ETA. ETA was increased significantly ($p<0.025$) from 38.3 ± 4.1 U/l on admission to 53.7 ± 6.9 U/l on day 3 in the eight patients receiving vitamin supplements. Concomitantly, there was a progressive and significant decrease to normal TPP effect values on the third (7.0 ± 2.0%, $p<0.05$) and seventh (4.2 ± 2.0%, $p<0.025$) days of supplementation. In the 16 patients who did not receive vitamin supplements, there was an increase in the TPP effect, evidence of increasing thiamine deficiency. These studies indicate that conversion of thiamine hydrochloride to its biologically active coenzyme form, thiamine pyrophosphate, is possible even in the presence of severe acute hepatocellular necrosis. Vitamin supplements should be included in the routine management of patients with acute hepatic failure.

8296 LIVER PROTOCOLLAGEN PROLINE HYDROXYLASE IN HUMAN LIVER DISEASES AND EXPERIMENTAL LIVER FIBROSIS. (Eng.) Tsujii, T.; Kimura, K.; Fukuhara, M.; Morita, T.; Matsui, T.; Tamura, M.; Matsuoka, Y. (Nara Medical Univ., 840 Shijocho, Kashiwara City, Nara 634, Japan). *Gastroenterol. Jpn.* 12(1):21-27; 1977.

Hepatic procollagen proline hydroxylase (PPH) activity was determined in 33 patients with various liver diseases, in rats with CCl_4-induced liver fibrosis, and in rats with choline deficiency (CD) fatty liver. PPH activity (disintegrations/min ^{3}H-hydroxyproline/mg protein) was highest (4-9 times that of controls) in persistent hepatitis patients, followed by patients with liver cirrhosis (2-8 times higher), chronic active hepatitis (x3), chronic inactive hepatitis (x2), and acute hepatitis (x2). PPH activity in the one patient with a fatty liver was lower than that in controls. Even though the persistent hepatitis patients had only a negligible or slight amount of fibrosis, their activity was similar to that of the liver cirrhosis patients. PPH activity correlated with the serum monoamine oxidase ($r=0.461$, $p<0.05$), serum alkaline phosphatase ($r=0.445$, $p<0.05$), and indocyanine green retention tests ($r=0.530$, $p<0.05$). Hepatic PPH activities in both groups of rats rose with time. Between 23 and 31 weeks after the start of the experiment, the activity was slightly lower in CD fatty liver rats without fibrosis than in those with fibrosis. However, the activity of the former was still considerably higher than that of control rats. It is concluded that there is a relation between PPH activity and liver pathology.

8297 FOCAL NODULAR HYPERPLASIA OF THE LIVER: POSSIBLE INFLUENCE OF FEMALE REPRODUCTIVE STEROIDS ON THE HISTOLOGICAL PICTURE. (Eng.) Moesner, J.; Baunsgaard, P.; Starklint, H.; Thommesen, N. (Patologisk Institut, Amtssygehuset, DK-8000 Aarhus, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(2):113-121; 1977.

Eighteen patients with focal nodular hyperplasia (FNH) of the liver were studied to evaluate possible histological differences between FNH patients who had taken female sex hormones and those who had no history of hormone treatment. Characteristic histological changes were found in the lesions of four women who had taken oral contraceptives for 4-7 yr (lesion 4.0-10.5 cm maximum diameter) and one man who had taken diethylstilbestrol (30 mg/day) for prostatic carcinoma for 2 yr until death. These lesions consisted of young connective tissue septa with a pronounced bile duct proliferation, piecemeal necrosis, and lymphocytic infiltration. Smaller nodes (0.3 to 2.2 cm maximum diameter) containing much less or no activity were found in the remaining 13 patients who had not been treated with hormones. Possible mechanisms for the effect of the female reproductive steroids are discussed. It is proposed that FNH represents a congenital malformation, possibly a hamartoma. The liver cells of this hamartoma may suffer from enzymatic defects, which may render them especially vulnerable to female sex hormones, resulting in secondary changes of the liver parenchyma, blood vessels, and bile ducts of the lesion.

8298 HEPATIC METABOLIC CHANGES FOLLOWING ENERGY DEPRIVATION BY AMMONIA IN PATIENTS AND RABBITS WITH JAUNDICE. (Eng.) Kamiyama, Y.; Takeda, H.; Ohshita, M.; Nambu, H.; Yamaoka, Y.; Yamamoto, M.; Kimura, K.; Ozawa, K.; Honjo, I. (Kyoto Univ. Faculty Medicine, Kyoto, Japan). *Surg. Gynecol. Obstet.* 145(1):33-40; 1977.

The effect of ammonia on the energy metabolism of the severely damaged human and rabbit liver was investigated. The ammonia concentrations in portal and venous blood and peripheral arterial blood remained unchanged during the study period, although the concentration in portal blood was about four times that in peripheral blood. Hepatic carbamoyl phosphate synthetase I and ornithine carbamoyl transferase activities did not decrease in patients with obstructive jaundice and in rabbits subjected to ligation of the common bile duct. In these rabbits, the adenylate energy charge level fell rapidly to a mean of 0.780 ± 0.024, compared with 0.866 ± 0.003 for rabbits that were fed normally ($p<0.05$). Their mortality rate increased with decrease of the hepatic energy charge, which was accompanied by a decrease in ATP content (to 1.712 ± 0.034 μmol/g liver, from a control value of 2.743 ± 0.046; $p<0.05$) and an increase in ADP content (to 0.774 ± 0.018 μmol/g liver, from a control value of 0.643 ± 0.024; $p<0.05$). Mitochondrial phosphorylative activity and citrulline synthesizing ability decreased significantly ($p<0.05$). The latter was restored by the addition of exogenous ATP to the medium. I.p. loading of ammonium chloride in experimental rabbits caused hyperammonemia and an additional decrease in the energy charge and ATP content in the liver. The energy charge and ATP content were negatively correlated with arterial blood ammonia ($p<0.001$). The results suggest that ammonia from the intestinal tract is fixed preferentially in the severely damaged liver, in which energy metabolism is impaired to a level at which the tissue can no longer function adequately, and that it leads to the depletion of large amounts of hepatic energy.

8299 PELIOSIS HEPATIS: TWELVE CASES ASSOCIATED WITH ORAL ANDROGEN THERAPY. (Eng.) Nadell, J.; Kosek, J. (Stanford Univ. Sch. Medicine, Palo Alto, CA 94304). *Arch. Pathol. Lab. Med.* 101 (8):405-410; 1977.

Twelve cases of peliosis hepatis associated with high-dose androgen therapy are reviewed. Eleven patients had received up to 200 mg/day of p.o. oxymetholone for 1.5-19 months. Three of the 11 also had received a second agent; 1 had received 30 mg/day of p.o. methyl testosterone for 3 months and 2 had received 200 or 400 mg/week of i.m. testosterone for 10 and 14 months, resp. The twelfth patient had received an unknown amount of fluoxymesterone. In three patients, liver failure was the primary cause of death. In one patient, the diagnosis was established by biopsy, the androgen therapy was discontinued, and the lesion was absent at autopsy 2 yr later. In eight patients, peliosis hepatis was an incidental finding at postmortem examination. The liver was about twice the normal weight in nine patients, normal in two, and smaller than normal in one. Previously reported cases of peliosis are reviewed briefly.

8300 TREATMENT OF PORPHYRIA CUTANEA TARDA WITH CHLOROQUINE AND PHLEBOTOMY. (Eng.) Swanbeck, G.; Wennersten, G. (Sahlgren's Hosp., S-413 45, Goteborg, Sweden). *Br. J. Dermatol.* 97(1):77-81; 1977.

Chloroquine (CQ) therapy alone or in combination with phlebotomy was used to treat 11 patients with porphyria cutanea tarda (PCT). In nine patients, one to four venesections were performed (at 3-to-7-day intervals, 300 ml blood being removed each time) prior to the p.o. administration of CQ phosphate (250 mg/day) for 7 days. The two patients who were treated with CQ only developed fever (39.6 and 38.6 C), nausea, vomiting, and myalgia. One of these patients, when treated 2 yr later with two venesections before CQ administration, still reacted with fever (39.0 C), slight nausea, and headache. The other nine patients experienced no troublesome clinical reactions, although five noticed slight nausea. In all patients, urinary porphyrin excretion rose rapidly, and hepatic enzyme levels were at their highest near the end of CQ therapy. Porphyrin excretion and serum hepatic levels diminished rapidly during the first month after treatment and then fell progressively over the next several months, mostly to levels well below the pretreatment level. There seemed to be no correlation between the number of venesections performed before treatment and the porphyrin excretion or hepatic enzyme levels. When three apparently normal siblings in a family in which the mother and one of the children had PCT were treated with CQ in an attempt to uncover a postulated latent PCT, no clinical reactions or biochemical manifestations resulted.

8301 ULTRASTRUCTURAL ABNORMALITIES OF LIVER CELLS IN REYE'S SYNDROME. (Eng.) Iancu, T. C.; Mason, W. H.; Neustein, H. B. (Childrens Hosp. Los Angeles, 4650 Sunset Blvd., Los Angeles, CA 90027). *Hum. Pathol.* 8(4):421-431; 1977.

The ultrastructure of liver biopsy specimens from nine infants and children with Reye's syndrome was studied. Excessive fat content was the most striking abnormality, and it occurred in all specimens. Mitochondrial abnormalities were also frequent. However, no correlation could be established between the severity of the mitochondrial changes and clinical or biochemical data, and two patients with low levels of the first two urea cycle enzymes showed only mild mitochondrial abnormalities. Nonspecific or artifactual factors have been suggested to explain the mitochondrial changes; however, the data suggest that most of the reported mitochondrial abnormalities are not artifacts and that they can be helpful in the ultrastructural diagnosis of Reye's syndrome.

8302 SICKLE CELL HEPATOPATHY. (Eng.) Sheehy, T. W. (Veterans Admin. Hosp., 700 S. 19th St., Birmingham, AL 35233). *South. Med. J.* 70(5): 533-538; 1977.

The incidence and course of hepatobiliary complications of sickle cell anemia (SSA, 88 patients) and viral hepatitis (67 patients) in black patients are reviewed. Only 5/88 SSA patients had viral hepatitis; none of the 67 viral hepatitis patients had SSA, but 4 had the sickle cell trait. Twenty-eight hepatic crises occurred in 8/88 SSA patients, during which their SGOT levels ranged from 48 to 179 IU, serum alkaline phosphatase levels from 100 to 290 IU, and serum bilirubin levels from 2.1 to 12.9 mg%. Liver function tests were transiently abnormal in 26/42 SSA patients with extrahepatic crises. Hepatic crisis should be differentiated from acute cholecystitis or viral hepatitis. Cirrhosis is relatively common and is often the terminal event in SSA; 3/6 patients who died had cirrhosis. Choledocholithiasis (1 patient) and cholecystitis (7 patients) are infrequent complications, despite the prevalence of cholelithiasis (11 patients).

8303 HEPATIC LIPID METABOLISM IN SEVERE HUMAN OBESITY. (Eng.) Kral, J. G.; Lundholm, K.; Bjorntorp, P.; Sjostrom, L.; Schersten, T. (Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *Metab. Clin. Exp.* 26(9):1025-1031; 1977.

To elucidate mechanisms underlying steatosis, lipid and protein syntheses were studied in 17 morbidly obese patients and 17 normal controls. The rate of incorporation of glycerol-carbon into triglyceride (TG) in liver slices from the normolipoproteinemic patients during jejunoileal bypass was significantly elevated compared with the controls (280 ± 16 μmol/hr/kg versus 209 ± 15 μmol/hr/kg, $p<0.01$). The obese patients had an almost sevenfold increase in hepatic TG content as well. None of the patients had manifest diabetes, though increased basal levels of insulin and impaired glucose tolerance during p.o. glucose tolerance tests (OGTT) were common. There were statistically significant positive Spearman rank correlations between plasma insulin levels and TG synthesis ($r=0.57$, $p<0.01$), TG content ($r=0.54$, $p<0.01$), and serum fatty acids ($r=0.52$, $p<0.05$). The basal insulin levels were also positively correlated to the incorporation rate of fructose-carbon into fatty acids ($r=0.47$, $p<0.05$). The sum of insulin values during OGTT showed a trend toward positive correlation with the hepatic cholesterol content ($r=0.34$, $p<0.10$). The hepatic protein content as well as the rate of leucine-carbon incorporation into proteins did not differ from controls. However, there was a trend toward a negative correlation between protein synthesis and basal plasma insulin levels ($r=-0.33$, $p<0.10$). Liver steatosis in severely obese patients may be due to significantly increased hepatic lipid synthesis in the face of elevated levels of serum fatty acids.

8304 THE MECHANISMS OF HEMOLYSIS IN WILSON'S DISEASE: STUDY OF A CASE AND REVIEW OF THE LITERATURE. (Eng.) Meyer, R. J.; Zalusky, R. (Mount Sinai Sch. Medicine, Fifth Ave. and 100 St., New York, NY 10029). *Mt. Sinai J. Med.* 44(4):530-538; 1977.

The mechanisms of hemolysis were studied in a 17-yr-old girl with Wilson's disease during a phase of active hemolysis. Her RBC reduced glutathione content was low and had abnormal stability. RBC enzyme activities were normal or increased, and hemoglobin stability, hemoglobin oxygen affinity, and RBC deformability were all normal. Copper-induced oxidative stress has been incriminated as the cause of hemolysis in Wilson's disease, although supporting data is equivocal. In previous studies, supraphysiological copper concentrations added *in vitro* have been shown to affect glucose-6-phosphate dehydrogenase, GSH, and GSH stability with increased formation of Heinz bodies. These findings do not appear to adequately explain the degree of hemolysis observed, either in this patient or in others described in the literature. Copper-induced damage or alteration of the RBC membrane requires futher study.

8305 HEPATOLENTICULAR DEGENERATION (WILSON'S DISEASE) AND PREGNANCY. A REVIEW AND REPORT OF A CASE. (Eng.) Toaff, R.; Toaff, M. E.; Peyser, M. R.; Streifler, M. (Hakiryah Maternity Hosp., Tel-Aviv, Israel). *Obstet. Gynecol. Surv.* 32(8):497-507; 1977.

Wilson's disease (WD), or hepatocellular degeneration, is an inherited metabolic dysfunction of Cu metabolism. Its manifestations, which are variable and may develop gradually or suddenly, include extrapyramidal disturbances, mental and emotional disturbances, postnecrotic cirrhosis of the liver (leading to splenomegaly, ascites, jaundice, hepatomegaly, hematemesis, and spider angiomas), acute hemolytic anemia, Kayser-Fleischer rings, and renal tubular dysfunction. The nature of the metabolic error in WD remains obscure. The fertility of women affected by WD is impaired markedly. However, because of the current efficacy of penicillamine (PA) treatment, pregnancies in these patients will be more common in the future. In this review, the relation of WD to many areas of obstetric physiology are evaluated: effect of Cu and WD on fertility and on a normal pregnancy, effect of pregnancy on the natural history of WD, effect of WD on the newborn, potential dangers and actual effect of PA treatment during pregnancy, and association between WD and hypertensive disorders of pregnancy. A table summarizes the available clinical data on nine successful pregnancies in WD reported in the literature. Six occurred in PA-treated patients, one in a Versanate/2,3-dimercaptopropanol-treated patient. In four of these patients, pregnancy was associated with a remission of symptoms that lasted a few weeks to 6 months after delivery. Also included is the detailed case report of a young woman with WD who had two successful pregnancies. Upon diagnosis of the disease at age 13, she was treated with 750 mg/day PA until her first pregnancy at age 21, when the dose was reduced to 150 mg x 3. Her second pregnancy began 6 months after the first delivery. Percutaneous renal and liver biopsies performed immediately after each delivery were normal.

8306 ORTHOTOPIC LIVER TRANSPLANTATION: THE FIRST 60 PATIENTS. (Eng.) Calne, R. Y.; Williams, R. (Addenbrooke's Hosp., Cambridge CB2 2QQ, England). *Br. Med. J.* 1(6059):471-476; 1977.

Experience gained from 60 orthoptic liver transplants carried out between May 1968 and 31 December 1976 is presented. Of the 35 patients operated on before 1973, 12 died within the first postoperative week, but there were no deaths within this period in patients operated on in 1975 and 1976. During this period there were changes in the selection of patients and their management. Initially, some patients were operated on when they were too ill, often because of a prolonged wait for a donor. There was a high incidence of fatal complications of biliary drainage in patients who survived longer than the first week after operation. An analysis of the first 33 patients showed that 14 of the 22 who survived the immediate operation developed biliary fistulae. Improved results have been due to the development of a simple method of preserving the liver, thereby increasing the pool of potential donors, and by a new technique of biliary drainage, which allows well vascularized anastomoses without tension, retains the sphincter of Oddi, and leaves access for radiological examination of the biliary tree. Uncontrollable rejection of the liver occurred in less than 10% of cases. This contrasts strongly with the incidence of rejection among kidney transplants. Fourteen of the 60 patients lived for over 6 months, and 6 patients lived for over 1 yr, the longest surviving for more than 5 yr, and 13 patients were still alive at the beginning of 1977.

8307 OBSERVATIONS ON PRESERVATION, BILE DRAINAGE AND REJECTION IN 64 HUMAN ORTHOTOPIC LIVER ALLOGRAFTS. (Eng.) Calne, R. Y.; McMaster, P.; Portmann, B.; Wall, W. J.; Williams, R. (Dept. Surgery, Univ. Cambridge, Cambridge, England). *Ann. Surg.* 186(3):282-290; 1977.

Current changes in the management of patients undergoing orthotopic liver allografts in one hospital are presented, on the basis of experience with 64 patients operated on between 1968 and 1977. Many patients were referred for liver grafting late in the course of their diseases and were operated on when they were extremely ill, or they died before suitable livers could be found. Complications of biliary drainage were the most frequent causes of death. In the past 2 yr, a method of liver preservation that permits up to 8 hr of safe storage, without any complicated machines, has been used, and 22 livers have been transported by air and road from other institutions. This has enlarged the pool of potential donors and therefore reduced the average waiting time for a liver transplant. A new method of biliary drainage has been employed in 24 patients using the vascularized gallbladder as a conduit between the donor and recipient common ducts. This procedure has resulted in a marked reduction in early postoperative complications of biliary fistula and obstructed bile drainage. Following 35 allografts carried out between 1968 and 1974, 11 recipients died during the first postoperative week, 19 died between the 1st week and the 6th month, 2 died between the 6th month and the 1st year, and only 1 patient was still alive in 1977. None of the 29 patients who underwent surgery between 1975 and 1977 died during the 1st week; 10 died between the 1st week and the 6th month, 4 died between the 6th month and 1st yr, and 14 were still alive in 1977. Now that survival has been improved, it has become clear that uncontrollable rejection of the allografted liver in man is much less severe than that experienced with kidney transplants. The results of liver grafting in this unit during the past year are better than those obtained with kidneys from cadaver donors.

8308 USE OF HIGH DOSE ALPHA-MERCAPTOPROPIONILGLYCINE IN CHRONIC LIVER DISEASES. (Ita.) Cafiero, M.; Buono, G.; Ussano, L.; Sensale, P. (Ente Ospedaliero Generale S. Camillo, Napoli, Italy). *Rass. Int. Clin. Ter.* 56(18):1108-1111; 1976.

8309 CLINICAL FINDINGS IN PORPHYRIA CUTANEA TARDA. (Ger.) Heilmann, E.; Vakilzadeh,

F. (Med. Univ.-Poliklinik, Westring 3, 44 Munster/Westf., W. Germany). *Fortschr. Med.* 95(10):659-661; 1977.

8310 PHARMACOKINETICS OF LIVER CIRRHOSIS. (Ger.) Ackermann, E. (Med. Akademie Carl Gustav Carus, Fiedlerstrasse 27, 8019 Dresden, E. Germany). *Z. Gesamte Inn. Med.* 32(1):29-33; 1977.

8311 TREATMENT OF HEPATIC PORPHYRIA. (Rum.) Coia, A.; Nicoara, A. (Clinica a III-a medicala, I.M.F., Cluj, Rumania). *Med. Interna* 28(2):105-108; 1976.

8312 HEPATOCELLULAR ADENOMA. (Por.) Campos, J. V. M.; Luisi, A.; Gentil, F.; Garcia, E. P. A.; Mantovani Guerreiro, C. A.; Wroclawski, E. R. (Central Hosp. A. C. Camargo, Sao Paulo, Brazil). *Rev. Assoc. Med. Bras.* 22(7):265-268; 1976.

8313 PRIMARY LIVER CARCINOMA: HOSPITAL EXPERIENCES. (Spa.) Monroy-Rodriguez, O.; Aguilar Requena, E. (No affiliation given). *Medicina* 56(1208):129-136; 1976.

8314 WILSON'S DISEASE: SUMMARY OF RESEARCH ON A FAMILY WITH WILSON'S DISEASE. IMPORTANCE OF AMINO ACID BALANCE IN HOMO- AND HETEROZYGOTES AS AN INDICATOR OF LIVER DAMAGE. (Ita.) Degli Esposti, A.; Antener, I.; Ambrosioni, G.; Bonfiglioli, G. (Ospedale di Bologna, Bologna, Italy). *Minerva Pediatr.* 28(34):2063-2084; 1976.

8315 THE RADIOLOGICAL EXPLORATION OF BUDD-CHIARI SYNDROME: A STUDY OF 13 CASES. (Fre.) Job, C.; Brault, B.; Levesque, M.; Nahum, H. (Hopital Beaujon, 100, Bld. du General Leclerc, F 92110 Clichy, France). *Nouv. Presse Med.* 6(12):1021-1024; 1977.

8316 INTRAHEPATIC CHOLESTASIS. (Rus.) Mansurov, Kh. Kh.; Mirodzhov, G. K.; Saliev, F. Sh. (Tadzhikistan Scientific Res. Inst. Gastroenterology, Dushanbe, USSR). *Sov. Med.* (2):69-74; 1977.

8317 CLINICAL USE OF A HEPATODETOXICANT AND TROPHOMETABOLIC ASSOCIATION, PER OS: CONTROLLED STUDY IN CARDIOPATHIC SUBJECTS. (Ita.) Ronzoni, L.; Aiazzi, L.; Caprioli, G. (Ospedale Generale Provinciale, Legnano, Italy). *Gaz. Med. Ital.* 135(9):467-476; 1976.

8318 POSSIBILITIES OF CONVENTIONAL AND MAGNIFIED OPTICS LAPAROSCOPY IN THE DIAGNOSIS OF PRIMARY LIVER CANCER. (Spa.) Reina, J. A.; Reina Campos, F.; Trujillo Rodriguez, L.; de la Santa, J.; Andreu Kern, F. (Ciudad Sanitaria "Virgen del Rocio," de la Seguridad Social, Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(203):203-214; 1977.

8319 ANALYSIS OF SOME CLINICO-LABORATORY INDICES OF HEPATIC COMA IN PATIENTS WITH CHRONIC LIVER DISEASES. (Rus.) Postovit, V. A.; Osipov, L. N.; Zhurkin, A. T. (Leningrad Pediatric Medical Inst., Leningrad, USSR). *Ter. Arkh.* 48(10):104-108; 1976.

8320 STUDIES ON PROTEIN BINDING OF ANTIBIOTICS IN PATIENTS WITH VARIOUS DISEASES: INFLUENCE OF DYSPROTEINEMIA AND HYPERBILIRUBINEMIA ON PROTEIN BINDING. (Jpn.) Kubo, K. (Osaka City Univ. Medical Sch., Osaka, Japan). *Chemotherapy (Jpn.)* 24(2):409-435; 1976.

8321 CONTROL OF BLOOD LOSS DURING HEPATIC RESECTION. (Ger.) Grundmann, R.; Pichlmaier, H. (Chirurgische Univ.-Klinik, Joseph-Stelzmann-Str. 9, D-5000 Koln 41, W. Germany). *Chirurg* 48(4):232-237; 1977.

8322 EXCHANGE BLOOD TRANSFUSION UNDER HYPOTHERMIA AND EXTRACORPOREAL CIRCULATION AS A METHOD OF TREATMENT FOR HEPATIC COMA. (Rus.) Galperin, E. I.; Pisarevsky, A. A.; Neklyudova, E. A.; Mikhailov, A. T.; Naumov, S. P.; Antipov, V. F.; *et al.* (Inst. Transplantation Organs and Tissues, Moscow, USSR). *Khirurgiia (Mosk.)* (2):78-85; 1977.

8323 LIVER INJURIES IN CHILDHOOD. (Ger.) Fuchs, K.; Zuhlke, V.; Castrup, H. J. (Klinik und Poliklinik fur Allgemeinchirurgie der Universitat Gottingen, Gosslerstrasse 10, 3400 Gottingen, W. Germany). *Z. Kinderchir.* 21(1):63-73; 1977.

8324 LIVER SCANNING AFTER BLUNT HEPATIC TRAUMA. (Ger.) Brands, W.; Waag, K. L.; Bottger, E.; Joppich, I. (Klinikum Mannheim der Universitat Heidelberg, Theodor-Kutzer-Ufer, 6800 Mannheim 1, W. Germany). *Z. Kinderchir.* 20(4):312-320; 1977.

8325 CLINICAL PROBLEMS IN THE APPLICATION OF SEDATIVES TO PATIENTS WITH CHRONIC LIVER DISEASE. (Ger.) Kecker, K. (Med. Klinik II, Stadt. Krankenanstalten, Lutherplatz 40, 4150 Krefeld, W. Germany). *Z. Gastroenterol.* 15(6):356-361; 1977.

8326 CHANGES OF THE BLOOD COAGULATION FACTORS IN CANCER PATIENTS FOLLOWING SURGERY. (Hun.) Krasznai, A.; Doklen, A. (Semmelweis Orvostudomanyi Egyetem II, sz. Sebeszeti Klinika, Hungary). *Magy. Onkol.* 21(2):119-127; 1977.

8327 CONDITION OF FREE AMINO ACID METABOLISM IN CHRONIC DISEASES OF THE LIVER IN CHILDREN. (Rus.) Popov, D. T. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 21(9):44-45; 1976.

8328 AMBIGUOUS AND OBSCURE PROBLEMS OF LIVER RESECTION. (Rus.) Shapkin, V. S. (Vladivostok Medical Inst., Vladivostok, USSR). *Khirurgiia (Mosk.)* (2):85-91; 1977.

8329 INDICATIONS FOR LIVER AND BRAIN SCANS: SCREENING TESTS FOR PATIENTS WITH OAT CELL CARCINOMA OF THE LUNG. (Eng.) Wittes, R. E.; Yeh, S. D. J. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *JAMA* 238(6):506-507; 1977.

8330 GRAY SCALE ULTRASONOGRAPHY IN MEDULLARY CYSTIC DISEASE OF THE KIDNEY AND CONGENITAL HEPATIC FIBROSIS WITH TUBULAR ECTASIA: NEW OBSERVATIONS. (Eng.) Rosenfeld, A. T.; Siegel, N. J.; Kappelman, N. B.; Taylor, K. J. W. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Roentgenol.* 129(2):297-303; 1977.

8331 TUMOURS OF THE LIVER. (Eng.) Schauer, A.; Kunze, E. (Inst. Pathology, Univ. Gottingen, Gottingen, W. Germany). *IARC Sci. Publ.* (6):41-72; 1976.

8332 SCANNING OF THE LIVER, SPLEEN AND PANCREAS. (Eng.) Wright, F. W. *In: Topics in Gastroenterology*. Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):195-211; 1976.

8333 LIVER INVOLVEMENT IN MYELOMATOSIS [Letter to Editor]. (Eng.) Child, J. A.; Cooper, E. H.; Ward, A. M. (General Infirmary at Leeds, Leeds, England). *Lancet* 2(8028):98; 1977.

8334 ALPHA-1-FETOPROTEIN. (Eng.) Alpert, E. (No affiliation given). *Clin. Gastroenterol.* 5(3):639-644; 1976.

8335 CARBOHYDRATE METABOLISM IN LIVER DISEASE. (Eng.) Johnston, D. G.; Alberti, K. G. M. M. (No affiliation given). *Clin. Endocrinol. Metab.* 5(3):675-702; 1976.

See also, 7906, 8051, 8057, 8060, 8124, 8129, 8131, 8132, 8135, 8141, 8159, 8203, 8353, 8356, 8374, 8396, 8399, 8400, 8402, 8410, 8412, 8414, 8432, 8486.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

8336 SYNERGISM BETWEEN OXYTOCIN ADMINISTRATION IN THE MOTHER AND HYPERBILIRUBINEMIA IN THE NEONATE. (Ita.) Patriarca, P. L.; Zorzi, L.; Petrelli, G. P.; Zecca, G.; Terenzi, P. (Ospedale Generale di Zona, Morbegno, Italy). *Minerva Med.* 29(21):1335-1339; 1977.

A retrospective study was made of 1,020 normal births that occurred over a 2-yr period in Morbegno Hospital. The 1,020 births were subdivided into three groups: group A consisted of 376 neonates whose mothers did not receive oxytocin to induce or stimulate labor; group B consisted of 334 neonates whose mothers received ≤3 IU of oxytocin; group C consisted of 310 neonates whose mothers received >3 IU of oxytocin either to induce or to stimulate labor. The number of cases of neonatal icterus with bilirubinemia of ≥12 mg% was calculated for each group. In group A, there were 27 such cases of icterus, in group B, 20 cases (not statistically different from the incidence rate for group A), and in group C, 41 cases, a significantly higher incidence than in either groups A or B. The hyperbilirubinemic effect of oxytocin appears to be dose-dependent. It is suggested that the protocols for induction and stimulation of labor with oxytocin be reviewed.

8337 IMMUNE COMPETENCE ASSESSMENT IN HYPERBILIRUBINEMIC NEWBORNS BEFORE AND AFTER PHOTOTHERAPY. (Eng.) Rubaltelli, F. F.; Piovesan, A. L.; Semenzato, G.; Barbato, A.; Ongaro, G. (Clinica Pediatrica dell'Universita di Padova, 35100 Padova, Italy). *Helv. Paediatr. Acta* 32(2):129-133; 1977.

Tests for immune competence in six normal and six hyperbilirubinemic newborns were assessed before and after phototherapy. The lymphoproliferative response to phytohemagglutinin in the hyperbilirubinemic infants was inhibited in the presence of autologous plasma in comparison with normal infants and normal adults. The phototherapy thus does not seem to inhibit the lymphoproliferative response. After phototherapy, an increased level of IgM and a slight decrease in IgG concentration were found. These data support the possibility that phototherapy is not contraindicated during septic hyperbilirubinemia.

8338 ICTERUS NEONATORUM, PATHOGENESIS AND CLINIC. (Ger.) Metze, H. (Universitats-Kinderklinik, Josef-Schneider-Strasse 2, 87 Wurzburg, W. Germany). *Fortschr. Med.* 95(13):887-888; 1977.

See also, 8286.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

8339 LIVER FUNCTION AND STRUCTURE IN SURVIVORS OF ACETAMINOPHEN POISONING: A FOLLOW-UP STUDY OF SERUM BILE ACIDS AND LIVER HISTOLOGY. (Eng.) Hamlyn, A. N.; Douglas, A. P.; James, O. F. W.; Lesna, M.; Watson, A. J. (Univ. Newcastle upon Tyne Medical Sch., Newcastle upon Tyne, NE1 4LP, England). *Am. J. Dig. Dis.* 22(7):605-610; 1977.

Liver function and structure in 30 patients, hospitalized with acetaminophen overdose, were studied during initial admission and again 3 months later. The quantity of acetaminophen ingested varied from 5-50 g, and 19 patients developed raised serum transaminase levels during the initial period. Liver damage, on the basis of needle biopsy findings, was categorized as severe in 5, moderate in 7, and mild or minimal in 18 patients. At 3 months follow-up all but one of the biochemical indicants of liver damage had reverted to normal in all patients. The exception was the serum total bile acids. Residual changes found on liver biopsy at 3 months were minimal and nonspecific, apart from one previously severely affected patient in whom there was evidence of scarring. It is concluded that in the usual spectrum of acetaminophen poisoning requiring hospitalization, there is no evidence of lasting liver damage.

8340 HEPATITIS DUE TO ERYTHROMYCIN PROPIONATE. (Fre.) Pessayre, D.; Marie, C.; Benhamou, J. P. (Unite de Recherches de Physiopathologie Hepatique, Hopital Beaujon, F 92110 Clichy, France). *Arch. Fr. Mal. App. Dig.* 65(5):405-408; 1976.

Erythromycin propionate (EP) was implicated in inducing hepatitis in a 58-yr-old man treated for furunculosis. Following daily treatment with 2 g EP for 9 days, he complained of abdominal pain, asthenia, and a feeling of dizziness. The drug was discontinued, but 2 days later icterus appeared and the feces and urine were discolored. The serum bilirubin level was 40 mg/l, and the SGPT and alkaline phosphatase levels rose to five and two times their normal values, resp.; eosinophilia was also present. Icterus persisted for 8 days. The biochemical values returned to normal 2 weeks later. Challenge with 500 mg EP resulted in the reappearance of the original complaints, which lasted for 3 days. They were accompanied by vomiting, a rise in SGPT and serum bilirubin values, and eosinophilia. These reactions disappeared after 10 days. Subsequent oral cholecystography revealed normal bile ducts.

8341 EFFECT OF URIDINE AND UDPG ON GALACTOSAMINE INDUCED HEPATITIS IN THE RAT. (Ita.) Zonta, N.; Mantovani, E.; Bescape, F. (IV Cattedra di Farmacologia dell'Universita di Milano, Milan, Italy). *Atti Accad. Med. Lomb.* 31(2):133-135; 1976.

The effect of uridine and uridine diphosphoglucose (UDPG) on galactosamine-induced hepatitis was studied in adult female rats. Groups of 12 rats received 2 mM/kg galactosamine i.p. followed at 3, 5, and 8 hr by either 2 mM/kg uridine i.p. or 2 mM/kg UDPG i.p. Control animals received physiological saline only. Animals were sacrificed 24 hr after treatment and SGOT, SGPT, lactic dehydrogenase, bilirubin, and total lipid levels in the liver were determined. Both UDPG and uridine were effective in reducing enzyme and bilirubin levels to near normal, although UDPG was slightly more effective in all instances. UDPG was more effective than uridine in reducing total lipids. The reason for the superiority of UDPG over uridine in these studies was not determined.

8342 CLINICAL PICTURE IN CHRONIC POISONING WITH TOLUENE NITRODERIVATIVES AT MODERN INDUSTRIAL PLANTS. (Rus.) Kleiner, A. I.; Dynnik, V. I.; Khizhnyakova, L. N.; Anatovskaya, V. S.; Makotchenko, E. P.; Nedbailo, E. P.; *et al.* (Inst. Occupational and Vocational Health, Kharkov, USSR). *Gig. Tr. Prof. Zabol.* (3):21-25; 1976.

8343 INFLUENCE OF ANESTHESIA ON POSTOPERATIVE LEVELS OF LIVER ENZYMES AND PROTEIN FRACTIONS. (Ger.) Schlebusch, H.; Garstka, G.; Harnack, H. (Univ.-Frauenklinik, 53 Bonn-Venusberg, W. Germany). *Fortschr. Med.* 95(10):662-668; 1977.

8344 ESTRO-PROGESTINIC-INDUCED ICTERUS: REPORT OF ONE CASE. (Ita.) Carnasciali, E.; Pezzini, F. (Provincial Psychiatric Hosp., Lucca, Italy). *Minerva Med.* 68(32):2249-2251; 1977.

8345 α FOETOPROTEIN IN ACUTE CARBON TETRACHLORIDE POISONING [Abstract]. (Eng.) Conso, F.; Crabie, P.; Gaultier, M. (Hopital Fernand-Widal, Paris, France). *Acta Pharmacol. Toxicol.* 41(Suppl. 2):315; 1977.

8346 FACTOR VIII INHIBITOR ASSOCIATED WITH CHLORPROMAZINE-INDUCED HEPATIC INJURY. (Eng.) Glazier, R. L.; Crowell, E. B., Jr. (McGuire Clinic, Inc., 7702 Parham Rd., Richmond, VA 23229). *Thromb. Haemostas.* 37(3):523-526; 1977.

8347 MANAGEMENT OF HEPATIC INJURY. (Eng.) Hanna, S. S.; Jirsch, D. W. (Sunnybrook Medical Center, Toronto, Ontario, Canada). *Can. Med. Assoc. J.* 117(4):352-353; 1977.

See also, 8027, 8029, 8348, 8375.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

8348 HEPATITIS AND OPERATING-ROOM PERSONNEL: AN APPROACH TO DIAGNOSIS AND MANAGEMENT. (Eng.) Naulty, J. S.; Reves, J. G.; Tobey, R. E.; Schultz, W. W. (George Washington Univ. Sch. Medicine, Washington, DC). *Anesth. Analg. (Cleve.)* 56(3):366-372; 1977.

Hepatitis is twice as frequent in health care workers as in the general population, and the incidence in operating room (OR) personnel is even higher. Although the cause of the higher incidence has not been established definitely, possible explanations included frequent handling of blood products, contact with the oral secretions and serum of viral hepatitis patients, and exposure to hepatotoxic chemicals such as halothane and chloroform. Viral hepatitis can be diagnosed readily by radioimmunoassay techniques. At present, halothane-induced hepatitis can be deduced only by ruling out viral infection.

8349 STUDIES OF AN OUTBREAK OF ACUTE HEPATITIS A: II. ANTIBODY CHANGES TO CYTOMEGALOVIRUS AND HERPESVIRUS. (Eng.) Baer, G. M.; Yager, P. A.; Hierholzer, J. C.; Walker, J. A.; Almeida, J. D. (Bureau of Epidemiology, Center for Disease Control, CDC Lawrenceville Facility, Lawrenceville, GA). *J. Med. Virol.* 1(1):9-14; 1977.

The presence of antibody changes to 70 viral antigens was investigated in the acute and convalescent sera from 14 school children with acute hepatitis A and in sera from 9 sex- and age-matched healthy classmates. The children were 6-12 yr, and the outbreak of hepatitis was from a contaminated water source. In a few children with hepatitis, low but stable complement-fixing antibody titers were observed for parainfluenza, adenoviruses, mumps, rubella, and Coxsackie viruses, but the rise or fall was not more than twofold. Marked decreases, reaching levels fourfold or greater, in antibody to cytomegalovirus were noted in sera of 5/14 children with hepatitis and in antibody to herpesvirus 1 in sera of 3 of the sick children. No such changes in antibody levels against viral antigens were observed in sera of the matched healthy controls. Antibody changes appeared to be related to the degree of illness, since they were noted in four of six children with icterus.

8350 INTERFERON PRODUCTION AND ROLE OF α_2-MACROGLOBULIN IN THE IMMUNE RESPONSE DURING HUMAN VIRAL HEPATITIS A. (Fre.) Bador, H.; Colobert, L.; Giroud, M.; Lesbre, F. (Faculte de Medecine Alexis-Carrel, rue Guillaume Paradin, 69008 Lyon, France). *Clin. Chim. Acta* 78(2):217-226; 1977.

The immunological characteristics of 31 patients with the monophasic and polyphasic forms of viral hepatitis A are described. The hepatitis was diagnosed as A rather than B on the basis of the absence of the Australia antigen, sudden onset with high fever, absence of arthritic signs or urticaria, and the epidemic origin. Interferon levels followed a biphasic pattern in both monophasic and polyphasic hepatitis A. Study of the immunoglobulins revealed a different pattern between the two forms only for IgG. In monophasic hepatitis, IgG levels were only slightly elevated (to 1,500 mg/100 ml from a normal value of 1,130 mg/100 ml) during the first month, after which they slowly returned to normal values. In polyphasic hepatitis A, however, the IgG levels rose to >1,600 mg/100 ml during the first month, after which they continued to rise to >1,900 mg/100 ml. In both forms of hepatitis A, IgM was increased markedly during the first month (to nearly 400 mg/100 ml from a normal value of 145 mg/100 ml), followed by a return to normal levels, but the IgA level remained unchanged. α_2-Macroglobulin rose to above-normal levels (>230 mg/100 ml) only during convalescence of the monophasic patients, but they rose as early as the first 30 days of illness in the polyphasic patients. The macroglobulin levels remained elevated for several months in the latter, which may account for the immunological injury to the virus-infected hepatocytes and for the prolongation of infection in polyphasic patients.

8351 THE ANTIBODY RESPONSE FOLLOWING HEPATITIS A INFECTION. (Eng.) Locarnini, S. A.; Ferris, A. A.; Lehmann, N. I.; Gust, I. E. (Monash Medical Sch., Alfred Hosp., Commercial Rd., Prahran, Victoria 3181, Australia). *Intervirology* 8(5):309-318; 1977.

The development of antibody to hepatitis A virus of the IgM class (anti-HAV IgM) was studied in serial serum specimens from 10 patients with confirmed hepatitis A infection. A specific IgM response to hepatitis A virus was detected in sera from all patients, using immune electron microscopy and solid-phase radioimmunoassay. The presence of virus-specific IgM in 19S components of acute and early convalescent phase sera was detected. Virus-specific IgM was demonstrated in whole serum specimens by indirect immunoferritin labeling. Following acute infection, however, the major immunoglobulin response appears to be IgG, since titers of specific 7S and whole serum antibody were very similar.

8352 ACUTE INFECTIOUS HEPATITIS. CLINICAL AND EPIDEMIOLOGICAL STUDY. (Eng.) Canosa, C. A.; Gosalvez, J. A.; Abeledo, G.; Dalmau, J. (Children's Hospital, Social Security "La Fe," Alferez Provisional 21, Valencia, Spain). *Helv. Paediatr. Acta* 32(1):21-28; 1977.

Data on 120 children, age 0-7 yr, hospitalized in the period 1971-1974 for acute infectious hepatitis are presented. Only the most serious cases were admitted to this regional children's hospital. The disease was diagnosed in 5% of all hospital admissions, and its seasonal distribution did not follow the expected epidemiological pattern. The presence or absence of the Australian hepatitis antigen (HbAg) was correlated with the nutritional status, blood groups, clinical signs and symptoms (hepatomegaly, jaundice, choluria, etc.), blood and other biochemical findings, morbidity, and mortality. Children with blood group A$^+$ were four times as likely to be HbAg negative as those with other blood groups; O$^+$ children were more than twice as likely to be HbAg positive. Nutritional status played an important role in the incidence and seriousness of the disease, since a high percentage of the children were malnourished or small for their age. Bilirubin, SGOT, SGPT, and LDH were the most sensitive indicators of disease evolution. Complete clinical and biochemical recovery usually occurred within 30 days of admission, but there was a mortality rate of 2.5%.

8353 SEX DIFFERENCES IN RESPONSE TO HEPATITIS B INFECTION AMONG PATIENTS RECEIVING CHRONIC DIALYSIS TREATMENT. (Eng.) London, W. T.; Drew, J. S. (Fox Chase Cancer Center, Philadelphia, PA 19111). *Proc. Natl. Acad. Sci. U.S.A.* 74(6):2561-2563; 1977.

The hypothesis that with equal exposure there is no sex difference in response to hepatitis B virus (HBV) was tested. Patients undergoing treatment at a community-based renal dialysis clinic were monitored monthly for hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs). Of 160 patients who began treatment HBsAg-negative/anti-HBs-negative, 77 subsequently became HBsAg-positive. Once HBsAg-positive, males were more likely to remain HBsAg-positive indefinitely, whereas females were more likely to convert to HBsAg-negative and develop anti-HBs. This was not due to a sex difference in exposure to hepatitis B virus because only patients who became infected while undergoing treatment were included in the analysis. These data are clear evidence of a sex difference in response to hepatitis B virus, which may partially explain the greater incidence of several chronic liver diseases, including primary hepatocellular carcinoma, in males.

8354 IMMUNE RESPONSES TO THE HEPATITIS B SURFACE ANTIGEN AND LIVER-SPECIFIC LIPOPROTEIN IN ACUTE TYPE B HEPATITIS. (Eng.) Lee, W. M.; Reed, W. D.; Osman, C. G.; Vahrman, J.; Zuckerman, A. J.; Eddleston, A. L. W. F.; Williams, R. (Columbia Univ. Coll. Physicians and Surgeons, 630 W. 168th St., New York, NY 10032). *Gut* 18(3):250-257; 1977.

A serial prospective study of cellular immunity to hepatitis B surface antigen (HBsAg) and liver-specific membrane lipoprotein was carried out in 21 adults with acute hepatitis type B. Thymus-derived (T) lymphocytes reacting with HBsAg on the surface of infected hepatocytes may destroy these cells and also initiate an anutoimmune reaction responsible for continued liver damage in chronic active hepatitis. Cellular immunity to HBsAg, as determined by leukocyte migration inhibition with partially purified HBsAg as antigen, was detected in all the patients during the recovery phase of the illness and was already detectable at the time of admission in 13 (62%) patients. In five of the remaining eight, the titer of HBsAg in the serum at admission was high, and in the whole series, there was an inverse correlation between the degree of migration inhibition on admission and the peak HBsAg titer, suggesting that antigen or antigen/antibody complexes might be interfering with the demonstration of cellular immunity *in vitro*. Using a combination of minimum migration index recorded during the recovery period and peak HBsAg titer, the peak aspartate aminotransferase level was computed with reasonable accuracy, a finding consistent with the hypothesis that the severity of the illness is related to both the number of infected hepatocytes and the vigor of the immune response to HBsAg. Evidence of an immune response to the liver-specific hepatocyte membrane lipoprotein was present in 50% of the patients tested at the time of admission, but was transient, having disappeared in every case by 4 weeks. The minimum migration index recorded with HBsAg as antigen was significantly lower in patients with detectable sensitization to the lipoprotein, and it is possible that this autoimmune reaction is also generated by the interaction of T cells with viral antigenic determinants on the liver cell surface.

8355 NUCLEAR FLUORESCENCE OF LIVER CELLS FOR IgG IN VIRAL HEPATITIS B: SIGNIFICANCE AND RELATION TO HEPATITIS B-CORE AND ANTI-HEPATITIS B-CORE FORMATION. (Eng.) Gudat, F.; Bianchi, L.; Finch, M.; Krey, G.; Endo, Y. (Institut fur Pathologie der Universitat, Schonbeinstr. 40, CH-4056, Basel, Switzerland). *Klin. Wochenschr.* 55 (7):329-336; 1977.

In 64 hepatitis B surface antigen (HBsAg)-negative patients and 59 HBsAg-positive patients, serum anti-hepatitis B core antigen (HBcAg) levels were correlated with HBsAg in the cytoplasm and HBcAg and IgG in the nuclei of hepatocytes to determine the diagnostic and prognostic significance of these parameters. Two conditions were essential for the occurrence of nuclear IgG: (1) detectable HBcAg in the hepatocyte nuclei and (2) antibody formation to HBcAg with anti-HBcAg levels higher than 1:64. The 64 patients with various liver diseases who were negative for serum HBsAg were negative for all HBAg components in the liver tissue, and IgG was never observed in the liver cell nuclei. Anti-HBcAg antibodies were demonstrated in 5/64 patients with titers ranging from 1:32 to 1:512. HBcAg was present in liver cell nuclei in 17/19 patients with chronic aggressive hepatitis and 3/6 patients with hepatitis transitional between acute and chronic, all of whom were sera-positive for HBsAg. IgG nuclear fluorescence was observed in the hepatocytes of all but three of the patients with nuclear HBcAg, and serum anti-HBcAg titers were consistently elevated (1:512-1:4,096), regardless of presence of tissue HBcAg. Neither HBcAg nor IgG was observed in the hepatocytes of 19/20 patients with chronic nonaggressive hepatitis who were sera positive for HBsAg. These patients had cytoplasmic HBsAg in 16/19 biopsies and their anti-HBcAg titers ranged between 1:64 and 1:2,048. Nuclear IgG was demonstrated only in the presence of hepatocyte nuclear HBcAg and serum anti-HBcAg in eight kidney transplant patients on immunosuppressive medication who were HBsAg positive. It is concluded that immunofluorescent demonstration of IgG in liver cell nuclei strongly indicates a hepatitis B virus infection.

8356 PERIPHERAL IMMUNOFLUORESCENCE OF HEPATOCYTES: RELATION TO SMOOTH MUSCLE ANTIBODIES AND BILE CANALICULI. (Eng.) Diederichsen, H.; Riisom, K.; Andersen, I. (Odense Univ. Hosp., Odense, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85A(3): 399-404; 1977.

IgG immunofluorescence staining of the periphery of bovine hepatocytes was observed in sera from 50/52 cancer patients, 21/21 patients with acute viral hepatitis (hepatitis B surface antigen-positive), and 73/73 normal blood donors. The fluorescence reaction(s) with sera from the acute hepatitis patients were generally more intense than those with sera from the cancer patients and normal blood donors. The peripheral fluorescence reaction was not related to bile canaliculi, despite the fact that bile canaliculi antibody had been demonstrated in patients with chronic active liver disease. It also did not appear to be directed against contractile proteins on the liver cell membrane, since only a minor proportion of the sera had IgG smooth muscle antibody (SMA) and anti-actomyosin antibody obtained by affinity chromatography did not react with the hepatocyte. IgM immunofluorescence of the hepatocyte periphery was produced only with sera from patients with acute hepatitis, and the fluorescence pattern resembled that of IgG. All sera producing IgM peripheral fluorescence also showed IgM SMA. When rat liver hepatocytes were used instead of bovine hepatocytes, identical fluorescence patterns were obtained.

8357 HEPATITIS B CORE AND SURFACE ANTIGENS IN LIVER TISSUE: LIGHT AND ELECTRON MICROSCOPIC LOCALIZATION BY THE PEROXIDASE-LABELED ANTIBODY METHOD. (Eng.) Yamada, G.; Nakane, P. K. (Univ. Colorado Medical Center, 4200 E. 9th Ave., Denver, CO 80262). *Lab. Invest.* 36(6):649-659; 1977.

The ultrastructural and light microscopic localization of hepatitis B core antigen (HBcAg) and hepatitis B surface antigen (HBsAg) was studied in human liver tissues by the peroxidase-labeled antibody method. Several methods of fixation, staining, and inhibition of endogenous peroxidase activity were studied. The periodate-lysine-paraformaldehyde fixative effectively preserved the tissue structure and the antigenicity of both antigens, and the peroxidase-labeled Fab' fraction of IgG penetrated well into hepatocytes. HBcAg was present in nuclei, or cytoplasm of hepatic cells, or both. In nuclei, the antigen was found both in virus-like particles of approximately 20 nm diameter and in nuclear ground substance. In the cytoplasm, the antigen was found on membrane-bound ribosomes and free polysomes, and also in the ground substance of the cytosol near ribosomes and around nuclear membranes, especially near nuclear pores. HBcAg-positive virus-like particles were also demonstrated sparsely or in clusters in the cytoplasm. HBsAg was not present in nuclei, but was found in the perinuclear space and in cisternae of endoplasmic reticulum, and on nuclear, endoplasmic reticulum, and cell membranes of hepatic cells. HBsAg-positive 25- to 30-nm wide tubular forms, round particles (probably cross-sections of tubular forms), and a few large particles of 40 to 50 nm diameter were seen in cisternae. Such HBsAg-positive particles were also present in the intercellular space and in Disse's space. These findings suggest that HBcAg produced on the cytoplasmic ribosomes migrates through nuclear pores to the nucleus and is assembled into core particles there. These particles may then move through nuclear pores to the cytoplasm where they are invested with HBsAg-positive membrane in cisternae of endoplasmic reticulum or as they enter the endoplasmic reticulum. These virus particles are then released together with other HBsAg-positive forms into the intercellular space by reversed phagocytosis.

8358 PRESENCE OF HBcAg, DNA POLYMERASE ACTIVITY, DANE PARTICLE IN DIFFERENT CATEGORIES OF HBsAg CARRIERS AND EVIDENCE OF HEPATITIS TYPE B INFECTION IN THEIR FAMILY CONTACTS. (Eng.) Zanetti, A. R.; Ferroni, P. (Istituto di Virologia dell'Universita di Milano, Via Pascal, 38-20133 Milano, Italy). *Boll. Ist. Sieroter. Milan.* 56(1):79-86; 1977.

Dane particles, DNA polymerase activity, and the e system were investigated in 15 hepatitis B surface antigen (HBsAg) carriers on hemodialysis and in 28 asymptomatic HBsAg-positive blood donors. A correlation between the presence in the sera of these markers and signs of hepatitis type B infection in family contacts was studied. The e antigen (HBeAg) was present in 10 of the 15 hemodialysis patients but in none of the healthy carriers. Among dialysis patients, a perfect correlation between Dane particles, DNA polymerase activity, and HBeAg was found. In contrast, antibody to HBeAg (anti-HBe) was detected in 15 of the 28 asymptomatic carriers and in none of renal patients. No association between anti-HBe and DNA polymerase activity or Dane particles could be found. Two asymptomatic carriers had DNA polymerase activity and Dane particles in the serum but were HBeAg negative. The difference in the prevalence of HBsAg in family clusters of hemodialysis patients and of blood donors compared with healthy controls was statistically significant ($p<0.01$, $p<0.05$). In addition, the highest incidence of serological evidence of hepatitis B virus (HBV) infection occurred in the relatives of dialysis patients; the lowest occurred in the household contacts of asymptomatic HBsAg carriers. These findings support the association between the presence of Dane particles, DNA polymerase activity, or HBeAg and risk of HBV infection.

8359 CLINICAL AND IMMUNOLOGICAL STUDIES ON HEALTHY BLOOD DONORS: HEPATITIS B ANTIBODY CARRIERS. (Eng.) Cianciara, J.; Swiderska, H.; Slusarczyk, J.; Loch, T. (Medical Acad., ul. Wolska 37, 01-201 Warsaw, Poland). *Vox Sang.* 33 (2):88-92; 1977.

The immune status of 10 healthy blood donors persistently seropositive for antibody to hepatitis B surface antigen (anti-HBs) and without a history of clinically overt viral hepatitis was studied. While physical examination and biochemical liver function tests exhibited normal values in all cases, immunologic studies revealed coexistence of a long-term anti-HBs carrier state with the presence of cell-mediated immunity to hepatitis B virus antigens and autoantibodies in some; antinuclear antibodies occurred in six cases, and smooth muscle antibodies occurred in five. These results suggest a complex immunologic phenomenon underlying the development of the anti-HBs carrier state.

8360 TRANSMISSION OF HEPATITIS B TO CHIMPANZEES BY HEPATITIS B SURFACE ANTIGEN-POSITIVE SALIVA AND SEMEN. (Eng.) Alter, H. J.; Purcell, R. H.; Gerin, J. L.; London, W. T.; Kaplan, P. M.; McAuliffe, V. J.; *et al.* (Natl. Inst. Allergy and Infectious Diseases, Bethesda, MD 20014). *Infect. Immun.* 16(3):928-933; 1977.

To assess the infectivity of hepatitis B surface antigen (HBsAg)-containing body fluids other than blood, chimpanzees were inoculated i.v. with saliva and semen obtained from four HBsAg-positive humans implicated in non-percutaneous transmission of hepatitis B. Saliva and semen samples were negative for occult blood. The titer of HBsAg in saliva was on the average only 1/3,000 that of the corresponding serum. One chimpanzee, inoculated sequentially with saliva from three individuals, developed HBsAg at 9 weeks and serum glutamic pyruvic transaminase elevation at 13 weeks after injection. HBsAg persisted for 15 weeks. This animal also developed antigen, anti-core antibody, and anti-surface antibody. Liver biopsies showed acute hepatitis that subsequently resolved. A second chimpanzee, inoculated with HBsAg-positive semen, developed HBsAg and elevated serum glutamic pyruvic transaminase 4 weeks after inoculation and then died suddenly without explanation. HBsAg was positive in two consecutive samples and was confirmed by specific neutralization. Autopsy did not reveal evidence of hepatitis. The results indicate that HBsAg-positive saliva and, probably, semen contain infectious virus and suggests that saliva and/or semen may serve as important mechanisms in the transmission of type B hepatitis.

8361 AMERICAN STUDIES HAVE ESTABLISHED THE FACT THAT THE BLOOD OF COMMERCIAL DONORS CARRIES A HIGH RISK OF TRANSMITTING HEPATITIS, WHEREAS BLOOD FORM VOLUNTARY DONORS CARRIES A LOW RISK ONLY. HAS THE SCREENING OF PLASMA FOR THE ABSENCE OF HEPATITIS-B-ANTIGEN AFFECTED THE DIFFERENCE BETWEEN THE TWO DONOR GROUPS TO ANY SIGNIFICANT DEGREE? (Eng.) Ashworth, J. N.; Bayer, W. L.; Mosley, J. W. (Cutter Lab., Fourth & Parker St., Berkeley, CA 94710). *Vox Sang.* 32(6):364-366; 1977.

8362 'HOW FREQUENT IS POSTTRANSFUSION HEPATITIS AFTER THE INTRODUCTION OF 3rd GENERATION DONOR SCREENING FOR HEPATITIS B? WHAT IS ITS PROBABLE NATURE?' (Eng.) Alter, H. J.; Barker, L. F.; Fiedler, H.; Frey-Wettstein, M.; Gitnick, G. L.; Greenwalt, T. J.; *et al.* (Natl. Inst. Health, Blood Bank Dept., Bldg. 10A, Room 1E33, Bethesda, MD 20014). *Vox Sang.* 32(6):346-363; 1977.

8363 HEPATITIS B MINIEPIDEMIC IN A PERITONEAL DIALYSIS UNIT. (Eng.) Spector, D. (Baltimore City Hosp., Baltimore MD 21224). *Arch. Intern. Med.* 137(8):1030-1031; 1977.

8364 SEROEPIDEMIOLOGY OF HEPATITIS B VIRUS IN ISRAEL: RESULTS OF A PILOT STUDY IN JERUSALEM. (Eng.) Sandler, S. G.; Nath, N.; Biger, Y. (Hadassah-Hebrew Univ. Medical Center, P.O. Box 499, Jerusalem, Israel). *Am. J. Epidemiol.* 106(1): 76-82; 1977.

8365 PITFALL IN DIAGNOSIS OF VIRAL HEPATITIS ON HAEMODIALYSIS UNIT [Letter to Editor]. (Eng.) Berger, M.; Potter, D. E. (Univ. Texas Medical Branch, Galveston, TX 77550). *Lancet* 2 (8028):95-96; 1977.

8366 INFECTIOUS HEPATITIS IN A PSYCHIATRIC HOSPITAL. (Eng.) Anonymous. (Public Health Lab. Service, England). *Br. Med. J.* 2(6081): 272; 1977.

8367 TYPE B VIRAL HEPATITIS: PROGRESS REPORT. (Ita.) Brunello, F.; Emanuelli, G.; Calcamuggi, G.; Cestonaro, G.; Tarocco, R. P.; Anfossi, G. (Istituto di Medicina Interna, Universita degli Studi di Torino, Corso Polonia 14, 10100 Turin, Italy). *Minerva Med.* 68(38):2647-2666; 1977.

8368 COMPARISON OF PLASMA LIPOPROTEIN CONCENTRATIONS IN VIRAL HEPATITIS AND IN OBSTRUCTIVE JAUNDICE. (Pol.) Kryska, A.; Kiczka, W.; Juszczyk, J. (Klinika Chorob Zakaznych Instytutu Chorob Wewnetrznych AM, ul. Wincentego 1, 61-003 Poznan, Poland). *Pol. Tyg. Lek.* 32(34):1325-1328; 1977.

8369 VIRAL HEPATITIS. PART 2: CLINICAL ASPECTS. (Fre.) Lemaire, A. (37, avenue de Breteuil, 75007 Paris, France). *Ann. Gastroenterol. Hepatol.* 13(4):379-394; 1977.

8370 CLINICO-LABORATORY CHARACTERISTICS OF THE FUNCTIONAL STATE OF THE LIVER IN TYPICAL FORMS OF VIRAL HEPATITIS IN CHILDREN. (Rus.) Parfentieva, A. Ya. (Dept. Pediatrics, Chelyabinsk Medical Inst., Chelyabinsk, USSR). *Pediatriia* (3):19-23; 1977.

8371 SERUM CHOLINESTERASE ACTIVITY IN PREDNISOLONE TREATED PATIENTS WITH VIRAL HEPATITIS. (Rus.) Vanat, I. M. (Dept. Infectious Diseases, Ternopol Medical Inst., Ternopol, USSR). *Vrach. Delo* (5):144-146; 1977.

8372 IMMUNOGLOBULINS IN VIRAL HEPATITIS. (Pol.) Maslowski, W.; Makowska, U. (Z Kliniki Chorob Zakaznych Instytutu Med. Wewn. CKP WAM, Warsaw, Poland). *Wiad. Lek.* 29(20):1799-1805; 1976.

8373 CHANGES IN THE SERUM PROTEIN SPECTRUM IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Makhmudov, O. S. (Second Dept. Childhood Infections, Central Asiatic Inst. Pediatrics, Tashkent, USSR). *Pediatriia* (3):23-26; 1977.

8374 THE EFFECT OF THIOLA IN POSTHEPATITIS HEPATIC INSUFFICIENCY. (Ita.) Precchia, G.; d'Amico, A.; Precchia, E.; Precchia, A.; Vela, R. ("D. Cotugno" Hosp., Naples, Italy). *Minerva Med.* 68(36):2505-2507; 1977.

8375 HEPATITIS IN THE AGED. (Fre.) LaPointe, G.; Cholette, A. (Hopital de Chicoutimi Inc., Chicoutimi, Quebec, Canada). *Union Med. Can.* 105(9):1344-1347; 1976.

8376 RESULTS OF 10-YEAR FOLLOW-UP OF PATIENTS WITH HEPATITIS. (Ger.) Brauner, R.; Leupold, H. (Poliklinik, Med. Zentrum, Am Frankenwall, Stralsund, E. Germany). *Z. Gesamte Inn. Med.* 32(7):153-156; 1977.

8377 TRANSUMBILICAL INFUSION WITH A SEVERE COURSE OF VIRAL HEPATITIS. (Rus.) Ilyinsky, Yu. A.; Luchshev, V. I.; Pak, S. G.; Lezhnev, I. A.; Stepanyan, M. G.; Sitenkow, D. M.; *et al.* (Central Scientific Res. Inst. Epidemiology, USSR Ministry Public Health, USSR). *Sov. Med.* (3): 94-96; 1977.

8378 THE HEPATITIS B ANTIGEN (HBsAg) AS A FACTOR OF CLINICAL AND BIOCHEMICAL DISCRIMINATION OF ACUTE VIRAL HEPATITIS. (Ita.) Fico, P.; Filippini, P.; Giorgio, A.; Lo Buono, M. L.; Gaeta, G. B. (Ospedaliero Regionale per Infettivi "D. Cotugno," Naples, Italy). *Rass. Int. Clin. Ter.* 57(3):198-202; 1977.

8379 ASSESSMENT OF THREE DIFFERENT METHODS FOR DETECTING HBsAg, BASED ON IMMUNOELECTROPHORESIS, PASSIVE HEMAGGLUTINATION AND RADIOIMMUNOASSAY. (Spa.) Sanz, M. A.; Marty, M. L.; Gonzalez-Molina, A.; Montoro, J. A.; Carbonell, F.; Sanchez-Cuenca, J. M. (Ciudad Sanitaria de la Seguridad Social "La Fe," Avenida Alferez Provisional, 21, Valencia 9, Spain). *Sangre (Barc.)* 22 (4):468-473; 1977.

8380 HEPATITIS B ANTIGEN AND ITS DETERMINANTS IN VIRAL HEPATITIS IN CHILDREN. (Rus.) Reisis, A. R.; Barinsky, I. F.; Grannikova, S. A. (M. F. Vladimirskii Moscow Oblast Scientific Res. Inst. Clinical Medicine, Moscow, USSR). *Pediatriia* (3):15-19; 1977.

See also, 8121, 8145, 8285, 8286, 8296, 8319, 8396, 8472.

LIVER AND BILIARY TRACT

Chronic Hepatitis

8381 HLA AND CHRONIC ACTIVE HEPATITIS (CAH). (Eng.) Dumble, L. J.; Mackay, I. R. (Royal Melbourne Hosp., Univ. Melbourne, Melbourne, 3052 Victoria, Australia). *Digestion* 15(4):254-259; 1977.

Mixed lymphocyte culture (MLC) studies were performed on lymphocytes from the family of a patient with chronic active hepatitis (CAH) after it was observed that the patient and her four siblings were histocompatibility antigen (HL) A and B identical. The paternal haplotype transmitted was HLA-A3, B7, and the maternal haplotype was HLA-A1, B8, so that of the children was HLA-A1, A3, B7, B8. A strong but not absolute association has previously been demonstrated between classic CAH and HLA-B8. In the MLC study, the patient's lymphocytes both stimulated and responded to the lymphocytes of her four healthy siblings; the lymphocytes of the siblings were mutually unresponsive. It is suggested that the patient had inherited a lymphocyte-defined antigen not expressed in the cells of her four siblings, which would explain the absence of disease in the other children.

8382 CHRONIC AGGRESSIVE HEPATITIS WITH NORMAL AND ELEVATED COMPLEMENT LEVEL IN THE BLOOD. (Spa.) Diaz-Rubio Garcia, M.; Enriquez, L.; Diaz-Rubio Garcia, E. (Catedra de Patologia y Clinica Medica, Universidad Complutense, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(1): 31-36; 1977.

Among 28 patients with chronic aggressive hepatitis, 15 patients were hypocomplementemic (group 1) and 13 patients had normal levels of complement in the blood (group 2). These groups were compared with respect to the complement components C3, CT and C4, albumin, SGOT, prothrombin, IgG, IgA, IgM, and the hepatitis B surface antigen (HBsAg). Group 1 had significantly lower blood levels of C3, prothrombin ($p<0.001$), and CT ($p<0.05$). IgA levels in group 1 were higher than in group 2 ($p<0.05$). Positive HBsAg indications were found in 5/15 group 1 and 3/13 group 2 patients. The Waaler-Rose test (the sheep cell agglutination test) was positive in 33% of group 1 patients and 7.7% of group 2 patients; these results were not statistically significant. Significant differences ($p<0.025$) were detected by the latex agglutination test; negative reactions were recorded for group 1 (20%) and group 2 (61.6%), positive reactions for group 1 (26.6%) and group 2 (30.7%), and strongly positive reactions for group 1 (53.4%) and group 2 (7.7%). From these observations it was not possible to conclude that hypocomplementemia proceeds or does not proceed from a defect in hepatic synthesis; a study of increased catabolism is proposed. The possible role of circulating immune complexes in depleting complement in patients with chronic aggressive hepatitis is discussed.

8383 LYMPHOCYTE SUBPOPULATIONS IN CHRONIC LIVER DISEASE. (Ita.) Fargion, S. R.; Cappellini, M. D.; Malesci, A.; Ronchi, G.; Fiorelli, G. (Istituto di Clinica Medica II dell'Universita di Milano, Milan, Italy). *Minerva Gastroenterol.* 22(3):245-250; 1976.

T and B lymphocyte populations and cellular immune reactions were determined in patients with chronic liver disease to evaluate whether there is an alteration of lymphocyte subpopulations in this disease. One group of patients with chronic persistent hepatitis (CPH), chronic active hepatitis (CAH), or primary biliary cirrhosis (PBC) had received no immunosuppressive therapy. A second group of patients with CAH had received either prednisone or azathioprine for periods from 6 months to 2 yr. Antinuclear, antimitochondrial, antismooth muscle (SMA), antigastroparietal, antiliver/kidney, and antithyroid antibodies were determined by immunofluorescence. Lymphocyte transformation by phytohemagglutinin (PHA) or pokeweed mitogen (PWM) was determined by tritiated thymidine incorporation. Plasma cells in liver tissue were also determined. SMA levels were elevated in CAH patients and were highest in those patients who were serum positive for the presence of hepatitis B surface antigen. Lymphocyte transformation by PHA and PWM was significantly reduced in CAH patients but was unaffected in CPH patients. In CPH and CAH patients there was no difference in the ratio of T and B lymphocytes with respect to the controls. In PBC patients, there was a slight increase in the number of peripheral B cells. Immunosuppressive therapy did not alter the number of circulating T and B cells, whereas liver plasma cells were reduced by azathioprine treatment.

8384 TREATMENT OF CHRONIC ACTIVE HEPATITIS WITH EITHER PREDNISOLONE OR CORTICOTROPHIN: A CONTROLLED TRIAL. (Eng.) Giusti, G.; Piccinino, F.; Ruggiero, G.; Galanti, B.; Lucchelli, P. E.; Manzillo, G.; *et al.* (Clinica delle Malattie Infettive 1, Facolta di Medicina, Via D. Cotugno 1 presso Osp. Gesu e Maria, I-80 135 Napoli, Italy). *Acta Hepatogastroenterol.* 24(3):131-139; 1977.

The effect of prednisolone was compared with that of synthetic corticotrophin in the treatment of 54 patients with chronic active hepatitis. Twenty-nine patients were treated with prednisolone (maintenance dose 15 mg/day), and 25 were treated with depot synthetic corticotrophin (maintenance dose 1 mg/week, i.m.); all were followed up for 6-24 months or longer. In this series, young men predominated, the incidence of serum hepatitis B surface antigen (HBsAg) positivity approached 80% in both treatment groups, and no patient had initial evidence of cirrhosis or had autoimmune-associated diseases. With either drug, the SGOT levels decreased during the initial 12 months of therapy ($p<0.05$); initial jaundice, when present, had disappeared by the third month of treatment. With both treatments, globulins and γ-globulins decreased significantly after 12-24 months of therapy. Serum HBsAg persisted in all but two cases. Serial liver biopsies showed the following evolutions of histological activity: 12 cases (22%) improved to the "inactive phase" (8 with prednisolone and 4 with corticotrophin); 19 (35%) improved to a lesser extent (8 with prednisolone and 11 with corticotrophin); 17 (32%) remained unchanged (11 with prednisolone and 6 with corticotrophin); and 6 (11%) worsened (2 with prednisolone and 4 with corticotrophin). Morphological features of cirrhosis developed in 15 patients (8 treated with prednisolone and 7 with corticotrophin). In seven of these patients, the morphological picture was associated with an improvement in inflammatory activity, and none of the 15 patients developed symptoms of cirrhosis. Differences between treatments were not significant. Side-effects necessitating drug discontinuation occurred only in six cases. The data suggest that both treatments result in improvement in chronic active hepatitis.

8385 EFFECT OF CORTICOSTEROID TREATMENT ON BILIRUBIN METABOLISM IN CHRONIC AGGRESSIVE HEPATITIS. (Eng.) Kawasaki, H.; Ogata, T.; Irisa, T.; Hirayama, C. (Tottori Univ. Medicine, Yonago 683, Japan). *Acta Hepatogastroenterol.* 24(3):175-181; 1977.

Unconjugated bilirubin metabolism was studied in the plasma of 17 patients with chronic hepatitis and 7 normal subjects, and the effect of corticosteroid treatment on bilirubin metabolism was investigated. Hepatic uptake, reflux from the liver to the plasma, and hepatic conjugation were calculated by two-compartmental analysis from the plasma disappearance curves of unconjugated bilirubin following a single i.v. injection of bilirubin (2 mg/kg). The clearance remained within normal range in patients with chronic persistent hepatitis, but was significantly impaired in 12 patients with chronic aggressive hepatitis, in whom corticosteroid treatment improved the clearance significantly ($p<0.01$). Since urinary excretion of d-glucaric acid remained unchanged by corticosteroid treatment, the improved clearance may be attributable to increased hepatic parenchymal function.

8386 THE PROGNOSIS OF CHRONIC AGGRESSIVE HEPATITIS: A CLINICAL AND MORPHOLOGICAL FOLLOW-UP STUDY. (Eng.) Dietrichson, O.; Christoffersen, P. (Hvidovre Hosp., DK-2650 Hvidovre, Denmark). *Scand. J. Gastroenterol.* 12(3):289-295; 1977.

To study the prognosis of chronic aggressive hepatitis (CAH), 85 patients were followed up; repeat liver biopsies and/or autopsy liver sections were available in 74 cases. The median time of observation was 45 months. Cirrhosis was demonstrated in 38 patients, and cirrhosis was suspected in a further 5 patients. Fifteen patients showed convincing histological improvement, and the remaining 16 still had chronic hepatitis. Twenty-six patients died during the observation period, seven of these of liver failure after the development of cirrhosis. The clinical follow-up of the 59 survivors (median observation time 69 months) showed biochemically active liver disease in 11 cases, all having cirrhosis or chronic aggressive hepatitis in the last biopsy. The clinical findings were correlated with the morphological follow-up diagnosis and the immunosuppressive treatment. Comparison of the initial histological, clinical, and serological variables was made in two well-defined follow-up groups. There were more women; marked portal inflammation, abnormal bile duct epithelium, and circulating autoantibodies occurred more frequently in the group with later development of cirrhosis than among the patients with subsequent morphological improvement. The results suggest candidates for thorough follow-up and more intensive immunosuppressive or other treatment.

8387 FUNCTIONAL ACTIVITY OF LEUKOCYTES IN PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS DURING PREDNISOLONE TREATMENT. (Rus.) Veprinskaya, S. I.; Radugina, G. S. (Donetsk Medical Inst., Donetsk, USSR). *Vrach. Delo* (6):98-100; 1977.

8388 THERAPY AND PROGNOSIS OF CHRONIC HEPATITIS. (Ger.) Morl, M. (Stoffwechselklinik der LVA Wurttemberg, Bismarckstrasse 31, 699 Bad Mergentheim, W. Germany). *Fortschr. Med.* 95(11):734-738; 1977.

See also, 8139, 8145, 8288, 8316, 8327, 8355, 8356, 8406.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

8389 HEPATIC SIDEROSIS AND ALCOHOLISM. (Ita.) Schmid, C.; Giordano, F. (Servizio di Anatomia e Istologia Patologica dell'Ente Ospedaliero di Vimercate e Ornago, Italy). *Pathologica* 69(987/988):23-34; 1977.

The cellular distribution of iron deposits was evaluated in 329 liver biopsy specimens from patients with a normal liver or with various liver diseases. Mild, moderate, or severe hepatic siderosis was present in 174 cases. In 14.4% of the cases, iron deposits were present in the parenchymal cells. In 20.1% of the cases, iron was contained within the Kupffer cells, while in most cases (65.5%), the iron deposits were both histiocytic and parenchymal. The deposits in the parenchymal cells were generally granular extending over a surface of 2 μm, while those in the Kupffer cells were under 0.5 μm. Siderosis was present in 67.1% of the cases of liver steatosis, in 39.5% of tha cases of liver cirrhosis, and in 77.5% of the cases of alcoholic liver disease.

8390 RED CELL METABOLIC AND MEMBRANE FEATURES IN HAEMOLYTIC ANAEMIA OF ALCOHOLIC LIVER DISEASE (ZIEVE'S SYNDROME). (Eng.) Goebel, K. M.; Goebel, F. D.; Schubotz, R.; Schneider, J. (Medizinische Poliklinik, Univ. Marburg, Marburg/Lahn, W. Germany). *Br. J. Haematol.* 35(4):573-585; 1977.

Zieve's syndrome (ZS, transient hemolytic anemia, jaundice, hyperlipoproteinemia, and alcohol-induced liver disease) was studied in 20 men during the acute phase, and in 10 men during the remittent phase. Ten chronic alcoholics without hemolysis and 10 healthy men served as controls. RBC were separated into old and young cells by density-layer centrifugation. Those fractions containing older RBC disclosed a pyruvate-kinase instability that resulted in impaired metabolism. Changes in membrane lipid composition, as indicated by increased cholesterol and polyunsaturated fatty acids (PUFA), were also detected in patients during the acute phase of ZS. Alcohol-induced RBC vitamin-E deficiency with a decrease in PUFA levels may provoke an oxidation of reduced RBC glutathione, which in turn results in the enzyme instability. This study supports the hypothesis that the putative role of the RBC metabolic injury in the origin of hemolysis in ZS cannot be envisaged without introducing membrane-linked and extracellular cofactors.

8391 COBALT-ACTIVATED ACYLASE ACTIVITY AND IMMUNOGLOBULIN LEVEL IN BLOOD SERUM OF CHRONIC ALCOHOLICS. (Pol.) Kryszewski, A.; Bardzik, I.; Przezdziak, J. (I Klinika Chorob Wewnetrznych Instytutu Chorob Wewnetrznych AM, ul. Debinki 7, 80-211 Gdansk, Poland). *Pol. Tyg. Lek.* 32(15):561-564; 1977.

8392 DIAGNOSIS OF ALCOHOLIC CIRRHOSIS. (Fre.) Labayle, D.; Buffet, C.; Etienne, J. P. (Hopital Antoine-Beclere, 157, rue de la Porte-de-Trivaux, F 92141 Clamart, France). *Rev. Prat. (Paris)* 26(51):3583-3598; 1976.

8393 PROGNOSIS OF ALCOHOLIC CIRRHOSIS. (Fre.) Beraud, C.; Amouretti, M.; Boisseau, C.; Couzigou, P. (Hopital du Haut-Leveque, C.H.R. de Bourdeaux, avenue de Magellan, 3600 Pessac, France). *Rev. Prat. (Paris)* 26(51):3665-3669; 1976.

8394 STUDY OF THE SURVIVAL OF PATIENTS WITH ALCOHOLIC CIRRHOSIS DIAGNOSED BEFORE THE DEVELOPMENT OF ASCITES, HEMORRHAGE, OR JAUNDICE. (Fre.) Gastard, J.; Gosselin, M.; Alexandre, J. L.; Brichard, J. M. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3):311; 1977.

8395 TREATMENT OF DIGESTIVE HEMORRHAGES IN (ALCOHOLIC) CIRRHOTIC PATIENTS. (Fre.) Rueff, B. (Hopital Beaujon, 92110 Clichy, France). *Rev. Prat.* 26(51):3617-3623; 1976.

See also, 8145, 8281, 8325, 8407, 8495.

LIVER AND BILIARY TRACT

Cirrhosis

8396 AETIOLOGY OF CIRRHOSIS, HEPATIC FIBROSIS, AND HEPATOCELLULAR CARCINOMA. (Eng.) Blenkinsopp, W. K.; Haffenden, G. P. (St. Mary's Hosp., London W2, England). *J. Clin. Pathol.* 30(6): 579-584; 1977.

Autopsy specimens were examined to investigate the contribution of histology to the diagnosis of the etiology of cirrhosis, hepatic fibrosis, and hepatocellular carcinoma. The histological study of 69 cases of cirrhosis, 9 of severe generalized hepatic fibrosis, and 19 of hepatocellular carcinoma showed an association with alcohol, hepatitis B surface antigen (HBsAg), or α_1-antitrypsin bodies in 41 (cirrhosis), 5 (fibrosis), and 9 (carcinoma) cases, resp. Eight cases of cirrhosis and two of carcinoma had double associations, HBsAg being present in all. Orcein and aldehyde fuchsin staining gave both false-positive and false-negative results when compared with immunofluorescence and immunoperoxidase methods for HBsAg. Large amounts of copper were found in four cirrhotic livers, and moderate amounts in 13; the diagnostic value of copper staining is questioned.

8397 LIVER CIRRHOSIS AS CONSEQUENCE OF GENETIC DEFECTS.

(Ger.) Morl, M.; Gabriel, L. (Stoffwechselklinik der LVA Wurttemberg, D-6990 Bad Mergentheim, W. Germany). *Med. Klin.* 72(12):483-491; 1977.

Observations and studies on liver cirrhosis due to Wilson's disease and idiopathic hemochromatosis are reviewed. Wilson's disease, basically a defect of copper incorporation into ceruloplasmin, leads to excessive copper storage in the liver, fatty degeneration, periportal fibrosis, chronic hepatitis, and ultimately to liver cirrhosis after a usually clinically silent latent period of several years. Long-term normalization of copper storage can be achieved by liver transplantation, but not by substitution of human ceruloplasmin. Wilson's disease is usually manifested as acute or chronic hepatopathy, mostly mimicking infectious hepatitis, or juvenile cirrhosis. The complications include hemolytic anemia, fulminant hepatitis, hepatic coma, and esophageal varices. Life-long therapy with D-penicillamine (0.6-1.2 g) and vitamin B_6 is recommended, even in presymptomatic cases. Excessive iron storage in the liver in idiopathic hemochromatosis over several years to decades leads to liver cirrhosis. Complications include esophageal varices, hepatic coma, hepatocellular carcinoma, and diabetes mellitus. It is possible to achieve a 5-yr survival rate of nearly 90% by regular bloodlettings.

8398 BILE SALTS SECRETION IN CIRRHOSIS.

(Eng.) Correia, J. P.; Areias, E.; Meneses, L.; Tiago, E. (Hosp. Escolar Sta. Maria, Lisbon 4, Portugal). *Acta Hepatogastroenterol. (Stuttg.)* 24(1):15-19; 1977.

Basal and stimulated bile salt secretion was studied in 10 normal subjects (controls) and in 16 patients with alcoholic cirrhosis to investigate factors that could interfere with fat absorption. In the controls, the total bile salt concentration was 2.93 ± 2.15 µmol/ml during the basal period and 2.88 ± 2.58 µmol/ml 60 min after stimulation by secretin (1 U/kg i.v.). In the cirrhosis patients, the values were 4.83 ± 2.74 and 1.96 ± 1.25 µmol/ml, resp. The differences between the two groups were not significant. During the first 20 min after secretin, however, the total bile salt concentration was >3 µmol/ml in 8/10 controls (mean, 6.26 ± 5.03 µmol/ml) and <2 µmol/ml in 10/16 patients (mean, 3.16 ± 2.12 µmol/ml). The ratios of trihydroxy to dihydroxy bile salts were similar in both groups. The ration between bile salts conjugated with glycine and those conjugated with taurine was 1.69 ± 1.30 in the controls and 1.02 ± 0.65 in the cirrhotics. This difference was statistically significant ($p<0.05$). However, the ratio of free to conjugated bile salts was higher in the cirrhotics (0.42 ± 0.9, versus 0.17 ± 0.14 in controls). The lower concentration of total bile salts immediately after secretin and the higher proportion of taurine conjugates and of free bile salts may be relevant to the altered fat digestion and absorption and bowel motility found in alcoholic cirrhosis patients.

8399 STUDIES ON THE KINETICS OF UNCONJUGATED $[^{14}C]$BILIRUBIN METABOLISM IN NORMAL SUBJECTS AND PATIENTS WITH COMPENSATED CIRRHOSIS.

(Eng.) Owens, D.; Jones, E. A.; Carson, E. R. (Walton Hosp., Rice Lane, Liverpool L9 1AE, England). *Clin. Sci. Mol. Med.* 52(6):555-570; 1977.

The kinetics of unconjugated $[^{14}C]$-bilirubin metabolism were studied and analyzed in terms of a three-pool model in seven normal subjects and eight cirrhotic patients who did not have an appreciable degree of conjugated hyperbilirubinemia. The mean volume of distribution, the mean mass of the rapidly mixing pool ("plasma"--pool 1), and the mean 4-hr retention were greater than the corresponding values in the normal subjects (81.7 ± 11.2 versus 68.1 ± 12.5 ml/kg body weight, 69.1 ± 43.8 versus 30.6 ± 8.9 µmol, $p<0.05$, and 18.6 ± 6.6 versus 10.6 ± 3.4%, $p<0.01$, resp.). In contrast, the mean fractional clearance rate and the mean estimated erythrocyte life-span were significantly less than the corresponding values in normal subjects (0.0059 ± 0.0019 versus 0.0086 ± 0.0025/min, $p<0.01$ and 93.6 ± 40.9 versus 129.3 ± 6.3 days, resp.). Mean hepatic clearance rate and mean bilirubin production rate were not significantly different than those in normal subjects. Of the model-dependent parameters of unconjugated $[^{14}C]$-bilirubin metabolism, the mean fractional transfer rates and fluxes from pool 1 to pool 3 ("extravascular") and vice versa were significantly greater than the corresponding values in the normal subjects ($p<0.05$). The mean fractional transfer rate from pool 1 to pool 2 ("hepatic unconjugated bilirubin") was less than that in normal subjects and from pool 2 to the conjugated pool was greater than that in normal subjects ($p>0.05$). It is suggested that in compensated cirrhotics the efficiency of the liver in extracting unconjugated bilirubin from plasma against a concentration gradient is impaired, even though the liver's capacity to conjugate bilirubin may be normal. As a result of the increased volume of distribution, the absolute hepatic clearance of unconjugated bilirubin is relatively well maintained.

8400 HEME CATABOLISM IN LIVER CIRRHOSIS WITH PORTAL HYPERTENSION AFTER SHUNT SURGERY.

(Eng.) Mercke, C.; Lundh, B.; Bengmark, S.; Borjesson, B.; Simert, G.; Vang, J. (Univ. Hosp., S-221 85 Lund, Sweden). *Scand. J. Gastroenterol.* 12(4):473-480; 1977.

Endogenous production of carbon monoxide (VCO) and total and direct-reacting serum bilirubin (TSB, DRB) were determined in 26 patients with liver cirrhosis and portal hypertension to evaluate the effect of various shunt operations on total heme catabolism. The patients were divided into three groups. In group I, 11 nonoperated patients had a mean VCO of 18.4 ± 6.0 μmol/mmol total body heme per day (reference value 12.6 ± 2.9). In group II, seven patients who underwent subcutaneous transposition and a subtotal splenectomy had a mean VCO that was not significantly raised (14.4 ± 4.7 μmol/mmol/day). In group III, eight patients underwent a modified distal splenorenal shunt; the highest mean VCO (26.1 ± 9.0 μmol/mmol/day). The mean TSB in the three groups was 34.8 ± 29.2, 11.2 ± 3.0, and 46.4 ± 41.0 μM, resp., and mean DRB was 18.2 ± 20.8, 3.7 ± 1.0, and 26.8 ± 34.1 μM, resp. Estimated from preoperative laboratory values, there was no difference in liver function between the three groups. Heme catabolism is increased by 50% in liver cirrhosis complicated by portal hypertension, probably due to a slight decrease in erythrocyte survival. Heme catabolism tends to normalize after subcutaneous transposition and subtotal splenectomy. After spleno-renal shunting, a further increase in heme catabolism is seen. The increase in serum bilirubin often seen after the latter type of surgery is mainly related to a raised bilirubin production and not to a further decrease in liver function.

8401 STUDY OF PANCREATIC RESPONSE TO SECRETIN-PANCREOZYMIN IN CIRRHOTIC PATIENTS. COMPARATIVE ANALYSIS BY FECAL CHYMOTRYPSIN TEST. (Spa.) Aparisi-Quereda, L.; Rodrigo Gomez, J. M.; Garcia Perez, H.; Guix-Garcia, J.; Serra-Desfilis, M. A.; Olmo-Puchalt, J. A.; Wassell, A. (Catedra de Patologia y Clinica Medica "B," Facultad de Medicina, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):803-805; 1976.

Pancreatic function in 21 patients with hepatic cirrhosis of diverse etiology was compared with that in 18 normal controls. The pancreatic function was tested with a stimulus of secretin (1 U/kg) and pancreozymin (2 U/kg); feces were collected during 3 days of administration of the Schmidt diet and during another 3 days of an experimental meal. The cirrhotic patients segregated a larger volume of pancreatic juice (279 cm^3/hr versus 201 cm^3/hr, $p<0.05$), with smaller concentrations of bicarbonate (81 ± 16 mEq/l versus 90 ± 18 mEq/l, $p<0.05$), lipase (855 ± 536 U/cm^3/hr versus 1,217 ± 352 U/cm^3, $p<0.02$), and chymotrypsin (144 ± 67 U/cm^3 versus 194 ± 79 U/cm^3, $p<0.05$) than controls. The cirrhotic patients also had higher values for fecal fats (4.5 ± 3.7 g/day versus 2.4 ± 1.4 g/day, $p<0.025$) and proteins (10.9 ± 5.5 g/day versus 7.9 ± 3.8 g/day, $p<0.05$) than controls. The concentration of fecal chymotrypsin was slightly lower in the cirrhotic patients than in controls (113 ± 51 U/g feces versus 128 ± 78 U/g feces). The experimental meal induced a smaller increase in the fecal chymotrypsin in cirrhotic patients (from 13.4 ± 8.1 KU/day after the Schmidt diet to 19.1 ± 20.2 KU/day after the experimental meal) than in normal controls (from 12.7 ± 12 KU/day, Schmidt diet, to 21.8 ± 21.5 KU/day, experimental meal). These results do not support the existence of a pancreatic insufficiency intense enough to justify the appearance of "esteotorrea" and creatinuria.

8402 NEW TECHNIQUES FOR INTERRUPTION OF GASTROESOPHAGEAL VENOUS BLOOD FLOW. (Eng.) Pereiras, R.; Viamonte, M., Jr.; Russell, E.; LePage, J.; White, P.; Hutson, D. (Veterans Admin. Hosp., Miami, FL). *Radiology* 124(2):313-323; 1977.

Enlarged gastroesophageal veins were successfully obliterated in 41 patients with hepatic cirrhosis and portal hypertension using embolization with modified autogenous clots and/or Gelfoam, balloon occlusion, iatrogenic perivenous hematoma, sclerosing agents (Sotradecol and Keflin), or a combination of these methods. Surgical exploration of 16 patients and autopsies of 5 showed persistent obliteration ranging between 3 weeks and 7 months. No major complications requiring reparative surgery were encountered. Gelfoam soaked with Sotradecol is the preferred agent because it provides persistent obliteration of the embolized veins. Patients who are acutely bleeding or have done so previously are candidates for selective obliteration of the gastroesophageal veins.

8403 PREGNANCY IN CIRRHOTIC AND NONCIRRHOTIC PORTAL HYPERTENSION. (Eng.) Varma, R. R.; Michelsohn, N. H.; Borkowf, H. I.; Lewis, J. D. (Medical Coll. Wisconsin, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Obstet. Gynecol.* 59(2):217-222; 1977.

The course of pregnancy in one patient with chronic active hepatitis (CAH) and cirrhosis, and in another with extrahepatic portal vein obstruction (EHPVO) is described. The management of pregnancy in these diseases associated with portal hypertension is discussed, and risks of pregnancy are compared. The patient with CAH, a 25-yr-old woman, presented with anovulatory cycles, and ovulation occurred following immunosuppressive therapy. The second patient, a 21-yr-old woman, had experienced episodes of gastrointestinal bleeding since age 5 and presented with severe bleeding at 32 weeks gestation. Both women experienced massive upper gastrointestinal bleeding from esophageal varices. Bleeding was difficult to control and required variceal ligation in the first patient. Both patients manifested features suggesting cerebral edema, indicating the need for caution with fluid and electrolyte therapy. Recovery of the woman with CAH after a low cervical cesarean delivery was slow. In the second patient, spontaneous labor of a stillborn fetus occurred 2 days after an emergency transesophageal variceal ligation was performed. A review of the literature demonstrated that variceal bleeding occurred in 43% of women with EHPVO, compared to 23% of those with CAH and cirrhosis. Additional complications, including hepatocellular failure (24%), occurred in patients with CAH, but not in EHPVO.

8404 STUDY OF 32 PATIENTS TREATED BY PORTA-SYSTEMIC SHUNTS AT THE HOSPITAL CENTER OF LAVAL UNIVERSITY OVER A 5-YEAR PERIOD. (Fre.) Painvin, G. A.; Martineau, G. (Centre Hospitalier de l'Universite Laval, Monteal, Quebec, Canada). *Union Med. Canada* 106(3):347-351; 1977.

8405 "ACUTE ABDOMEN" SYNDROME IN HEPATIC CIRRHOSIS. (Rus.) Sapozhnikov, V. M. (Moscow Municipal Hosp. No. 70, Moscow, USSR). *Vestn. Khir.* (6):41-43; 1977.

8406 EPIDEMIOLOGICAL ROLE OF PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Kantorovich, R. A.; Chimbru, V. I.; Semendyaeva, M. E.; Blinkov, I. L.; Belokrinitsky, D. V.; Lorie, N. Yu.; Aleksandrovskaya, T. N. (N. Yu. Gamalei Inst. Epidemiology and Microbiology, Moscow, USSR). *Sov. Med.* (5):13-19; 1977.

8407 BIOPSY DIAGNOSIS OF ALCOHOLIC CIRRHOSIS. (Ger.) Roschlau, G. (Medizinischen Akademie "Carl Gustav Carus," DDR-8019 Dresden, Fetscherstr. 74, E. Germany). *Dtsch. Gesundheitsw.* 32(26):1211-1214; 1977.

8408 ETIOLOGY AND CLINICAL ASPECTS OF LIVER CIRRHOSIS. (Ger.) Horak, W. (Ordinariat fur Gastroenterologie und Med. Computerwissensch. der Univ., Garnisongasse 13, A-1090 Wien, Austria). *Z. Gesamte Inn. Med.* 32(1):16-22; 1977.

8409 CONSERVATIVE THERAPY OF LIVER CIRRHOSIS. (Ger.) Teichmann, W.; Schwager, A. (Klinik fur Innere Medizin der Wilhelm-Pieck-Univ., Ernst-Heydemann-Strasse, 25 Rostock, E. Germany). *Z. Gesamte Inn. Med.* 32(1):38-42; 1977.

8410 LAPAROSCOPY IN THE DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF ASCITES. (Ger.) Brailski, C. (Medical Acad., 8 Belo More St., Sofia, Bulgaria). *Z. Gesamte Inn. Med.* 32(3):82-84; 1977.

8411 CLINICAL-CHEMICAL DIAGNOSIS OF LIVER CIRRHOSIS. (Ger.) Haschen, R. J. (Institut f. Klin. Biochemie der Martin-Luther-Univ., Leninallee, 402 Halle [Saale], E. Germany). *Z. Gesamte Inn. Med.* 32(1):22-26, 27-28; 1977.

8412 CASUISTIC CONTRIBUTION TO α_1-ANTITRYPSIN DEFICIENCY WITH LIVER CIRRHOSIS IN ADULTS. (Ger.) Heidl, G.; Roschlau, G.; Dittrich, H.; Stotzner, H.; Kemmer, C. (Medizinische Akademie "Carl Gustav Carus," Fetscherstrasse 74, DDR-8019 Dresden, E. Germany). *Zentralbl. Allg. Pathol.* 121(3):229-234; 1977.

8413 A CONTRIBUTION TO PATHOMORPHOLOGY OF NON-NEOPLASTIC LIVER TUMORS. II. CIRRHOSIS HEPATITIS SUB FORMA TUMORIS. (Pol.) Sosnik, H. (Zakladu Anatomii Patologicznej, ul. Marcinkowskiego 1, 50-368 Wroclaw, Poland). *Patol. Pol.* 27(3):269-274; 1976.

8414 NONSPECIFIC IMMUNITY INDICES IN CIRRHOSIS AND PRIMARY CANCER OF THE LIVER. (Rus.) Afanas'eva, K. A.; Afanas'ev, S. S.; Ablaeva, T. D.; Podobedov, G. M. (Medical Inst., Astrakhan, USSR). *Vopr. Onkol.* 22(12):21-24; 1976.

8415 CIRRHOTIC ENCEPHALOPATHY. (Fre.) Degos, J. D. (Hopital Henri-Mondor, 51, av. de-Lattre-de-Tassigny, 94010 Creteil, France). *Rev. Prat. (Paris)* 26(51):3641-3648; 1976.

8416 PRESENT-DAY THERAPY OF HEPATIC ENCEPHALOPATHY. (Ger.) Imler, M. (Centre Hospitalier Universitaire, F-67005 Strasbourg Cedex, France). *Munch. Med. Wochenschr.* 118(52/53):1685-1694; 1976.

8417 THE PREVENTION OF POSTHEMORRHAGIC ENCEPHALOPATHY IN CIRRHOTICS BY HIGH FLOW INTESTINAL LAVAGE: WATER-ELECTROLYTE DISTURBANCES. (Fre.) Champault, G.; Patel, J. C.; Pourriat, J. L.; Garnier, M.; Fabre, F.; Psalmon, F. (Hopital Jean-Verdier, av. du 14 Juillet, F93140 Bondy, France). *Nouv. Presse Med.* 6(6):435-438; 1977.

8418 TROPHIC FUNCTION OF GASTRIN AND FORMATION OF DUODENAL ULCERS IN PATIENTS WITH LIVER CIRRHOSIS. (Rus.) Bassalyk, L. S.; Loginov, A. S.; Kondrashova, Z. D. (Central Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 49(5):99-102; 1977.

See also, 8139, 8285, 8296, 8298, 8316, 8319, 8322, 8327, 8369, 8383, 8387, 8395, 8436.

Gallbladder and Biliary Tract Diseases

8419 THE EFFECT OF PARA-AMINOBENZOIC ACID AND TAUROCHOLIC ACID FEEDING ON HUMAN BILE COMPOSITION. (Eng.) Gardner, B.; Dennis, C.; Patti, J.; Chenouda, M. (Downstate Medical Center, Brooklyn, NY). *Surg. Gynecol. Obstet.* 144(6):879-882; 1977.

Seven patients were investigated after cholecystectomy and exploration of the common bile duct to determine bile composition and excretion rates. An initial depression of the major components of bile stabilized by the sixth postoperative day. Feeding of para-aminobenzoic acid (2 g 3 times/day, 2 days) and taurocholic acid (3 g on 1 day) to these patients resulted in an increase in excretion of total bile acids, taurine, and glycine conjugates, cholates, and deoxycholates. Para-aminobenzoic acid failed to block glycine conjugation. Preferential conjugation of bile acid with glycine is due to a deficient taurine pool and not to a preferential metabolic pathway.

8420 LIMY BILE. (Ger.) Schierholt, K. D. (Rontgenabteilung, Krankenhauses St. Josef, 6220 Rudesheim, W. Germany). *Fortschr. Roentgenstr.* 127(1):26-29; 1977.

The roentgenological, clinical, and biochemical aspects of limy bile are reviewed on the basis of a survey of 43 cases that occurred during 1937-1969. In the absence of characteristic clinical symptoms, radiological investigation is essential for diagnosis. On x-ray, the gallbladder appears as a dense shadow containing several round, annular-shaped shadows. It is of normal or slightly reduced size, and it usually shows mild inflammation with occlusion of the cystic duct by a cholesterol stone. The gallbladder contains greenish white limy bile produced by the bladder mucosa. The limy bile contains 24-52% calcium carbonate in amorphous and crystalline form, 12-55% cholesterol, and a small quantity of calcium phosphate. Bile pigments are present in trace amounts, if at all. Although the calcium carbonate may reach a pulpy consistency, it never forms solid stones. The blood calcium level was determined in four patients, and it was normal. The few clinical symptoms include attacks of biliary colic that usually recur at long intervals. Jaundice is rare, and some patients were symptom-free. The observations indicate that limy bile is not an early stage of gallstone formation and that it does not result from calcified gallbladder empyema. Limy bile formation must occur parallel to the formation of calcium carbonate stones.

8421 CONGENITAL EXTRAHEPATIC BILIARY ATRESIA. (Eng.) Scotto, J. M.; Stralin, H. G. (Hopital de Bicetre, U 56 INSERM, 94270 Le Kremlin-Bicetre, France). *Arch. Pathol. Lab. Med.* 101(8):416-419; 1977.

Ten cases of congenital extrahepatic biliary atresia were studied ultrastructurally. Liver samples were obtained from each patient, fibrous tracts were also secured in six patients. Extrahepatic biliary ducts occurred in the fibrous tracts, but were hypoplastic. In places, necrosed epithelial cells, without obvious inflammatory processes, were observed. The ductular cell cytoplasmic changes and the inflammatory reaction are different according to whether extrahepatic or intrahepatic sites are considered. These differences, as well as the cytoplasmic modifications of liver parenchymal cells, seem to be the result of impaired bile flow. On the other hand, extrahepatic bile duct hypoplasia and necrosis seem to be directly related to the unknown origin of this disease. If the nuclear changes of hepatocytes are the expression of direct injury to the liver, it is possible that the disease might evolve as an independent liver disease, despite a correctly performed and uncomplicated surgical intervention.

8422 PRIMARY SCLEROSING CHOLANGITIS. (Ita.) Lamarca, S.; Farinella, M. (Ospedale Civile di Castellamonte, Castellamonte, Italy). *Arch. Sci. Med. (Torino)* 134(2):219-223; 1977.

A case of intermittant icterus in a male patient was observed over a 2-yr period without a definitive laboratory or clinical diagnosis. Hepatic-cholestatic fibrosis with stenosis of the lumen and patency of Vater's tubule was diagnosed by laparotomy. Bile duct drainage was accomplished by insertion of a transcholedochal, transpapillary T-tube that was left in place for 4 months. Twenty months after removal of the tube, the patient is in good health with no recurrence of icterus. The final diagnosis was primary sclerosing cholangitis.

8423 CHOLECYSTOKININ CHOLECYSTOGRAPHY IN THE DIAGNOSIS OF CHRONIC ACALCULOUS CHOLECYSTITIS AND BILIARY DYSKINESIA: A CRITICAL APPRAISAL. (Eng.) Berk, R. N. (5323 Harry Hines Blvd., Dallas, TX 75235). *Gastrointest. Radiol.* 1(4):325-330; 1977.

The active fragment of the cholecystokinin molecule has been made available for use in clinical practice; reports on the value of cholecystokinin cholecystography were, therefore, reevaluated to determine whether the procedure is worthwhile in patients with persistent symptoms and a normal conventional oral cholecystogram. A literature review discloses that there is no uniform agreement on what constitutes an abnormal examination and raises serious questions concerning the scientific validity of much of the data. It is apparent that there is no immutable evidence indicating that cholecystokinin cholecystography is an accurate technique to determine which patients in this category will benefit from cholecystectomy.

8424 CHOLEDOCHOSCOPY IN EXPLORATION OF THE COMMON BILE DUCT. (Eng.) Finnis, D.; Rowntree, T. (Dept. Surgery, Univ. British Columbia, Vancouver, British Columbia, Canada). *Br. J. Surg.* 64(9):661-664; 1977.

The technique of operative fiberoptic choledochoscopy was evaluated in 88 patients with gallstones requiring exploration of the common bile duct. There were no cases of retained calculi that were endoscopically undetected. Postoperative T-tube cholangiography was carried out in 81 cases; this technique confirmed the findings of operative biliary endoscopy in all cases. Choledochoscopy is an accurate and safe operative procedure that can eliminate the problem of undetected residual calculi.

8425 TREATMENT OF RETAINED BILE DUCT CALCULI WITH T-TUBE INFUSION OF SODIUM CHOLATE AND HEPARIN. (Eng.) Christiansen, L. A.; Schersten, T.; Burcharth, F.; Bruusgaard, A.; Lindblad, L.; Cahlin, E. (Rigshospitalet, Univ. Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(3):337-339; 1977.

The value of sodium cholate and heparin infusion through the T-tube in the treatment of retained radiolucent bile duct calculi was studied in 26 patients in whom the presence of bile duct calculi was diagnosed by postoperative cholangiography. All patients received an infusion of 15-20 g sodium cholate in 1,000 ml saline and 20,000 U of heparin in 1,000 ml saline every 24 hr. The calculi disappeared in 19 of 26 patients. No complications were encountered. This treatment is recommended prior to reoperation in all patients with retained radiolucent bile duct calculi diagnosed by postoperative cholangiography through the T-tube.

8426 THE CRYSTALLINE SALTS OF CALCIUM BILIRUBINATE IN HUMAN GALLSTONES. (Eng.) Sutor, D. J.; Wilkie, L. I. (Univ. Coll. Hosp. Medical Sch., Rayne Inst., 5 University St., London WC1E 6JJ, England). *Clin. Sci. Mol. Med.* 53(1):101-103; 1977.

To determine whether the crystalline pigment of gallstones is calcium bilirubinate, the acid, neutral, and "intermediate" salts of calcium bilirubinate were synthesized and analyzed chemically, crystallographically, spectroscopically, and by x-ray diffraction. All salts were found to be crystalline, and the intermediate salt, which has 1.5 molecules of bilirubin per calcium atom, probably has a crystal structure containing molecules of both acid and neutral salts. The acid or intermediate salts were found in 14 of 70 gallstones analyzed recently by x-ray diffraction.

8427 CALCIUM IN BILE AND CALCIUM SALTS IN GALLSTONES. (Eng.) Sutor, D. J.; Wilkie, L. I. (Dept. Chemistry, Univ. Coll., Gower St., London WC1E 6BT, England). *Clin. Chim. Acta* 79(1):119-127; 1977.

In the gallbladder and common duct bile from 21 patients undergoing cholecystectomy (usually because of gallstones), Ca was found to exist in at least two forms, bound Ca and ultrafilterable Ca. Ultrafiltration showed that some Ca was bound to substances with a molecular weight >10,000, and there was significantly less bound Ca ($p<0.002$) in common duct bile (1.20 ± 0.42 mM) than in bile from functioning gallbladders (3.89 ± 0.41 mM). The chief binding agent for Ca is likely to be the mixed micelle. There was a smaller amount of ultrafilterable Ca in common duct bile (1.16-1.61 mM) than in bile from functioning gallbladders (0.95-5.22 mM), but the difference was not significant. For patients with cholesterol or some Ca carbonate on the stone surface, ultrafilterable Ca concentrations covered a much narrower range (0.95-2.28 mM) than did the corresponding total Ca concentrations (2.40-9.70 mM). A comparison of ultrafilterable and total Ca values for different types of stone-formers showed that the deposition of Ca carbonate in gallstones was not related to any Ca measurement made. However, patients with some Ca phosphate and/or Ca bilirubinate on the stone surface had significantly more ultrafilterable Ca in their bile (3.62 ± 0.72 mM) than did patients with cholesterol stones (1.64 ± 0.11 mM, $p<0.002$) or patients with Ca carbonate stones (1.48 ± 0.14 mM, $p<0.01$).

8428 PREVALENCE OF HYPERLIPOPROTEINEMIA IN MEN WITH GALLSTONE DISEASE. (Eng.) Kadziolka, R.; Nilsson, S.; Schersten, T. (Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(3):353-355; 1977.

To determine whether there is a significant correlation between hyperlipoproteinemia and gallstone disease, the prevalence of hyperlipoproteinemia in a consecutive series of 46 male gallstone patients was compared with that in an age-matched consecutive series of 40 gallstone-free patients. Hyperlipoproteinemia was present in 43.5% of the gallstone patients as compared with 22.5% of the control patients ($p<0.05$). Prebeta-hyperlipoproteinemia (type IV) was the most common lipoprotein disorder in both the gallstone patients and controls.

8429 CHENODEOXYCHOLIC ACID THERAPY OF GALLSTONES. (Eng.) Dowling, R. H. (No affiliation given). *Clin. Gastroenterol.* 6(1):141-164; 1977.

Various aspects of chenodeoxycholic acid (CDCA) therapy of gallstones are discussed, and the indications for CDCA based on experience in treating >100 patients are outlined. Biliary colic is the most common symptom in cholelithiasis patients accepted for CDCA treatment; a history of pancreatitis, cholangitis, obstructive jaundice, and cholecystitis warrants cholecystectomy rather than a dissolution procedure. Patients with multiple, small, radiolucent gallstones in a gallbladder that opacifies well during cholecystography and contracts promptly in response to a fatty meal are most likely to benefit from CDCA treatment. The dose of CDCA should be a fixed amount per day related to body weight. Patients who received 14.4 ± 1.0 mg/kg showed dissolution of stones and their post-treatment saturation index (SI, numerical index of saturation of bile with cholesterol) was less than unity. However, in patients who received 10.6 ± 1.2 mg/kg, the stones remained unchanged in size and the mean post-treatment SI was greater than unity.

8430 IMPROVING CHOLECYSTECTOMY. (Eng.) Corlette, M. B.; Bismuth, H.; Hepp, J. (821 Massachusetts Ave., Arlington, MA 02174). *Am. J. Surg.* 133(6):655-657; 1977.

Bacteriologic studies of bile in 100 patients undergoing cholecystectomy for various manifestations of cholelithiasis were carried out, and a technique for reducing infection in cholecystectomy was tested in 200 patients. In the first 100 patients, there were 36 positive cultures. The frequency was greater in older individuals and in those with acute cholecystitis and common duct stone; these results are comparable to those in previous studies and reaffirm the septicity of the bile. The incidence of wound infection was only 0.5% in 200 patients in whom a water-impermeable wound drape was sewn to the peritoneum to prevent contamination by potentially infected bile. This result, in patients with an infectious risk comparable to that in other series, establishes the value of meticulous wound isolation in preventing wound infection.

8431 USE OF BILIARY DRAINAGE IN DIAGNOSIS OF BILIARY TRACT DISEASE. (Eng.) Sigman, H. H.; Goldberg, N.; Niloff, P. H.; Lachance, C. (Jewish General Hosp., Montreal, Canada). *Am. J. Gastroenterol.* 67(5):439-443; 1977.

A retrospective study was carried out in 35 patients with normal oral cholecystograms who underwent cholecystectomy on the basis of abnormal bile collected by duodenal drainage. The patients were found to have either cholesterol crystals, calcium bilirubinate pigment, or leukocytes in gallbladder bile collected through duodenal drainage. At cholecystectomy, the gallbladders all showed histological evidence of chronic cholecystitis and/or cholesterolosis. In addition, four gallbladders contained calculi. Cholecystectomy is recommended as treatment for a selected group of patients with duodenal bile crystals or pigment.

8432 DISTURBANCES OF BILE ACID METABOLISM IN CHOLESTASIS. (Eng.) Stiehl, A. (No affiliation given). *Clin. Gastroenterol.* 6(1):45-67; 1977.

Literature on the biochemical and clinical aspects of cholesterol-induced changes in bile acid metabolism is reviewed. Patients with cholestasis due to cirrhosis or biliary atresia have a markedly reduced total bile acid pool that is shifted from the enterohepatic circulation into the peripheral blood, liver, and other tissues. In cholestatic patients, bile acids such as 3β-hydroxy-5-cholenic acid, ursodeoxycholic acid, hyodeoxycholic acid, hyocholic acid, and trihydroxycoprostanic acid are detected in addition to the primary and secondary bile acids that predominate in healthy individuals. Since these bile acids are also detected in patients with complete or almost complete biliary obstruction, it is suggested that they are direct catabolites of cholesterol that do not necessarily originate from the bacterial degradation of cholic and chenodeoxycholic acids. In the serum of patients with cholestasis, only 10% to 20% of the bile acids are sulfated. A relatively low serum concentration and relatively high urinary excretion rates of sulfated bile acids (almost 50%, compared to 5-15% in normal subjects), might indicate that in these patients, organs other than the liver could contribute to the detoxification and excretion of possibly hepatotoxic bile acids.

8433 CELLULAR IMMUNITY IN INTRA- AND EXTRAHEPATIC CHOLESTASIS. (Ita.) Fargion, S. R.; Podda, M.; Cappellini, M. D.; Fiorelli, G. (Istituto di Clinica Medica III dell'Universita di Milano, Milan, Italy). *Minerva Gastroenterol.* 22(3):261-265; 1976.

In vivo and *in vitro* cellular immune reactions were determined in 17 patients with extrahepatic cholestasis and in 5 patients with primary biliary cirrhosis (PBC). Antimitochondrial antibodies (AMA) were determined by immunofluorescence. Intradermal reactivity was determined with purified protein derivative (PPD) and *Candida albicans* extract. Lymphocyte transformation in the presence of autologous and normal plasma was determined by tritiated thymidine incorporation. Fourteen healthy subjects served as controls. One hundred percent of patients with PBC were positive for AMA. Only 1.4% of the patients with extrahepatic cholestasis were AMA positive. Sixteen percent of patients with PBC and 17% with extrahepatic cholestasis were PPD positive, and 16% of PBC patients and 11% of patients with extrahepatic cholestasis were also *Candida* positive. Sixty-four percent of the controls were positive for PPD and 57% were positive for *Candida*. Autologous plasma reduced whereas normal plasma increased lymphocyte transformation in patients with both PBC and extrahepatic cholestasis. Plasma from PBC and extrahepatic cholestasis patients inhibited lymphocyte transformation in normal subjects. It is possible that plasma factors associated with cholestasis interfere with cellular immunity.

8434 NONOPERATIVE MANAGEMENT OF BILIARY DUCTAL STENOSIS: REPORT OF A MOST UNUSUAL CASE. (Eng.) McGill, C.; Aaron, W. S.; Polk, H. C., Jr.

(Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Gastroenterology* 73(1):150-153; 1977.

The case of a 22-yr-old woman with documented iatrogenic stricture of the common duct is reported. A biliary-cutaneous fistula and a lengthy, tapering stenosis of the common bile duct were observed 4 weeks after the patient had undergone cholecystectomy for chronic cholecystitis. Although the presenting illness of the patient followed much of the usual pattern for biliary stricture, certain characteristics indicated a good prognosis. First, her common bile duct had been accurately identified. Second, her stenosis appeared to be at the site of T-tube insertion. Third, the lesion tended to be more smoothly tapering and longer than typical bile duct injuries. This last characteristic, together with the absence of jaundice and the low volume of the biliary fistula, pointed to a consideration of nonoperative treatment. The authors hypothesized that such a lesion could be associated with inflammation and edema in the choledochostomy suture line, both of which were likely to improve with time. No reconstructive operation has been done. The strictured segment has resolved so that the patient is completely asymptomatic and has no direct or indirect laboratory or radiographic evidence of biliary obstruction.

8435 CHOICE OF SURGICAL APPROACH IN OPERATIONS ON THE EXTRAHEPATIC BILIARY TRACT. (Rus.) Shalayev, M. I.; Duberman, L. B.; Petrichenko, A. I.; Karasev, V. V.; Shubina, M. E. (Arkhangelsk Medical Inst., Arkhangelsk, USSR). *Khirurgiia (Mosk.)* (7):67-70; 1977.

8436 PORTAL HYPERTENSION IN OBSTRUCTIVE JAUNDICE. (Rus.) Napalkov, P. N.; Artemyeva, N. N. (Leningrad Sanitary Hygiene Medical Inst., Leningrad, USSR). *Khirurgiia (Mosk.)* (7):10-14; 1977.

8437 SPHINCTEROTOMY AND ABLATION OF CHOLEDOCHAL CALCULI BY THE ENDOSCOPIC ROUTE: REPORT OF 14 CASES. (Fre.) Gouerou, H.; Mendez, J.; Crespon, B.; Belaiche, J.; Debray, Ch. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Ann. Med. Interne* 128(6/7):545-547; 1977.

8438 APLASIA AND HYPOPLASIA OF THE GALLBLADDER. REPORT OF TWO CASES. (Ger.) de Heer, K.; Dahm, K. (Universitatskrankenhaus Eppendorf, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Chirurg* 48(2):70-72; 1977.

8439 RETROGRADE ENDOSCOPIC CATHETERISM OF VATER'S PAPILLA: ITS DIAGNOSTIC AND THERAPEUTIC POSSIBILITIES. (Spa.) Sala Felis, T.; Pertejo Pastor, V.; Berenguer Lapuerta, J. (Ciudad Sanitaria de la Seguridad Social "La Fe," Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(5):513-526; 1977.

8440 A RARE ABNORMALITY OF THE EXTRAHEPATIC BILE DUCTS AND THE V. CORONARIA VENTRICULI. (Ger.) Kubik, St.; Groscurth, P. (Anatomisches Institut der Universitat, Gloriastr. 19, CH-8006 Zurich, Switzerland). *Chirurg* 48(2):77-80; 1977.

8441 TREATMENT OF POSTOPERATIVE EXTERNAL BILIARY FISTULAS. (Rus.) Chalganov, A. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Khirurgiia (Mosk.)* (7):85-89; 1977.

8442 EXTERNAL BILE DUCT DRAINAGE. (Rus.) Shor, L. M.; Sherstobitova, L. V.; Buiynina, L. M.; Shor, A. L. (Kaliningrad Regional Hosp., Kaliningrad, USSR). *Khirurgiia (Mosk.)* (7):78-82; 1977.

8443 HEPATICOCHOLECYSTECTOMY IN BILE DUCT OBSTRUCTION. (Rus.) Blagovidov, D. F.; Vishnevskii, V. A.; Gasanov, T. M. (A. V. Bishnevsky Inst. Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (7):70-74; 1977.

8444 ELECTROGASTROENTEROGRAPHIC EXAMINATION FOLLOWING CHOLECYSTECTOMY. (Ger.) Blache, S.; Schulz, J.; Wolf, W. (Kreiskrankenhaus/Poliklinik, Oberst-Komarow-Str. 29, DDR-16 Konigs Wusterhausen, E. Germany). *Dtsch. Gesundheitsw.* 32(30):1428-1433; 1977.

8445 A CASE OF PNEUMOCHOLECYSTITIS. (Fre.) Testart, J.; Chamoun, S.; Jouanneau, P. (No affiliation given). *Chirurgie* 103(5):305-309; 1977.

8446 HEMOBILIA. (Ita.) Lamarca, S.; Rebecchi, F. (Ospedale Civile di Castellamonte, Castellamonte, Italy). *Gaz. Med. Ital.* 136:191-196; 1977.

8447 SURGICAL TREATMENT OF CHOLECYSTITIS. (Cze.) Sery, Z.; Kral, V.; Entner, M. (I. Chirurgicka Klinika Lekarske Fakulty University Palackeho, Olomouc, Czechoslovakia). *Cas. Lek. Cesk.* 116(23):712-715; 1977.

8448 SCINTIGRAPHIC ABSCESS LOCALIZATION WITH ^{99m}Tc-LABELED LEUKOCYTES COMPARED TO ^{67}Ga-CITRATE. (Ger.) Hagemann, J.; Montz, R.; Kugler, S. (Universitatskliniken Eppendorf, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Radiol. Diagn. (Berl.)* 18(2):231-237; 1977.

8449 ACUTE CHOLECYSTITIS AND ITS TREATMENT. (Rus.) Vinogradov, V. V.; Zima, P. I. (Surgery Clinic, Patrice Lumumba People's Friendship Univ., Moscow, USSR). *Khirurgiia (Mosk.)* (7):38-44; 1977.

8450 USEFULNESS OF BIOCHEMICAL LIVER FUNCTION TESTS IN PATIENTS WITH CHOLECYSTITIS. (Pol.) Markert, R. (ul. Zelwerowicza 26a, 90-147 Lodz, Poland). *Wiad. Lek.* 30(14):1095-1099; 1977.

See also, 8001, 8002, 8051, 8123, 8124, 8130, 8132, 8135, 8137, 8138, 8140, 8142, 8267, 8274, 8286, 8302, 8368, 8459, 8461, 8486, 8495.

GENERAL

8451 ANATOMY AND RADIOLOGIC DIAGNOSIS OF PERIHEPATIC ABSCESSES. (Eng.) Whalen, J. P. (New York Hosp., 525 E. 68th St., New York, NY 10021). *Radiol. Clin. North Am.* 14(3):406-428; 1976.

Unfortunately, the morbidity and mortality of perihepatic abscesses are proportional to the time spent on diagnosis, and there is much confusion concerning the anatomy of the spaces of the upper abdomen. Therefore, an attempt was made to define and illustrate the spaces around the liver and to facilitate the radiologic diagnosis of the abscesses within these spaces. A simplified approach to the radiologic routine comprises plain films plus barium films of the stomach, duodenum, and colon in both the frontal and lateral projections. A brief description, accompanied by several radiographs, is given of the types of abscesses that can occur: right visceral abscesses (right paracolic or anterior visceral, midvisceral, posterior visceral), right subphrenic abscesses (anterior, porterior), left perihepatic abscesses (gastrohepatic recess, gastrosplenic recess, renosplenic, lesser sac), and left subphrenic abscesses.

8452 CHEMOTHERAPY OF MALIGNANT MAJOR SALIVARY GLAND NEOPLASMS: A 25-YEAR REVIEW OF M. D. ANDERSON HOSPITAL EXPERIENCE. (Eng.) Rentschler, R.; Burgess, M. A.; Byers, R. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Cancer* 40(2):619-624; 1977.

The clinical manifestations of malignant neoplasms of major salivary glands in 671 patients who received chemotherapy at one hospital during a 25-yr period were defined, and experience with single agent and combination chemotherapy was evaluated as a basis for possible prospective therapeutic trials. Thirty-six patients with advanced local or metastatic disease underwent 62 evaluable trials with a variety of chemotherapeutic agents, either alone or in combination. Six patients achieved a partial response, with a median duration of 3 months. Ten additional patients had stable disease for 2 or more months. Anthracyclines appeared to be the most effective agents in this study, with three partial responses of six evaluable trials. The longest partial response (10 months) occurred in a patient receiving combination chemotherapy plus *Bacillus Calmette-Guerin* immunotherapy. Pulmonary metastases were most commonly responsive to chemotherapy. The median intervals from diagnosis to death or to last follow-up and from initiation of chemotherapy to death or to last follow-up were 30 months and 6 months, resp. Further therapeutic trials are necessary before response rates to single chemotherapeutic agents or combinations can be accurately assessed. In view of the poor prognosis of patients with recurrent disease, postoperative adjuvant studies with chemoimmunotherapy in patients with a high risk of recurrence are planned.

8453 TREATMENT OF DIARRHEAL DEHYDRATION. (Eng.) Sperotto, G.; Carazza, F. R.; Marcondes, M. D. (Hospital das Clinicas, Caixa Postal 8091, Sao Paulo, Brazil). *Am. J. Clin. Nutr.* 30(9):1447-1456; 1977.

A regimen for the treatment of diarrheal dehydration that was developed in Sao Paulo, Brazil, where the incidence of diarrheal disease is 15 to 20% of pediatric hospital visits (approximately 13,000/yr), is presented. The estimated water, Na, and Cl deficit is replaced by an infusion of half-isotonic saline in 2.5% glucose over a 2- to 3-hr period. Fluid deficit can be estimated from clinical parameters or from recent weight records. This rapid fluid replacement does not cause convulsions or pulmonary edema in reasonably well-nourished children. Initiating treatment with 20 ml/kg of saline is preferred in marasmic, malnourished children. K deficit can be corrected by the administration of 2.5 mEq/kg (1 ml of 19.1% KCl solution) for 3-4 days. The routine use of Mg salts, phosphate salts, or biocarbonate is not recommended. Metabolic activity was estimated in 11 children to calculate fluid and electrolyte maintenance needs. Estimating the gain of endogenous metabolic water as approximately 10 ml/100 cal/24 hr, water replaced at the rate of 100 ml/100 cal/24 hr with 3 mEq Na/100 cal/24 hr appeared to maintain urine excretion as an optimal osmolal concentration.

8454 Escherichia coli SEROTYPES THROUGHOUT THE GASTROINTESTINAL TRACT OF PATIENTS WITH INTESTINAL DISORDERS. (Eng.) Tabaqchali, S.; Howard, A.; Teoh-Chan, C. H.; Bettelheim, K. A.; Gorbach, S. L. (St. Bartholomew's Hosp., London, EC1A 7BE, England). *Gut* 18(5):351-355; 1977.

O and H antigen serotyping was performed of *Escherichia coli* present along the entire length of the gastrointestinal tracts of nine patients with bacterial overgrowth of the small intestine. Multiple serotypes and biotypes were represented, although usually a single serotype predominated in each patient. In a number of cases, the different O:H serotypes were antigenically related, indicating that antigenic degradation was occurring. The serotypes isolated from the stomach and small intestine were represented in the feces. In one patient, 6 weeks after p.o. tetracycline therapy, a recolonization of the small bowel with different serotypes of *E. coli* than those observed before antibiotic treatment was observed. Food did not have an effect on serotypes isolated. Fasting and postprandial samples of *E. coli* from four patients yielded similar serotypes, even though food had caused a marked increase in the *E. coli* viable counts and also led to the appearance of the anaerobic *Bacteroides sp.* for the first time in the intestinal aspirates from one patient. In general there appears to be a stable bacterial ecosystem in each patient that may require specific p.o. antibiotics for its alteration.

8455 A STUDY OF THE PREVALENCE OF ROTAVIRUS INFECTION IN CHILDREN WITH GASTROENTERITIS ADMITTED TO AN INFECTIOUS DISEASES HOSPITAL. (Eng.) Birch, C. J.; Lewis, F. A.; Kennett, M. L.; Homola, M.; Pritchard, H.; Gust, I. D. (Fairfield Hosp. for Communicable Diseases, Melbourne, Victoria, Australia). *J. Med. Virol.* 1(1):69-77; 1977.

Evidence of rotavirus infection was sought in 400 fecal specimens from children with gastroenteritis in Melbourne, Australia. Rotavirus was found in 41.7% of the specimens. This virus was detected more often during the winter months, particularly in children aged between 12 months and 3 yr. Detection of rotavirus by electron microscopy was more sensitive than detection by counterimmunoelectrophoresis. Routine bacterial and viral studies revealed that bacterial pathogens (*Salmonella* and *Shigella*) and common enteric viruses were associated with relatively few cases of gastroenteritis. There is little doubt that rotavirus is the most important etiological agent of acute gastroenteritis in young children in Melbourne.

8456 GASTROENTERITIS AND HUMAN REOVIRUS-LIKE AGENT INFECTION DURING THE 1975-76 OUTBREAK: AN ELECTRON MICROSCOPIC STUDY. (Eng.) Brandt, C. D.; Kim, H. W.; Rodriguez, W. J.; Arrobio, J. O.; Kapikian, A. Z.; Wyatt, R. G.; *et al.* (Children's Hosp., 2125 13th St., N.W., Washington, DC 20009). *Clin. Proc. Child. Hosp. Natl. Med. Cent.* 33(2):21-26; 1977.

The stools of 145 infants and children with gastroenteritis (hospitalized during a gastroenteritis epidemic between July, 1975 and June, 1976), 76 outpatients with diarrhea, and 257 controls were examined ultrastructurally for the presence of a human reovirus-like agent (HRVLA). HRVLA was found in the stools of 43.4% of the 145 infants and young children with gastroenteritis. HRVLA infections were detected between December 10, 1975 and May 24, 1976. During January, the peak epidemic month, 88.4% of 43 inpatients with gastroenteritis and 78.9% of 19 outpatients with gastroenteritis were found to be infected with this virus. For the third successive epidemic year, the recently described HRVLA has been a major cause of pediatric "winter" gastroenteritis in Washington, DC.

8457 "DIARRHEA" AND MALABSORPTION IN THE NEWBORN. (Eng.) Lester, R. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *N. Engl. J. Med.* 297(9):505-507; 1977.

8458 LOCATION OF FOOD CONSUMPTION AND TRAVELERS' DIARRHEA. (Eng.) Tjoa, W. S.; DuPont, H. L.; Sullivan, P.; Pickering, L. K.; Holguin, A. H.; Olarte, J.; *et al.* (Univ. Texas Medical Sch. at Houston, Houston, TX 77030). *Am. J. Epidemiol.* 106 (1):61-66; 1977.

8459 SUBPHRENIC ABSCESS: THE NEW EPIDEMIOLOGY. (Eng.) Wang, S. M. S.; Wilson, S. E. (Veterans Admin. Wadsworth Hosp. Center [691/112K], Los Angeles, CA 90073). *Arch. Surg.* 112(8):934-936; 1977.

8460 ROTAVIRUS GASTROENTERITIS. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 2(6090):784-785; 1977.

8461 DIETARY FIBRE: WHEN IS IT WORTH A TRIAL? (Eng.) Pomare, E. W. (Wellington Hosp., Wellington 2, New Zealand). *Drugs* 14(3):213-219; 1977.

8462 SERUM COMPLEMENT LEVELS IN PATIENTS WITH DIGESTIVE TRACT CARCINOMAS AND OTHER NEOPLASTIC DISEASES. (Eng.) Maness, P. F.; Orengo, A. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Oncology* 34(2):87-89; 1977.

8463 PLEOMORPHIC ADENOMAS OF THE PAROTID GLAND RESEMBLING MESENCHYMAL TUMORS. (Eng.) Merino, M. J.; LiVolsi, V. A. (Yale Univ. Sch. Medicine, 310 Cedar St., New Haven, CT 06510). *Oral Surg.* 44(3):405-410; 1977.

8464 ENTEROTOXICITY OF Aeromonas hydrophila. (Eng.) Annapurna, E.; Sanyal, S. C. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi--221005, India). *J. Med. Microbiol.* 10(3):317-323; 1977.

8465 PROGRESS REPORT: ORAL ULCERATION AND BEHCET'S SYNDROME. (Eng.) Lehner, T.

(Guy's Hosp. Medical and Dental Sch., London, England). *Gut* 18(6):491-511; 1977.

8466 PNEUMOPERITONEUM: THE MISLEADING DOUBLE WALL SIGN. (Eng.) de Lacey, G.; Bloomberg, T.; Wignall, B. K. (St. George's Hosp., London SW17, England). *Clin. Radiol.* 28(4):445-448; 1977.

8467 DIETARY FIBRE. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8033):337-338; 1977.

8468 ADENOID CYSTIC CARCINOMA OF THE SALIVARY GLAND AND ITS HISTOLOGIC VARIANTS: A CLINICOPATHOLOGIC STUDY OF THIRTY CASES [Abstract]. (Eng.) Nochomovitz, L. E.; Kahn, L. B. (Univ. Cape Town Medical Sch., Cape Town, South Africa). *Oral Surg.* 44(3):394-404; 1977.

8469 NECROTISING ENTEROCOLITIS DESPITE BREAST FEEDING [Letter to Editor]. (Eng.) Reisner, S. H.; Garty, B. (Beilinson Hosp., Petah Tikvah, Israel). *Lancet* 2(8036):507; 1977.

8470 AN OUTBREAK OF SHIGELLOSIS IN THE PROVINCE OF NEW BRUNSWICK. (Eng.) Leighton, P. M. (Regional Lab., 71 Brunswick St., Fredericton, New Brunswick E3B 1G5, Canada). *Can. J. Public Health* 68(3):249-252; 1977.

8471 RATIONAL MANAGEMENT OF CONSTIPATION. (Eng.) Goulston, K. (Woden Valley Hosp., P.O. Box 11, Canberra, Australian Capital Territory 2606, Australia). *Drugs* 14(2):128-131; 1977.

8472 HOMOSEXUALITY--A RISK FACTOR IN INFECTIOUS DISEASE [Letter to Editor]. (Eng.) Vaisrub, S. (No affiliation given). *JAMA* 238(13):1402; 1977.

8473 VENEREAL TRANSMISSION OF ENTERIC PATHOGENS IN MALE HOMOSEXUALS: TWO CASE REPORTS. (Eng.) Mildvan, D.; Gelb, A. M.; William, D. (Beth Israel Medical Center, New York, NY 10003). *JAMA* 238(13):1387-1389; 1977.

8474 EMERGENCE OF RESISTANCE TO CHLORAMPHENICOL IN Salmonella. (Eng.) Cherubin, C. E.; Neu, H. C.; Rahal, J. J.; Sabath, L. D. (Jewish Hosp. and Medical Center of Brooklyn, 555 Prospect Place, Brooklyn, NY 11238). *J. Infect. Dis.* 135(5):807-812; 1977.

8475 ANTIBIOTIC SUSCEPTIBILITY OF Salmonella typhi FROM CHRONIC ENTERIC CARRIERS. (Eng.) Nolan, C. M.; Rosenfeld, J. (Univ. Arkansas for Medical Sciences, Little Rock, AR 72201). *Curr. Ther. Res.* 21(5):736-740; 1977.

8476 PROLONGED MONOSYMPTOMATIC FEVER DUE TO Yersinia enterocolitica. (Eng.) Bliddal, J.; Kaliszan, S. (Diakonissestiftelsen, Dept. Medicine, P. Bangsvej 1, DK-2000 Copenhagen F, Denmark). *Acta Med. Scand.* 201(4):387-389; 1977.

8477 CYTOTOXICITY OF BREAD AND SOYA PROTEIN IN TISSUE CULTURE [Letter to Editor]. (Eng.) Freed, D. L. J.; Cooper, R. J. (Dept. Bacteriology and Virology, Univ. Manchester, Manchester M13 9PT, England). *Lancet* 1(8007):371-372; 1977.

8478 DISEASES OF THE ALIMENTARY SYSTEM: DYSPHAGIA. (Eng.) Atkinson, M. (General Hosp., Nottingham NG1 6HA, England). *Br. Med. J.* 1(6053):91-93; 1977.

8479 DISEASES OF THE ALIMENTARY SYSTEM: NAUSEA AND VOMITING. (Eng.) Gibbs, D. (London Hosp., London E1, England). *Br. Med. J.* 2(6050):1489-1492; 1977.

8480 PERNICIOUS ANEMIA IN A PATIENT WITH PROGRESSIVE SYSTEMIC SCLEROSIS. (Eng.) Hirose, Y.; Yoshida, Y.; Konda, S.; Tanaka, N.; Hirone, T. (Kanazawa Medical Univ., Ishikawa, Japan). *Acta Haematol. Jpn.* 40(1):1-8; 1977.

8481 HUMAN REOVIRUS-LIKE AGENT INFECTION: OCCURRENCE IN ADULT CONTACTS OF PEDIATRIC PATIENTS WITH GASTROENTERITIS. (Eng.) Kim, H. W.; Brandt, C. D.; Kapikian, A. Z.; Wyatt, R. G.; Arrobio, J. O.; Rodriguez, W. J.; *et al.* (Children's Hosp. Natl. Medical Center, 111 Michigan Ave., Washington, DC 20010). *JAMA* 238(5):404-407; 1977.

8482 MEGALOBLASTIC ANEMIA IN PATIENTS RECEIVING TOTAL PARENTERAL NUTRITION WITHOUT FOLIC ACID OR VITAMIN B_{12} SUPPLEMENTATION. (Eng.) Denburg, J.; Bensen, W.; Ali, M. A. M.; McBride, J.; Ciok, J. (St. Joseph's Hosp., 50 Charlton Ave. E, Hamilton, Ontario L8N 1Y4, Canada). *Can. Med. Assoc. J.* 117(2):144-146; 1977.

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8496 CHANGES IN MAGNESIUM LEVELS DURING DIGESTIVE SURGERY. (Fre.) Belda Poujoulet, R.; Garcia Romero, E.; Lozana Arrans, E.; Arcelus Imaz, I. Ma. (Clinique Chirurgicale I, Granada, Spain). *J. Chir. (Paris)* 111(4):451-458; 1976.

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See also, 7921, 7936, 7958, 7996, 8039, 8116, 8126, 8127, 8129, 8132, 8137, 8168, 8172, 8202, 8203, 8216, 8230, 8231, 8234, 8246, 8247, 8349, 8448.

GENERAL

Parasitology

8500 HYDATID DISEASE IN NEW ZEALAND: AN EPIDEMIOLOGICAL STUDY OF TRANSMISSION AMONG MAORIS. (Eng.) Burridge, M. J.; Schwabe, C. W. (Coll. Veterinary Medicine, Box J-125, JHMHC, Univ. Florida, Gainesville, FL 32610). *Am. J. Trop. Med. Hyg.* 26(2):258-265; 1977.

An epidemiological study was designed to determine the factors placing the Maori people of New Zealand at an unusually high risk of infection with *Echinococcus granulosus*. Using stepwise multiple regression techniques, it was shown that the most important determinant of the incidence rate of human hydatid disease was the proportion of Maoris in the local population. The Maori system of land tenure, based on the Maori land laws, led to the formation of many small fragmented properties under multiple ownership, decreasing the incentive of individual Maori farmers to improve their farming methods. In addition, long-standing behavioral patterns, such as an easy familiarity with working dogs and the feeding of dogs on raw offal, were practices that changed slowly, thus contributing to the maintenance of high *E. granulosus* prevalence in dogs owned by Maoris. These cultural and behavioral factors, together with poor dog control, exposed all members of the rural Maori community to an increased risk of infection with *E. granulosus*, resulting in a strikingly higher incidence rate of hydatid disease for all age-groups and for both sexes among Maoris than among non-Maoris.

8501 TAENIASIS IN POLAND 1966-1975. (Pol.) Zemrzuski, K. (Zakladu Parazytologii Lekarskiej PZH, Chocimska 24, 00-791 Warszawa, Poland). *Pol. Tyg. Lek.* 32(36):1397-1399; 1977.

8502 INTESTINAL HELMINTHIASIS IN IMMIGRANTS FROM SURINAM. (Dut.) Breedveld, P. H.; De Geus, A.; De Jong-Stoelinga, M. H. F. M. (Onderafdeling Tropische Geneeskunde, Koninklijk Instituut voor de Tropen, Amsterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(28):1126-1130; 1977.

8503 ELEMENTS OF A PROGRAM AIMED AT ERADICATION OF GEOHELMINTHIASIS (ASCARIDOSIS AND TRICOCEPHALOSIS), AND THE EVALUATION OF SUCH A PROGRAM. (Rum.) Georgescu, M. (Central Sanitar Antiepidemic, Judetul Ilfov, Rumania). *Rev. Ig.* 26(1):67-74; 1977.

8504 DIFFICULTIES AND ERRORS IN DIAGNOSING THE EARLY PHASE OF OPISTHORCHOSIS IN SURGICAL PRACTICE. (Rus.) Ziganshin, R. V.; Nekrasov, L. P.; Kirilenko, M. P.; Doronin, A. V.; Skarednov, N. I. (Tyumen Medical Inst., Tyumen, USSR). *Sov. Med.* (5):93-96; 1977.

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8506 COLITIS WITH TOXIC MEGACOLON IN A 47-YEAR-OLD WOMAN. (Eng.) Maynard, E. P., III.; Vickery, A. L., Jr. (Massachusetts General Hosp., Boston, MA). *N. Engl. J. Med.* 297(6):322-330; 1977.

See also, 8112, 8115, 8162, 8190, 8472, 8473.

GENERAL

Regional Enteritis

8507 FURTHER OBSERVATIONS ON THE TRANSMISSIBILITY OF CROHN'S DISEASE. (Eng.) Mitchell, D. N.; Rees, R. J. W. (Brompton Hosp., London, England). *Ann. N.Y. Acad. Sci.* 278:546-559; 1976.

To further investigate the possible existence of a transmissible factor in Crohn's disease, normal and immunologically deficient CBA mice were inoculated i.p. or i.v. with whole fresh, fresh autoclaved, fresh supernatant, or filtered supernatant of whole Crohn's or non-Crohn's homogenate prepared from fresh unfrozen gut or mesenteric lymph node tissue into footpads. Epithelioid and giant cell granulomas were present in a substantial proportion of the footpads and in the bowel or mesenteric lymph nodes of a proportion of mice given each fresh Crohn's homogenate b any of these routes 15-17 months after inoculation, but were not present in mice given non-Crohn's or autoclaved Crohn's homogenate. Successful passages were achieved following the inoculation of Crohn's mouse tissue homogenates, including passage from mice receiving filtered supernatant (0.2 μ) or whole Crohn's homogenate, into footpads or i.v. The epithelioid and giant cell granulomas evolved slowly over a period of many months following the inoculation of Crohn's tissue or passage homogenates and persisted thereafter. The transmissible agent is inactivated when homogenate from Crohn's tissue is autoclaved, can be passaged successfully into footpads or i.v., and has been shown to pass an 0.2-μ membrane filter. It is therefore presumably viable and must approximate to the size of a virus or be capable of being deformed to pass a filter of this pore size.

8508 RECTAL POTENTIAL DIFFERENCE AND HISTOLOGY IN CROHN'S DISEASE. (Eng.) Ruddell, W. S. J.; Blendis, L. M.; Lovell, D. (Central Middlesex Hosp., London, England). *Gut* 18(4):284-289; 1977.

Rectal potential difference (PD) was measured at 10 cm from the anus in 27 patients with Crohn's disease and in 16 subjects without gastrointestinal disease (controls) to establish a normal range. The rectal PD in the 16 controls ranged from 28 to 48 mV, with the mean value being 38 ± 3 mV (mucosa negative to serosa). The PD was significantly lower in six patients with sigmoidoscopically active rectal Crohn's disease (17 ± 3 mV) than in Crohn's patients with normal sigmoidoscopic appearances (36 ± 2 mV, $p<0.01$), Crohn's patients with an abnormal but inactive mucosa (40 ± 2 mV, $p<0.01$) and controls (38 ± 3mV, $p<0.01$). The rectal PD in six Crohn's patients whose biopsies showed abnormalities of the superficial epithelium (18 ± 4 mV) was significantly lower than that in Crohn's patients with normal histology (37 ± 2 mV, $p<0.01$) and in patients whose histological abnormalities were restricted to the lamina propria and glands (39 ± 2 mV, $p<0.01$). Excluding patients with sigmoidoscopically active rectal Crohn's disease, the mean rectal PD in 6 Crohn's patients with diarrhea (29 ± 3 mV) was significantly lower than that in 15 Crohn's patients with normal bowel habits (41 ± 2 mV, $p<0.01$) and in controls ($p<0.01$). When the response of rectal PD in 13 patients with Crohn's disease was assessed in relation to mineralocorticoid stimulation with p.o. fludrocortisone (0.1 mg every 8 hr for 6 doses), the PD failed to rise significantly only in 3 patients with sigmoidoscopically active disease and in 3 patients who had severe superficial epithelial abnormalities in their rectal biopsies. Response to fludrocortisone proved to be a less sensitive indication of minor mucosal abnormalities than sigmoidoscopy or biopsy.

8509 THE DILEMMA OF CROHN'S DISEASE: ILEODUODENAL FISTULA COMPLICATING CROHN'S DISEASE. (Eng.) Wilk, P. J.; Fazio, V.; Turnbull, R. B., Jr. (Downstate Medical Center, State Univ. New York, Brooklyn, NY). *Dis. Colon Rectum* 20(5): 387-392; 1977.

The surgical management of nine cases of ileoduodenal fistula complicating Crohn's disease is reported. Because an attempt at primary closure of the duodenal defect may fail, the treatment of choice was formal cross-cut two-layered duodenojejunal anastomosis with extensive drainage of the area postoperatively. Five patients underwent duodenojejunal anastomosis, resection of the terminal ileum, subtotal colectomy, and ileostomy for Crohn's ileocolitis with ileoduodenal fistula; two patients underwent duodenojejunal anastomosis, resection of the terminal ileum and right colon with ileotransverse colon anastomosis, and segmental resection of the sigmoid with colocolonic anastomosis for ileitis with ileoduodenal and ileosigmoidal fistulas; one patient underwent duodenojejunal anastomosis and resection of the terminal ileum and right colon with ileocolonic anastomosis for ileitis with ileoduodenal fistula; and one patient underwent closure of the duodenal fistula, subtotal colectomy, and ileostomy for ileocolitis with ileoduodenal fistula. The inflammatory nest in the right upper quadrant was drained extensively with Penrose drains in every case. There was no postoperative mortality, and only three patients had postoperative complications (mild pneumonia, urinary tract infection, blood clot from bleeding omental vessel). All nine patients have been followed for 6 months to 10 yr and are well with no late recurrence of duodenal fistula. Five patients have needed reoperation for recurrent Crohn's disease of the ileum or colon.

8510 POSSIBLE SIGNIFICANCE OF PROSTAGLANDINS IN THE PATHOGENESIS OF CROHN'S DISEASE. (Ger.) Schmidt, E.; Bruch, H. P.; Walter, K. (Chirurgische Universitatsklinik, Josef-Schneider-Strasse 2, D-8700 Wurzburg, W. Germany). *Chirurg* 48(4):254-255; 1977.

8511 RECURRENCE OF CROHN'S DISEASE: PROBLEMS IN THE INDICATION FOR REINTERVENTION. (Ger.) Krieg, H.; Brunner, H. (Chirurgische Univ.-Klinik, Langenbeckstr. 1, D-6500 Mainz 1, W. Germany). *Chirurg* 48(2):88-92; 1977.

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8513 PROBLEMS RELATED TO COLONIC AND RECTAL LOCALIZATIONS OF CROHN'S DISEASE. (Fre.) Heully, F.; Gaucher, P.; Bigard, M. A.; Leichtmann, G. A. (Hopital de Brabois, 54500 Vandoeuvre, France). *Ann. Gastroenterol. Hepatol.* 13(4):295-306; 1977.

8514 PERI-ANAL SUPPURATION DUE TO CROHN'S DISEASE: FREQUENCY, PATHOGENESIS, AND TREATMENT. (Fre.) Crismer, R.; Delforge, M. (Centre Hospitalier de Briancon, Hautes-Alpes, Belgium). *Ann. Gastroenterol. Hepatol.* 13(4): 311-315; 1977.

8515 IMMUNOSTIMULATING TREATMENT OF CROHN'S DISEASE. (Fre.) Geffroy, Y.; Hecketsweiler, P.; Colin, R.; Paillot, B. (Hopital Ch. Nicolle, 1, rue de Germont, F 76038 Rouen Cedex, France). *Ann. Gastroenterol. Hepatol.* 13(4):317-326; 1977.

8516 TWENTY TWO CASES OF ILEOCECAL COLONIC CASES OF CROHN'S DISEASE TREATED BY SCARIFICATION BY BCG. (Fre.) Hardouin, J. P.; Preel, J. L. (Hopital Louis-Mourier, F 92701 Colombes Cedex, France). *Ann. Gastroenterol. Hepatol.* 13(4):327-330; 1977.

8517 TREATMENT BY CORTICOSTEROIDS OR ACTH. (Fre.) Ruyters, L. (Hopital de Baviere, 66, boulevard de la Constitution, B. 4000 Liege, Belgium). *Ann. Gastroenterol. Hepatol.* 13(4): 331-346; 1977.

See also, 8223, 8242, 8263, 8266, 8451, 8454.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

AADLAND, E.
7963*
AARON, W.S.
8434*
ABELEDO, G.
8352*
ABERNATHY, C.O.
7996*, 8039*
ABLAEVA, T.D.
8414
ABRUNHOSA, R.
8164*
ACKERMANN, E.
8310
ADIGAMOV, L.F.
7989
ADLOFF, M.
8269
AFANAS'EV, S.S.
8414
AFANAS'EVA, K.A.
8414
AFONINA, I.P.
8059
AGUILAR REQUENA, E.
8313
AHLSTEDT, S.
8100*
AIAZZI, L.
8317
AKERLUND, A.S.
8100*
AKIMOTO, R.
8235*
ALAGILLE, D.
8286*
ALAKUIJALA, P.
8033*
ALBERTI, K.G.M.M.
8335
ALEKSANDROVSKAYA, T.N.
8406
ALEMANY ONTIVEROS, J.R.
7976
ALEXANDRE, J.L.
8394
ALI, M.A.M.
8482
ALLEN, T.D.
7904*
ALLGOWER, M.
8165*
ALMEIDA, J.D.
8349*
ALPERT, E.
8334
ALPHIN, R.S.
8105*
ALTER, H.J.
8360*, 8362
ALVARADO, F.
8088*
ALVAREZ, B.
8023*
AMBROSIONI, G.
8314
AMENT, M.E.
8193*
AMIROV, N.S.
7975
AMOURETTI, M.
8393
ANAGNOSTOU, A.
8036*
ANATOVSKAYA, V.S.
8342
ANCONA, E.
8161
ANDERSEN, I.
8356*
ANDREIMAN, L.A.
8060
ANDREU KERN, F.
8318
ANFOSSI, G.
8367
ANIBAL, O.V.
8276
ANNAPURNA, E.
8464
ANTENER, I.
8314
ANTIPOV, V.F.
8322
ANTONOV, D.V.
7975
AOYAMA, Y.
8017*
APARISI-QUEREDA, L.
8401*
APRAHAMIAN, M.
8269
ARAKI, H.
7954
ARCELUS IMAZ, I.M.
8496
ARDASHEVA, S.V.
8079
AREIAS, E.
8398*
ARENDT, R.
8142
ARMELLINI, F.
8098
ARNAUD, J.P.
8269
ARNHOLDT, H.
8091*
ARNOLD, G.
7943
ARONSEN, K.F.
8045*
ARROBIO, J.C.
8456*, 8481
ARTEMOV, O.A.
8174
ARTEMYEVA, N.N.
8436
ASAKURA, H.
8264*
ASANO, E.
8235*
ASANO, T.
8102*
ASCH, L.
8201
ASHIDA, K.
8017*
ASHNER, M.
8212
ASHWORTH, J.N.
8361
ASQUITH, P.
8263*
ATANASSOVA, E.
7938*
ATKINSON, M.
8478
AUBERT, D.
8210
AUZERIE, J.
8214
AZNAR LOPEZ, J.
7976
BABADZHANOVA, N.C.
8239
BABUT, J.M.
8198
BADER, J.P.
8488
BADOR, H.
8350*
BAER, G.M.
8349*
BAGGIO, E.
8098
BAHR, R.
8220
BAKLIEN, K.
8226*
BALINT, J.A.
7926
BARBALATT, S.
7999*
BARBATO, A.
8337*
BARBER, S.M.
8114
BARBIER, J.P.
8197
BARDZIK, I.
8391
BARINSKY, I.F.
8380
BARKER, L.F.
8362
BARON, J.H.
7959*
BARONE, J.
8036*
BARRY, R.E.
8192*
BARTELS, H.
7999*, 8268*
BARTLETT COMA, A.
7976
BASKIN, W.N.
7905*
BASS, P.
8086*
BASSALYK, L.S.
7972, 8418
BATEN'KOVA, I.V.
8205

BATKO, B.
8070
BATSAKIS, J.G.
8487
BATTIN, J.
8214
BAUMGARTEN, R.
8203
BAUNSGAARD, P.
8297*
BAYER, W.L.
8361
BEAUFILS, F.
8229
BECKER, S.V.
8115
BELAICHE, J.
8437
BELDA POUJOULET, R.
8496
BELLEMANN, P.
7992*
BELOKRINITSKY, D.V.
8406
BENDA, K.
8215
BENDER-GOTZE, C.
8268*
BENEDETTI, A.
8021*
BENGMARK, S.
8400*
BENHAMOU, J.P.
8340*
BENJAMIN, I.S.
8035*
BENSEN, W.
8482
BENYO, I.
8107*
BENYO, Z.
8107*
BENZ, L.
8086*
BERAUD, C.
8393
BERCU, G.
8212
BERENGUER LAPUERTA, J.
8439
BERG, T.
8013*
BERGER, M.
8365
BERGMAN, F.
8051
BERGSETH, M.
8046
BERK, R.N.
8423*
BERSTAD, A.
7963*
BESCAPE, F.
8341*
BESSESEN, A.
8011*
BESSOT, M.
8289*
BETTELHEIM, K.A.
8454*
BETTILI, G.
8098
BEYERMAN, H.C.
7983*
BHUJWALA, R.A.
8484
BIANCHI, L.
8355*
BIDALLIER, M.
8046
BIEGER, W.
7987*
BIGARD, M.A.
8513
BIGER, Y.
8364
BIKHAZI, A.B.
7919*
BILETSKY, S.V.
8075
BILLESDON, J.
8192*
BINNIE, S.
8287*
BIRCH, C.J.
8455*
BISMUTH, H.
8430*
BJORNTORP, P.
8303*
BLACHE, S.
8444
BLAGOVIDOV, D.F.
8443
BLASCHKE, T.F.
8283*
BLASCHKE, U.
8142
BLASI, A.
7971
BLENDIS, L.M.
8508*
BLENKINSOPP, W.K.
8396*
BLIDDAL, J.
8476
BLINKOV, I.L.
8406
BLOOMBERG, T.
8466
BLOOMFIELD, G.A.
8291*
BLUMBERG, A.
8230
BLUMGART, L.H.
8035*
BOCHENEK, W.J.
7927
BODNAR, G.V.
8176
BOESBY, S.
8146*
BOGDANIKOWA, B.
8243
BOHANE, T.D.
8225*
BOIKO, N.S.
7977
BOISSEAU, C.
8393
BOKA, V.A.
8275
BOLSEN, K.
8025*
BOLTON, P.M.
8105*
BONDARENKO, N.M.
8071
BONFIGLIOLI, G.
8314
BONFILS, S.
8495
BONG, A.W.
8196
BONK, G.M.
8149
BOQUILLON, M.
7916*
BORJESSON, B.
8400*
BORKOWF, H.I.
8403*
BORON, Z.
8244
BORTHISTLE, B.K.
7902*
BOSSECKERT, H.
8172
BOTTGER, E.
8324
BOUCLY, M.
8246
BOURRILLON, A.
8229
BOUTELIER, P.
8151, 8270
BOWER, R.H.
7961*
BRACQ, H.
8198
BRAGG, D.G.
8129
BRAILSKA, M.
8499
BRAILSKI, C.
8410
BRANDAU, H.
8077
BRANDS, W.
8324
BRANDT, C.D.
8456*, 8481
BRANDT, G.
8159
BRANDTZAEG, P.
8226*
BRAULT, B.
8315
BRAUNER, R.
8376
BREEDVELD, P.H.
8502
BRICHARD, J.M.
8394

BRITTON, K.E.
8057
BROWN, B.E.
8267*
BROWN, J.N.
8049
BROWN, W.R.
7902*
BRUCH, H.P.
8510
BRUNELLO, F.
8367
BRUNNER, H.
8145, 8511
BRUNT, P.W.
8287*
BRUUSGAARD, A.
8425*
BUCHELER, E.
8490
BUDANTSEVA, S.I.
7979
BUDINGER, T.F.
8134
BUFFET, C.
8392
BUIYNINA, L.M.
8442
BULLON, A.
8173
BUONO, G.
8308
BURCHARTH, F.
8425*
BURGER, J.
8135
BURGESS, L.W.
7922
BURGESS, M.A.
8452*
BURKE, V.
7911*
BURRIDGE, M.J.
8500*
BURSTON, D.
7912*
BUTS, J.P.
8228
BUURMAN, R.
8490
BUZY, P.
8202
BYERS, R.
8452*
CAFIERO, M.
8308
CAHILL, P.T.
7997*
CAHLIN, E.
8425*
CALCAMUGGI, G.
8367
CALDWELL, J.H.
8147*
CALNE, R.Y.
8306*, 8307*
CALVO ZAPATA, M.
8245
CAMPO, C.
8173
CAMPOS, J.V.M.
8312
CANOSA, C.A.
8352*
CANTERBURY, W.J.
8040*
CAPEL, I.D.
8113
CAPPELLINI, M.D.
8383*, 8433*
CAPRIOLI, G.
8317
CAPRON, J.P.
7908
CARAZZA, F.R.
8453*
CARBALLAL LUGRIS, M.
8195
CARBONELL, F.
8379
CARNASCIALI, E.
8344
CARNOT, F.
8197
CARSON, E.R.
8399*
CASINI, A.F.
8021*
CASSAN, P.
8278
CASTRO DEL OLMO, R.
8245
CASTRUP, H.J.
8323
CATALANO, F.
7971
CERDA, J.J.
7923
CERF, M.
8231
CESTONARO, G.
8367
CHABAL, J.
8253
CHALGANOV, A.I.
8441
CHALUT, J.
8242
CHAMOUN, S.
8445
CHAMPAULT, G.
8224, 8417
CHANDRA, R.K.
8484
CHAPUIS, Y.
8224
CHARIOT, J.
7940*
CHEESEMAN, C.I.
7913*
CHELI, R.
8166, 8191*
CHEMODUROV, N.T.
8170
CHEN, N.C.
8016*
CHEN, N.S.C.
8016*
CHENOUDA, M.
8419*
CHEPURNOY, G.I.
8153
CHEREDNICHENKO, A.M.
8206
CHERNOBAYEVA, I.D.
8169
CHERUBIN, C.E.
8474
CHILD, J.A.
8333
CHIMBRU, V.I.
8406
CHOE, D.
8023*
CHOLETTE, A.
8375
CHOW, A.W.
8192*
CHRISTIANSEN, L.A.
8425*
CHRISTOFFERSEN, P.
8281*, 8386*
CHRISTOPHE, J.
7986*
CHUBAROVA, Z.V.
8261
CIANCIARA, J.
8359*
CIOK, J.
8482
CLAHSEN, H.
7943
CLARK, M.L.
7912*
CLARK, S.B.
7924
CLINE, W.S.
8086*
COIA, A.
8311
COLIN, R.
8209, 8515
COLLEY, D.G.
8112
COLLOMBEL, C.
8066
COLOBERT, L.
8350*
COMPORTI, M.
8021*
CONDON, R.E.
8274*
CONLON, T.P.
7983*
CONSO, F.
8345
CONTIERI, E.
8080
COOKE, W.T.
8263*
COOMBES, R.C.
8291*
COOPER, E.H.
8333

COOPER, K.A.
7968*
COOPER, R.J.
8477
CORAN, A.G.
8133
CORLETTE, M.B.
8430*
CORNET, A.
8197
CORREIA, J.P.
8398*
CORRING, T.
7933
COUNTEE, R.W.
7942
COURT, H.
7926
COUTURIER, D.
7940*
COUZIGOU, P.
8393
CRABIE, P.
8345
CREMER, M.
8280
CRESPON, B.
8437
CRICK, W.F.
7923
CRISMER, R.
8514
CROITORESCU, L.
8015*
CROIZAT, B.
8254
CROSS, S.A.M.
7964*
CROWELL, E.B., JR.
8346
CUNNINGHAM, H.M.
7934
CUOMO, V.
7948
CURSTEDT, T.
8004*
CUSARO, G.
8089*
CUSCHIERI, A.
8084*
CUSUMANO, A.
8161
CUTZ, E.
8225*
CZARNETZKI, H.D.
8081
D'AMICO, A.
8374
DAEMS, W.T.
7903*
DAGORNE, D.
8067
DAHM, K.
8438
DALE, G.
8486
DALGAARD, J.B.
8281*
DALMAU, J.
8352*
DAMLE, S.R.
8292*
DAPSON, R.W.
7944
DAS, K.M.
8237*
DASHKINA, Z.I.
8074
DAVIDSON, J.F.
8273*
DAVIES, R.L.
8118
DAVIGNON, J.
8046
DAVIS, M.
8295*
DAVY, A.
8252
DE BRITTO-COSTA, R.
8190*
DE CARVALHO, C.A.F.
7901*
DE GEUS, A.
8502
DE GODOY, R.A.
8162*
DE HEER, K.
8438
DE JONG-STOELINGA, M.H.F.M.
8502
DE LA PENA, M.
8173
DE LA SANTA, J.
8318
DE LA SANTA LOPEZ, J.
8258
DE LACEY, G.
8466
DE LAMO, R.
7995*
DE MELLO, J.D.
8120
DE MONTALIER, H.
8278
DE WEVER, I.
7937*
DEBESSE, B.
8197
DEBRAY, C.
7940*, 8437
DECOSSE, J.J.
8274*
DEDLOVSKAIA, V.I.
8206
DEGLI ESPOSTI, A.
8314
DEGOS, J.D.
8415
DEL VALLE BODEGA FRIAS, B.M.
8249
DELAFOLIE, A.
8150
DELAITRE, B.
8224
DELCOURT, A.
8271*
DELFORGE, M.
8514
DEMATTEIS, R.
8026*
DEMIDOVA, A.I.
8097
DENBURG, J.
8482
DENNIS, C.
8419*
DEROIDE, J.P.
8278
DESCHNER, E.E.
8111
DEYHLE, P.
8256
DIAZ-RUBIO GARCIA, E.
8382*
DIAZ-RUBIO GARCIA, M.
8382*
DICKENSON, C.J.
8055
DICKINSON, F.M.
8055
DIEDERICHSEN, H.
8356*
DIEMER, N.H.
8110
DIETRICHSON, O.
8386*
DIMAGNO, E.P.
8125
DITTRICH, H.
8412
DIVRY, P.
8150
DJALDETTI, M.
8282*
DOKLEN, A.
8326
DOMRES, B.
8219
DORONIN, A.V.
8504
DOUGLAS, A.P.
8339*
DOWLING, R.H.
8429*
DRENICK, E.J.
8193*
DREVON, C.A.
8013*
DREW, J.S.
8353*
DROZO, J.
8243
DRUTZ, D.J.
8054
DUBERMAN, L.B.
8435
DUMBLE, L.J.
8381*
DUPAS, J.L.
7908
DUPONT, H.L.
8458
DUPREZ, A.
8289*

DVORACEK, C.
8215
DYBICKI, J.
8247
DYBING, E.
8029*
DYER, I.A.
8016*
DYNNIK, V.I.
8342
EASTWOOD, M.
8136
EBEID, A.M.
7956*
EDDLESTON, A.L.W.F.
8354*
EDMONDS, C.J.
7918*
EDWARDS, W.D.
8148*
EGOROVA, G.I.
8189
ELLISON, M.
8291*
EMANUELLI, G.
8367
ENDERLIN, F.
8135
ENDO, Y.
8355*
ENGELHARDT, D.L.
8117
ENRIQUEZ, L.
8382*
ENTNER, M.
8447
ERBER, W.F.
8237*
ERIKSSON, H.
8004*
ESCOURROU, J.
8204
ESSIOUX, H.
8512
ESSY, A.J.
7944
ETIENNE, J.P.
8392
EVANS, J.S.
8007*
EVERED, D.F.
7931
EVERTS, V.
7960*
FABRE, F.
8417
FACCIOLI, G.
8098
FAINARU, M.
8014*
FAIRCLOUGH, P.D.
7912*
FAMAEY, J.P.
7939*, 7952
FARCASIU, M.
8015*
FARGION, S.R.
8383*, 8433*
FARINELLA, M.
8422*
FAUSA, O.
8226*
FAUST, H.
8081
FAWCETT, A.N.
7982*
FAYS, J.
8289*
FAZIO, V.
8509*
FELDMAN, M.
7968*
FELKER, T.E.
8014*
FENGLER, J.D.
8203
FENNER, A.
7999*
FENYO, G.
8194*
FERGUSON, A.
8099*
FERRALI, M.
8021*
FERRAND, B.
8198
FERRIS, A.A.
8351*
FERRONI, P.
8358*
FIALA, J.M.
8257
FICO, P.
8378
FIEDLER, H.
8362
FILIPPINI, P.
8378
FINCH, M.
8355*
FINEGOLD, S.M.
8193*
FINNIS, D.
8424*
FIORELLI, G.
8383*, 8433*
FISCHER, J.F.
7956*
FLACH, A.
8219, 8220
FLIEGEL, C.P.
8128
FOKINA, A.A.
7977
FONTAINE, J.
7939*, 7946, 7952
FORDTRAN, J.S.
7968*
FORMAL, S.B.
7921*
FORTEZA VILLA, J.
8163*
FRACASSO, M.E.
8076
FRANKEL, N.B.
8262
FRASSON, P.
8161
FREED, D.L.J.
8477
FREEDLAND, R.A.
8009*
FREIDIN, N.
8282*
FREXINOS, J.
8204
FREY-WETTSTEIN, M.
8362
FREZZA, M.
7930
FRIED, W.
8036*
FRIEDMAN, I.H.
8131
FROLAND, S.S.
8226*
FROMKES, J.
8147*
FROMM, D.
7928
FUCHS, K.
8323
FUGIMURA, I.
7901*
FUHRO, R.
7928
FUJIMORI, H.
7914*
FUKUHARA, M.
8296*
FUKUSHIMA, T.
8095
FURMANENKO, N.F.
8277
GABBE, E.E.
8268*
GABRIEL, L.
8397*
GACYK, W.
8247
GAETA, G.B.
8378
GAFTER, U.
8282*
GALANTI, B.
8384*
GALL, D.G.
8225*
GALLEGO CARRACEDO, E.
8155
GALPERIN, E.I.
8322
GANGL, A.
8096
GARCIA, E.P.A.
8312
GARCIA PEREZ, H.
8401*
GARCIA ROMERO, E.
8496
GARDANI, G.
8259
GARDNER, B.
8419*

GARDNER, J.D.
7983*, 7985*
GARIJO FORCADA, J.M.
8195
GARNIER, M.
8417
GARRIDO, A.
8120
GARRIDO TORO, A.
7976
GARSTKA, G.
8343
GARTY, B.
8469
GASANOV, T.M.
8443
GASTARD, J.
8394
GATES, G.F.
8290*
GAUCHER, P.
8513
GAULTIER, M.
8345
GAUTIER-BENOIT, C.
8246
GAVRILENKO, Y.V.
8186
GEBHARDT, R.
7992*
GEENEN, J.W.
8274*
GEFFROY, Y.
8209, 8515
GELB, A.M.
8285*, 8473
GELLER, L.I.
8182, 8497
GENTIL, F.
8312
GEORGESCU, M.
8503
GERIN, J.L.
8360*
GEROK, W.
8028*
GERSHBEIN, L.L.
8037*
GIACOSA, A.
8191*
GIANNELLA, R.A.
7921*
GIBBS, D.
8479
GIBINSKI, K.
8494
GICHEV, Y.P.
8058
GIGNOUX, M.
8252
GILKES, J.J.H.
8291*
GILLE, P.
8210
GINSEL, L.A.
7903*
GINZBURG, S.N.
8239
GIORDANO, F.
8389*
GIORGIO, A.
8378
GIROUD, M.
8350*
GITNICK, G.L.
8362
GIUSTI, G.
8384*
GJONE, E.
8226*
GLAZIER, R.L.
8346
GLINSKAIA, T.P.
8182, 8497
GO, V.L.W.
8125
GOEBEL, F.D.
8390*
GOEBEL, K.M.
8390*
GOERZ, G.
8025*
GOH, E.H.
8000*
GOLDBERG, D.M.
7982*
GOLDBERG, N.
8431*
GOMEZ FAYREN, J.M.
8163*
GONZALEZ-MOLINA, A.
8379
GOODRICH, B.S.
8119
GORBACH, S.L.
8454*
GOSALVEZ, J.A.
8352*
GOSSELIN, M.
8394
GOTTWALD, G.
8140
GOTZE, W.
8069
GOUEROU, H.
8437
GOULSTON, K.
8471
GOVAERTS, J.P.
8280
GOVDENKO, P.F.
8277
GRACEY, M.
7911*
GRAND, R.J.
8090*
GRANNIKOVA, S.A.
8380
GRECHISHKINA, A.P.
7980
GREENWALD, M.
8043*
GREENWALT, T.J.
8362
GREGORY, R.L.
8105*
GREILING, H.
8012*, 8030*
GREIM, H.
8294*
GREK, O.R.
8058
GRESSNER, A.M.
7943, 8012*, 8030*
GREY, H.M.
7902*
GRINEVICH, V.B.
7978
GROENER, J.E.M.
8020*
GROSCURTH, P.
8440
GRUEV, I.
8499
GRUNDMANN, R.
8321
GRYBOSKI, J.D.
8109
GUBERGRITS, A.I.
8168
GUDAT, F.
8355*
GUEST, J.
8035*
GUIX-GARCIA, J.
8401*
GUL'MAN, L.A.
8200
GULLIKSON, G.W.
8086*
GURTOVENKO, V.M.
8059
GUST, I.D.
8455*
GUST, I.E.
8351*
HACKER, D.V.
8115
HAFFENDEN, G.P.
8396*
HAGEMANN, J.
8448
HAHN, R.G.
8233*
HAJJAR, J.J.
7919*, 7929
HAMER, D.B.
7959*
HAMILTON, J.R.
8225*
HAMILTON, R.L.
8014*
HAMLYN, A.N.
8339*
HANNA, S.S.
8347
HANSON, L.A.
8100*
HARARI, A.
8488
HARDERS, H.
8489

HARDOUIN, J.P.
8516
HARLER, B.
8157
HARMS, L.
7991
HARNACK, H.
8343
HART, F.E.
8034*
HARTIG, W.
8081
HARVEY, R.F.
8127
HASCHEN, R.J.
8411
HATFIELD, A.R.W.
8267*
HAUZEUR, F.
8142
HAVEL, R.J.
8014*
HECKETSWEILER, P.
8515
HEDGES, A.R.
7962*
HEHUNSTRE, J.P.
8214
HEIDELBERGER, K.P.
8133
HEIDL, G.
8412
HEIL, T.
7936*
HEILMANN, E.
8309
HEIMBERG, M.
8000*
HEIN, J.
7906
HEINRICH, H.C.
8268*
HELLEMANS, J.
7937*
HELSEN, L.
7946
HEMET, J.
8209
HEMMINGS, W.A.
7917*
HEMPEL, D.
8248
HEMS, D.A.
8019*
HEPP, J.
8430*
HERMEL, A.A.
8251
HERNANDO, L.
8044*
HERZOG, B.
8128
HETTENA, A.J.
7915*
HEULLY, F.
8513
HIBI, T.
8264*
HICKMAN, R.
8050
HIERHOLZER, J.C.
8349*
HIGASHI, T.
7993*
HIGUCHI, W.I.
8001*, 8002*
HILDEN, M.
8281*
HIMSWORTH, R.L.
8291*
HIOKI, M.
8024*
HIRAYAMA, C.
8385*
HIRONE, T.
8480
HIROSE, Y.
8480
HOFFER, R.E.
8114
HOFMANN, A.F.
8001*, 8002*
HOLGUIN, A.H.
8458
HOLLWARTH, M.
8265
HOLT, P.R.
7924
HOMOLA, M.
8455*
HONDA, F.
7947
HONJO, I.
8298*
HORAK, W.
8408
HORSING, M.
8272*
HOSHI, T.
7920*
HOWARD, A.
8454*
HUBEL, K.A.
7925
HUELIN BENITEZ, J.
8175
HUNT, J.N.
7953
HUTCHESON, D.P.
8115
HUTSON, D.
8402*
IAKIMENKO, G.V.
8179
IANCU, T.C.
8301*
IGARASHI, Y.
7920*
ILYINSKY, Y.A.
8377
IMLER, M.
8416
IMRIE, C.W.
8273*
IRISA, T.
8385*
ISHIDA, N.
8121
ISHIGURO, N.
8095
ISPIZUA, I.
8173
IVEY, K.J.
7905*
JACKSON, M.J.
7985*
JAKOB, A.F.
8005*
JAMES, J.
7960*
JAMES, O.F.W.
8339*
JANSSEN, P.A.J.
7946
JANSSENS, J.
7937*
JANTSCHULEV, J.
7990
JAROSS, W.
8069
JAVITT, N.B.
7997*
JIRSCH, D.W.
8347
JOB, C.
8315
JODAL, U.
8100*
JOHNS, M.E.
8487
JOHNSON, J.C.
8147*
JOHNSON, R.J.
8016*
JOHNSTON, D.G.
8335
JONES, E.A.
8399*
JONES, R.S.
8108*
JOPPICH, I.
8324
JOST, R.G.
8124*
JOUANNEAU, P.
8445
JUAREZ FERNANDEZ, C.
8175
JUHL, E.
8281*
JURUKOVA, Z.
7938*
JUSZCZYK, J.
8368
KADZIOLKA, R.
8428*
KAHN, L.B.
8468
KALINICHENKO, N.I.
7979
KALINKA, R.F.
8169
KALINOS, V.L.
8238

KALISZAN, S.
8476
KALLFELZ, F.A.
8114
KAMIYAMA, Y.
8298*
KANTOROVICH, R.A.
8406
KAPIKIAN, A.Z.
8456*, 8481
KAPITANENKO, A.M.
8186
KAPLAN, P.M.
8360*
KAPPELMAN, N.B.
8330
KARASEV, V.V.
8435
KARNAUKHOV, Y.N.
8186
KASMAN, S.R.
8179
KASPAR, R.L.
8054
KATO, K.
8181*
KATSUKI, S.
7947
KAWAMURA, I.
7941
KAWASAKI, H.
8385*
KAZIMIRCHIK, A.P.
8497
KAZNACHEEV, V.P.
8058
KECKER, K.
8325
KEDAR, I.
8043*
KEMMER, C.
8412
KENNETT, M.L.
8455*
KEPES, J.J.
8148*
KERMODE, J.C.
7918*
KERN, F., JR.
8004*
KERN, H.F.
7987*
KERR, J.C.
8006*
KERTSMAN, V.I.
7972
KERWAR, S.S.
8023*
KHAMIDKHODZHAEVA, D.
8053
KHARITONOV, L.G.
8152
KHASNULIN, V.I.
8058
KHIZHNYAKOVA, L.N.
8342
KICZKA, W.
8368
KIDOKORO, T.
8181*
KIEKENS, R.
8280
KIFFER, B.
8202
KIKKAWA, K.
8138
KILAM, S.
7935*
KIM, H.W.
8456*, 8481
KIM, Y.O.
8058
KIMURA, K.
8296*, 8298*
KIMURA, S.
8235*
KIRILENKO, M.P.
8504
KIRUKI, K.
7914*
KIRYUKHIN, I.F.
8170
KISSEBAH, A.H.
8008*
KITAGAWA, H.
8024*
KITO, F.
8095
KIYANOV, V.I.
8073
KIYOMOTO, A.
7949, 7951
KLATSKIN, G.
8293*
KLEE, J.
8110
KLEINER, A.I.
8342
KLEPACKI, A.
8243
KLIMA, T.
8262
KLIMENKO, A.I.
7907
KLIMOV, P.K.
7977
KLINKEN, L.
8110
KLOPPER, P.J.
7960*
KNOX, M.T.
7953
KOBLER, E.
8256
KOCH, H.
8266
KOELSCH, K.A.
8144
KOHAMA, T.
8121
KOLODEJ, A.
7945
KOMOROWSKA, M.
8180*
KONDA, S.
8480
KONDO, H.
8017*
KONDO, K.
8181*
KONDO, T.
7965*
KONDRASHOVA, Z.D.
8418
KONSTANTINOV, B.
7990
KONTUREK, S.J.
7967*
KOPYLOVA, L.S.
8061
KORTEZOVA, N.
7938*
KORZYCKI, J.
8213
KOSEK, J.
8299*
KOTHE, W.
8156
KOVALYOV, M.M.
8277
KOWALEWSKI, K.
7945, 7969*
KOZLOVA, Z.P.
8182
KRAL, J.G.
8303*
KRAL, V.
8447
KRASZNAI, A.
8326
KRAUSE, H.J.
7905*
KREY, G.
8355*
KRIEG, H.
8511
KRIEG, T.
8025*
KRIVULIS, D.B.
8060
KRONCHEN, A.
7943
KRYSKA, A.
8368
KRYSZEWSKI, A.
8391
KUBIK, S.
8440
KUBO, K.
8320
KUBO, R.T.
7902*
KUGLER, S.
8448
KUHNE-HELD, R.
8172
KULHANKOVA, J.
8215
KUNTZ, J.L.
8201
KUNZE, E.
8331
KUNZLE, J.E.
8190*

KUPCSULIK, P.
8042*
KURDYBAILO, F.V.
8139
KUSACHI, T.
7920*
KUTESHEV, F.K.
8216
KUZNETSOVA, N.I.
8059
KVITSINSKAYA, E.A.
8060
KWAN, K.H.
8001*, 8002*
KYRAL, V.
8498
LABADARIOS, D.
8295*
LABAYLE, D.
8392
LACHANCE, C.
8431*
LACKI, M.
8247
LAMARCA, S.
8422*, 8446
LAMBERT, R.
8187
LAMBOTTE, L.
8041*
LANDABURU, R.H.
7995*
LANGE, L.
8063
LAPIS, K.
8027*
LAPOINTE, G.
8375
LAPORTA, A.J.
8274*
LAVERDANT, C.
8512
LAWRENCE, G.A.
7934
LAWSON, T.L.
8123*
LAZAREV, I.M.
8238
LE GALL, J.R.
8488
LEBEDEV, D.A.
7989
LECHIN, F.
8167
LEE, W.M.
8354*
LEFRECHE, J.N.
8198
LEGER, L.
8224
LEHMANN, N.I.
8351*
LEHNER, T.
8465
LEIBOWITZ, S.
8284*
LEICHTMANN, G.A.
8513
LEIGHTON, P.M.
8470
LEJA, Y.Y.
8169
LELIEVRE-GASSIN, C.
8202
LEMAIRE, A.
8369
LEONE, R.
8076
LEPAGE, J.
8402*
LESBRE, F.
8350*
LESNA, M.
8339*
LESSARD, Y.
8067
LESTER, R.
8457
LEUPOLD, H.
8376
LEVENS, N.R.
7932
LEVESQUE, M.
8315
LEVITT, R.G.
8124*
LEVKOVSKY, A.V.
8185
LEVY, V.G.
8242
LEWINSKI, U.
8282*
LEWIS, F.A.
8112, 8455*
LEWIS, J.D.
8403*
LEZHNEV, I.A.
8377
LIBOV, A.S.
8216
LIDIN-JANSON, G.
8100*
LIEBERMANN-MEFFERT, D.
8165*
LIEPINSH, M.A.
8275
LINDBLAD, L.
8425*
LINDELL, B.
8045*
LINDENSCHMIDT, T.O.
8248
LINEVSKY, Y.V.
8207
LIPKIN, M.
8111
LIPPMANN, W.
7966*
LIPSHUTZ, W.H.
7961*
LISSNER, R.
8025*
LIVOLSI, V.A.
8463
LLANOS, O.L.
7967*
LLOMBART BOSCH, A.
8163*
LO BUONO, M.L.
8378
LOCARNINI, S.A.
8351*
LOCH, T.
8359*
LOGINOV, A.S.
8418
LOHRS, U.
8091*
LOMBARD-PLATET, R.
8254
LONDON, W.T.
8353*, 8360*
LOPEZ-NOVOA, J.M.
8044*
LOPEZ VIZCAYA, F.
8245
LORENZINI, C.
8289*
LORENZSONN, V.
8086*
LORIE, N.Y.
8406
LOUP, P.
8158
LOUVEL, A.
8224
LOVE, R.J.
8119
LOVELL, D.
8508*
LOWRY, P.J.
8291*
LOZANA ARRANS, E.
8496
LUCCHELLI, P.E.
8384*
LUCCIONI, P.
8278
LUCHSHEV, V.I.
8377
LUCIANI, M.
7930
LUISI, A.
8312
LUJAN PUJANTE, E.
8163*
LUNAZZI, G.C.
7930
LUNDH, B.
8400*
LUNDHOLM, K.
8303*
LUQUE MARTIN, A.
8245
LUSSIER-CACAN, S.
8046
MACDONALD, T.T.
8099*
MACHOTKA, S.V.
8040*
MACKAY, I.R.
8381*
MACKERCHER, P.
7905*

MACKINTOSH, P.
8263*
MACLENNAN, R.
8234*
MACLER, J.
8269
MADDREY, W.C.
8083*
MAGARIBUCHI, T.
7949, 7951
MAGEE, D.F.
7965*
MAGID, E.
8272*
MAGNUSSON, G.
8018*
MAGNUSSON, O.
8018*
MAHMOOD, A.
8088*
MAKARENKO, T.P.
8152
MAKAROVA, L.A.
8183
MAKHMUDOV, O.S.
8373
MAKOTCHENKO, E.P.
8342
MAKOWSKA, U.
8372
MALAJCZUK, A.
7911*
MALDONADO ELOY-GARCIA, J.
8175
MALESCI, A.
8383*
MALINOWSKI, S.
8494
MALLAS, E.G.
8263*
MANDEL, E.M.
8282*
MANDOUR, T.
8008*
MANESS, P.F.
8462
MANGAT, S.
7998*
MANGOLD, H.K.
8092
MANNING, A.S.
7931
MANSUROV, K.K.
8316
MANTOVANI, E.
8341*
MANTOVANI GUERREIRO, C.A.
8312
MANZILLO, G.
8384*
MARCEL, Y.L.
8046
MARCONDES, M.D.
8453*
MARGULIS, M.S.
8060
MARIE, C.
8340*
MARKERT, R.
8450
MARKOV, Y.G.
8060
MARLETTA, F.
7971
MARRS, T.C.
7912*
MARSELOS, M.
8033*
MARTI, M.C.
8255
MARTIGNON, C.
8197
MARTINEAU, G.
8404
MARTY, M.L.
8379
MASLOWSKI, W.
8372
MASON, W.H.
8301*
MASSET, F.
8257
MATHIEU, P.
8260
MATHON, C.
8254
MATSUI, T.
8296*
MATSUMOTO, H.
7954
MATSUOKA, Y.
8296*
MATTES, P.
7936*
MATTHEWS, D.M.
7912*
MAUUARY, G.
8289*
MAYER, D.
8063
MAYNARD, E.P., III
8506
MAZARRO VALLE, A.
8249
MCAULIFFE, V.J.
8360*
MCBRIDE, J.
8482
MCCABE, B.F.
8485
MCCONNELL, J.B.
8295*
MCCREARY, R.H.
8233*
MCGILL, C.
8434*
MCGINNIS, J.
8016*
MCMASTER, P.
8307*
MCMULLAN, J.M.
7931
MCPHIE, J.L.
8287*
MECKE, D.
7992*
MEKHJIAN, H.
8147*
MENDEZ, J.
8437
MENEGHELLI, U.G.
8162*
MENESES, L.
8398*
MERCIER, J.C.
8229
MERCKE, C.
8400*
MERINO, M.J.
8463
MESA, A.V.
8271*
METAYER, J.
8209
METZE, H.
8077, 8338
MEYER, R.J.
8304*
MICHALAK, J.
8217
MICHELSOHN, N.H.
8403*
MIERSCH, H.
8203
MIGNON, F.C.
8488
MIKHAILOV, A.T.
8322
MILOVAN, D.
8285*, 8473
MILEV, N.
8499
MILLER, J.H.
8290*
MINAIRE, Y.
8187
MINTZ, U.
8126
MIRAKHMEDOV, M.
8053
MIRODZHOV, G.K.
8316
MIRZOYAN, S.A.
7981
MITCHELL, D.N.
8507*
MITOLO-CHIEPPA, D.
7948
MIYAGAMI, H.
8181*
MIYAHARA, J.T.
7947
MIYAZAKI, I.
8235*
MIYOSHI, A.
7941
MIZUNO, Y.
8264*
MODIGLIANI, R.
8208
MODZELEWSKI, B.
8213
MOERTEL, C.G.
8233*

MOESNER, J.
8297*
MOHRI, T.
8024*
MOLINIE, C.
8512
MOLCKHIA, A.M.
8001*, 8002*
MONKS, J.L.
7922
MONNIER, J.P.
8242
MONOD, E.
8493
MONROY-RODRIGUEZ, O.
8313
MONTANT, A.
8257
MONTORO, J.A.
8379
MONTOWSKI, J.
8244
MONTZ, R.
8448
MOODY, D.E.
8052
MOOG, F.
8085*
MOREIRA, A.
8120
MORENO GONZALEZ-BUENO, C.
8154
MORENO LOPEZ, J.M.
8175
MORGAN, W.J.B.
8116
MORIN, C.L.
8228
MORITA, T.
8296*
MORIWAKI, C.
7914*
MORIYA, H.
7914*
MORL, M.
8388, 8397*
MORLAND, J.
8011*
MORRIS, J.A.
8116
MORRIS, J.G.
8009*
MORTON, A.G.
7994*
MOSER, G.
8257
MOSIMANN, R.
8158
MOSIN, V.I.
7957
MOSLEY, J.W.
8361
MOUROT, M.
8210
MUKHIN, A.S.
8059
MULLER, J.H.
7960*
MUNDAY, K.A.
7932
MUNZEL, M.
7958
MURAKI, T.
8095
MURPHY, D.
8273*
MURRAY, P.
7956*
MURTY, C.N.
8010*
MURZINA, N.B.
8497
MUSCHMOV, D.
8499
MYSHKIN, K.I.
8199
NADELL, J.
8299*
NADIR, N.S.
7919*
NAHNSEN, L.
8265
NAHUM, H.
8315
NAITO, K.
7955
NAKAGAWARA, G.
8235*
NAKAHATA, N.
7950
NAKAJIMA, H.
7949, 7951
NAKANE, P.K.
8357*
NAKANISHI, H.
7950
NAMBU, H.
8298*
NAPALKOV, P.N.
8436
NARNE, S.
8161
NARS, P.
8128
NARUSE, A.
7993*
NASAREVSKY, N.G.
8170
NATH, N.
8364
NAULTY, J.S.
8348*
NAUMOV, S.P.
8322
NECHIPORUK, V.M.
8185
NEDBAILO, E.P.
8342
NEFEDOVA, V.C.
8143
NEIDHARDT, B.
8188
NEKLYUDOVA, E.A.
8322
NEKRASOV, L.P.
8504
NELSON, E.W.
7923
NEMETH, M.
8042*
NEPOMNYASCHIKH, G.I.
8058
NESTEROVICH, I.M.
8078
NESTRUCK, A.C.
8046
NEU, H.C.
8474
NEUMANN, E.
8492
NEUSTEIN, H.B.
8301*
NEUTRA, M.R.
8090*
NEWPORT, G.R.
8048
NG, P.Y.
7924
NICOARA, A.
8311
NIEDERLAND, T.R.
8064, 8141
NIESSEN, K.H.
8220
NIGMATULINA, A.V.
8074
NIKI, K.
7970
NILOFF, P.H.
8431*
NILSSON, S.
8428*
NIZZE, H.
7991
NOCHOMOVITZ, L.E.
8468
NOLAN, C.M.
8475
NORUM, K.R.
8013*
NUESCH, H.J.
8256
O'CONNELL, M.J.
8233*
ODIEVRE, M.
8229
ODOULAMI, H.
8253
OGATA, T.
8385*
OHASHI, H.
7955
OHSHITA, M.
8298*
OKADA, T.
7955
OLARTE, J.
8458
OLLIVIER, J.M.
8252
OLMO-PUCHALT, J.A.
8401*
OLSEN, W.A.
8086*

ONGARO, G.
8337*
ONO, A.
8264*
OPPITZ, K.H.
8268*
ORENGO, A.
8462
ORLOVA, I.N.
8139
ORONSKY, A.L.
8023*
OSIPOV, L.N.
8319
OSMAN, C.G.
8354*
OSTROVERKHOV, G.E.
8074
OSTROWSKI, L.
8243
OTERO PORTELA, J.L.
8195
OTTOLENGHI, A.
8098
OWENS, D.
8399*
OZAWA, K.
8298*
OZHEREL'EVA, N.I.
8497
PACHKOWSKI, T.
7969*
PADOVAN, W.
8162*
PAGE, C.R., III
8048
PAGEAUT, G.
8210
PAILLOT, B.
8515
PAINVIN, G.A.
8404
PAK, S.G.
8377
PANFILI, E.
7930
PAQLET, K.J.
8157
PARFENTIEVA, A.Y.
8370
PARSONS, D.S.
7913*
PARSONS, M.E.
7962*
PASSARO, E., JR.
8193*
PATEL, J.C.
8224, 8417
PATERAS, C.
8260
PATRIARCA, P.L.
8336*
PATTI, J.
8419*
PAULET, G.
8067
PAUMGARTNER, G.
8062
PAUSCH, J.
8028*
PAWLOWSKI, S.
8221
PAZEN, H.
8030*
PELIKAN, L.
8215
PENENKOV, B.L.
8179
PENKA, W.E.
8148*
PERACCHIA, A.
8161
PEREIRAS, R.
8402*
PEREZ-OLIVARES JAEN, J.
8175
PERGOLA, F.
8184
PERTEJO PASTOR, V.
8439
PESAVENTO, G.
8161
PESENDORFER, F.X.
8492
PESSAYRE, D.
8340*
PETER, S.
7987*
PETRELLI, G.P.
8336*
PETRENKO, V.F.
8497
PETRICHENKO, A.I.
8435
PETRO, S.P.
8114
PETROV, V.P.
8240
PEYSER, M.R.
8305*
PEZZINI, F.
8344
PFAU, A.A.
8268*
PFEIFFER, C.J.
7935*
PHILIPPE, O.
8254
PICCININO, F.
8384*
PICHLMAIER, H.
8321
PICK, A.I.
8126
PICKERING, L.K.
8458
PIEGZA, S.
8223
PILASZANOVICH, I.
8505
PINTER, A.
8505
PIOVESAN, A.L.
8337*
PISAREVSKY, A.A.
8322
POCAS, L.
8164*
PODDA, M.
8433*
PODOBEDOV, G.M.
8414
POLIAK, N.R.
8261
POLK, H.C., JR.
8434*
POMARE, E.W.
8461
POPESCU, A.
8015*
POPIELA, T.
8180*
POPOV, D.T.
8327
POPOV, V.A.
8218
PORCELLINI, M.
8080
PORTMANN, B.
8307*
PORTNOY, L.M.
8143
POSTOVIT, V.A.
8319
POTTEN, C.S.
7904*
POTTER, D.E.
8365
POTZI, R.
8492
POURET, J.P.
8255
POURRIAT, J.L.
8417
POWANDA, M.C.
8040*
PRECCHIA, A.
8374
PRECCHIA, E.
8374
PRECCHIA, G.
8374
PREEL, J.L.
8516
PRESKORN, S.H.
8148*
PRICE, A.B.
7959*
PRITCHARD, H.
8455*
PROTCHENKO, N.V.
8241
PRZEZDZIAK, J.
8391
PSALMON, F.
8417
PURCELL, R.H.
8360*
PURRI, P.
8080
PYNADATH, T.I.
8003*
RADBIL', O.S.
7957

RADUGINA, G.S.
8387
RAHAL, J.J.
8474
RAIA, A.A.
8120
RAJALAKSHMI, S.
8047
RAKHIMOV, K.
8097
RAMIREZ MACIAS, M.
8245
RAMON Y CAJAL, S., JR.
8173
RAMSBOTTOM, N.
7953
RANCE, M.J.
8093
RAPIN, M.
8488
RAPTIS, S.
7936*
RASBOINIKOV, S.
8499
RATHE, J.
7986*
RAVID, M.
8043*
RAYFORD, P.L.
7967*
REBECCHI, F.
8446
REDDY, B.S.
7998*, 8103*
REDDY, J.K.
8052
REED, W.D.
8354*
REES, R.J.W.
8507*
REGEZI, J.A.
8487
REGIMBAU, V.
8150
REICHWALD, I.
8092
REID, M.
8010*
REINA CAMPOS, F.
8318
REINA, J.A.
8318
REISIS, A.R.
8380
REISNER, S.H.
8469
REITEMEIER, R.J.
8233*
RENAUD, R.
8269
RENGEL, M.A.
8044*
RENTSCHLER, R.
8452*
RERAT, A.
7933
REUSE, J.
7939*, 7952
REVES, J.G.
8348*
REYNOLDS, D.G.
8006*
RICHARDSON, C.T.
7968*
RIISOM, K.
8356*
RIMARCHUK, G.V.
8205
RINDI, G.
8089*
RIXON, R.H.
8038*
ROBBS, J.V.
8122
ROBERT, A.
8102*
ROBERTS, E.E.
8118
ROBERTS, G.M.
8118
RODGERS, J.B.
7927
RODICIO, J.L.
8044*
RODRIGO GOMEZ, J.M.
8401*
RODRIGUEZ, W.J.
8456*, 8481
ROGERS, Q.R.
8009*
RONCHI, G.
8383*
RONCIN, G.
8067
RONZONI, L.
8317
ROSCHLAU, G.
8407, 8412
ROSENFELD, A.T.
8330
ROSENFELD, J.
8475
ROSENKRANZ, H.S.
8117
ROSSOUW, J.E.
8295*
ROTENBERG, V.I.
8241
ROTHMAN, S.S.
7984*
ROTHMAN, U.
8045*
ROTHWELL, T.L.W.
8119
ROUGER, P.
8242
ROUGIER, P.
8495
ROUT, W.R.
7921*
ROUZIOUX, J.M.
8065
ROWNTREE, T.
8424*
ROY, C.C.
8228
ROZE, C.
7940*
ROZENTAL, R.L.
8060
RUBALTELLI, F.F.
8337*
RUBINSTEIN, A.
8237*
RUDDELL, W.S.J.
8508*
RUDLOFT, J.
8202
RUEFF, B.
8395
RUGGIERO, G.
8384*
RUMYANTSEV, V.V.
8149
RUNE, S.J.
8272*
RUSSELL, E.
8402*
RUSSELL, R.L.
8000*
RUYTERS, L.
8517
RYAN, C.J.
8035*
RYKOV, V.A.
8222
RYSS, E.S.
7909
RYZHKOV, A.I.
8218
SAAKYAN, A.G.
8183
SABATH, L.D.
8474
SACHS, I.L.
8262
SAGEL, S.S.
8124*
SAKAMOTO, Y.
7993*
SALA FELIS, T.
8439
SALAS-COLL, C.A.
7918*
SALE, J.K.
7982*
SALIEV, F.S.
8316
SANCHEZ-CUENCA, J.M.
8379
SANCHEZ DE LA CUESTA Y ALARCO
F. 7976
SANDLER, S.G.
8364
SANDOR, J.
8107*
SANTELLA, R.M.
8117
SANYAL, S.C.
8464
SANZ, M.A.
8379
SAPOZHNIKOV, V.M.
8405

SARKISYAN, E.L.
7979
SARLES, H.
8068
SARMA, D.S.R.
8010*, 8047
SAUBERLI, H.
8256
SAVICH, V.I.
8071
SAWADA, Y.
8181*
SCHADE, S.
8036*
SCHAFER, J.
8505
SCHAUER, A.
8331
SCHEDL, H.P.
7929
SCHERSTEN, T.
8303*, 8425*, 8428*
SCHIERHOLT, K.D.
8420*
SCHIFTER, P.
8505
SCHILLER, G.
8145
SCHLEBUSCH, H.
8343
SCHMID, C.
8389*
SCHMIDT, E.
8510
SCHMITT, J.C.
8260
SCHMITZ-MOORMANN, P.
7906
SCHNEIDER, J.
8390*
SCHRODER, H.
8110
SCHROEDER, J.J.M.
7960*
SCHUBOTZ, R.
8390*
SCHULLER, D.E.
8485
SCHULTE, W.J.
8274*
SCHULTZ, W.W.
8348*
SCHULZ, J.
8444
SCHULZE, F.
8265
SCHUMPELICK, V.
8250
SCHUTT, A.J.
8233*
SCHUTT, C.
7991
SCHWABE, C.W.
8500*
SCHWAGER, A.
8409
SCHWARTZ, S.E.
7922
SCHWARZ, L.R.
8294*
SCHWEIZER, P.
8219
SCHWENK, M.
8294*
SCHWILDEN, E.D.
8491
SCIORELLI, G.
8089*
SCOTTO, J.M.
8421*
SEAMAN, I.
7939*, 7952
SECORD, D.C.
7969*
SEETHALER, K.
7966*
SEGOL, P.H.
8252
SELBY, L.A.
8115
SEMB, L.S.
7963*
SEMENDYAEVA, M.E.
8406
SEMENZATO, G.
8337*
SEMLER, P.
7973
SENSALE, P.
8308
SEROR, J.
8260
SERRA-DESFILIS, M.A.
8401*
SERY, Z.
8447
SEVERINI, A.
8259
SHALAYEV, M.I.
8435
SHAPKIN, V.S.
8328
SHEARIN, N.L.
7935*
SHEEHY, T.W.
8302*
SHEINFIL, A.
7998*
SHER, A.
8112
SHERSTOBITOVA, L.V.
8442
SHIBATA, S.
7947
SHIKATA, T.
8288*
SHILLINGFORD, J.S.
8093
SHIRACHI, R.
8121
SHIRAISHI, H.
8121
SHKURKINA, L.G.
8171
SHOENFELD, Y.
8126
SHONO, K.
8181*
SHOR, A.L.
8442
SHOR, L.M.
8442
SHUBINA, M.E.
8435
SHULIAKOVSKAIA, T.A.
8079
SHUTE, K.
8101*
SIBIRKIN, N.V.
8189
SIDRANSKY, H.
8010*
SIEGEL, N.J.
8330
SIGMAN, H.H.
8431*
SIGNER, E.
8128
SILK, D.B.A.
7912*
SIMERT, G.
8400*
SIMMONDS, W.J.
7926
SIMONOV, N.N.
8177, 8178
SISKOS, P.A.
7997*
SITENKOW, D.M.
8377
SJOGREN, H.O.
8045*
SJOSTROM, L.
8303*
SJOVALL, J.
8004*
SKAPIK, M.
8498
SKAREDNOV, N.I.
8504
SKOPETS, M.D.
8199
SKORNETSKY, D.B.
8186
SLEPYNIN, V.I.
8186
SLINCHENKO, N.Z.
8071
SLUSARCZYK, J.
8359*
SMITH, B.M.
8108*
SMITH, T.M.
8049
SMITHIES, A.
8267*
SNYDER, S.L.
8040*
SOBOCINSKI, P.Z.
8040*
SODE, J.
7961*
SOETERS, P.B.
7956*

SOFIA, R.D.
8032*
SOJKA, W.J.
8116
SOKOLOVA-REVA, V.I.
8079
SOLER-ARGILAGA, C.
8000*
SOLOVIEVA, G.I.
7989
SORINOV, A.N.
8216
SOSCIA, A.
8080
SOSNIK, H.
8413
SOTTOCASA, G.L.
7930
SPECK, W.T.
8117
SPECTOR, D.
8363
SPEROTTO, G.
8453*
SPERSCHNEIDER, H.
8172
SPIRA, I.A.
8236*
SRINIVASAN, K.
8003*
STANLEY, P.
8290*
STANLEY, R.J.
8124*
STARKLINT, H.
8297*
STAUFFER, J.Q.
8227*
STEFANOVICH, A.N.
7907
STEIN, G.
8172
STEKKER, K.
8042*
STENGER, R.J.
8285*
STEPANYAN, M.G.
8377
STEWART, C.P.
7932
STIEHL, A.
8432*
STOHR, M.
8063
STOLTE, M.
8159
STONARD, M.
8026*
STOTZNER, H.
8412
STRALIN, H.G.
8421*
STREIFF, R.R.
7923
STREIFLER, M.
8305*
STRCEVAIA, L.N.
8079
STUDIER, A.L.
7944
STUDIER, E.H.
7944
SUDA, T.
8095
SULLIVAN, P.
8458
SURIYACHAN, D.
8022*
SUTOR, D.J.
8426*, 8427*
SUYAMA, T.
7941
SUZUKI, T.
7950
SUZUKI, Y.
7920*
SVANES, K.
8106*
SVARTS, V.Y.
8183
SWAN, K.G.
8006*
SWANBECK, G.
8300*
SWIDERSKA, H.
8359*
SZABO, G.
8107*
SZAFRAN, H.
8180*
SZAFRAN, Z.
8180*
SZAWDYN, J.
8196
SZENDE, B.
8027*
TABAQCHALI, S.
8454*
TADESSE, K.
8136
TAKEDA, H.
8298*
TAKEWAKI, T.
7955
TALAVDEKAR, R.V.
8292*
TAMURA, M.
8296*
TANAKA, N.
8480
TANIYAMA, K.
7954
TAROCCO, R.P.
8367
TATEISHI, N.
7993*
TAVERNIER, C.
8150
TAVILL, A.S.
7994*
TAWES, J.W., III
8105*
TAYLOR, K.J.W.
8330
TAYLOR, R.S.
8137
TEICHMANN, W.
8409
TEMPLIN, B.U.
7991
TEOH-CHAN, C.H.
8454*
TEPLOVA, L.L.
8082
TEPLY, V.K.
8276
TERBLANCHE, J.
8050
TERENZI, P.
8336*
TESTART, J.
8209, 8445
THANNER, F.
8232
THITHAPANDHA, A.
8022*
THOMAS, F.B.
8147*
THOMAS, J.
7911*
THOMAS, M.
8260
THOMAS, S.
8067
THOMMESEN, N.
8297*
THOMPSON, J.C.
7967*
TIAGO, E.
8398*
TILSON, M.D.
7915*
TIMMER, C.J.
8031*
TIRIBELLI, C.
7930
TJOA, W.S.
8458
TOAFF, M.E.
8305*
TOAFF, R.
8305*
TOBEY, R.E.
8348*
TODOROV, G.
8499
TOMPA, A.
8027*
TORIL ILLESCAS, M.
8175
TORRONEN, R.
8033*
TRAVERT, G.
8252
TRIER, J.S.
8090*
TRIPP, J.H.
8483
TROFIMOV, G.A.
8149
TRUBITSYNA, I.E.
7975
TRUBSBACH, A.
8069

TRUJILLO RODRIGUEZ, L.
8318
TSO, P.
7926
TSUCHIYA, M.
8264*
TSUJI, K.
8264*
TSUJII, T.
8296*
TSUKANOV, I.G.
8171
TUBIANA, J.M.
8242
TURAKULOV, Y.K.
8053
TURCZYNSKI, J.
8223
TURNBULL, R.B., JR.
8509*
TYSZKIEWICZ, S.
8223
ULVEN, A.
8106*
UNGER, G.F.
8274*
URBAN, E.
8087*
USPENSKY, V.M.
7978
USSANO, L.
8308
UTILI, R.
7996*, 8039*
UTKIN, V.V.
8275
UYS, C.J.
8050
UZAWA, T.
8288*
VAHRMAN, J.
8354*
VAISRUB, S.
8472
VAISSADE, P.
7933
VAKILZADEH, F.
8309
VALENKEVICH, L.N.
7988
VAN DER HOEDEN, R.
8271*
VAN DER LINDEN, W.
8051
VAN DER MERWE, W.
7999*
VAN DER WANT, J.J.L.
7903*
VAN DONGEN, R.J.A.M.
8491
VAN GOLDE, L.M.G.
8020*
VAN NUETEN, J.M.
7946
VAN ZON, A.
7983*
VANAT, I.M.
8371
VANDERMEERS, A.
7986*
VANDERMEERS-PIRET, M.C.
7986*
VANG, J.
8400*
VANTRAPPEN, G.
7937*
VARMA, R.R.
8403*
VASCONCELOS TEIXEIRA, A.
8164*
VASILIEVA, E.N.
8072
VAUGELADE, P.
7933
VAZQUEZ IGLESIAS, J.L.
8155
VELA, R.
8374
VEPRINSKAYA, S.I.
8387
VERBOLOVICH, V.P.
8082
VERNEY, E.
8010*
VERZIN, S.S.
8082
VIAMONTE, M., JR.
8402*
VICARY, F.R.
8132
VICKERY, A.L., JR.
8506
VINOGRADOV, V.V.
8449
VIRABIAN, T.L.
7974, 7981
VISHNEVSKII, V.A.
8443
VITSYN, B.A.
8211
VOKAC, V.A.
8105*
VOLKOVA, A.A.
8205
VON GOUMOENS, E.
8256
WAAG, K.L.
8324
WADE, A.E.
8007*
WAGENKNECHT, L.V.
8250
WALKER, J.A.
8349*
WALKER, P.R.
8038*
WALKER, R.I.
8040*
WALL, W.J.
8307*
WALSER, M.
8083*
WALSH, J.H.
7968*
WALTER, K.
8510
WANG, S.M.S.
8459
WARD, A.M.
8333
WASSELL, A.
8401*
WATANABE, K.
8103*
WATANABE, S.
8024*
WATANABE, Y.
8181*
WATSON, A.J.
8339*
WEBER, A.
8228
WEBER, F.L., JR.
8083*
WEINTRAUB, W.H.
8133
WEISBURGER, J.H.
7998*, 8103*
WEISS, S.
8282*
WENNERSTEN, G.
8300*
WETTENDORFF, P.
8279
WHALEN, J.P.
8451*
WHARTON, B.A.
8483
WHARTON, F.P.
8056
WHITE, P.
8402*
WHITFIELD, J.F.
8038*
WHITTLE, B.J.R.
8104*
WIGNALL, B.K.
8466
WIJNAND, H.P.
8031*
WIJNS, W.
7986*
WILK, P.J.
8509*
WILKIE, L.I.
8426*, 8427*
WILLIAM, D.
8473
WILLIAMS, D.C.
8113
WILLIAMS, E.W.
7917*
WILLIAMS, R.
8295*, 8306*, 8307*, 835
WILLSON, R.A.
8034*
WILMERS, M.J.
8483
WILSON, S.E.
8459
WINKLER, R.
8250

WITTES, R.E.
8329
WOHLEB, B.
8028*
WOLF, W.
8444
WOLFF, W.I.
8131, 8236*
WOLFSDORF, J.
7999*
WOLLOCH, J.
8126
WORMSLEY, K.G.
7982*
WORTHINGTON, K.K.
8084*
WRAY, C.
8116
WRIGHT, D.J.M.
8056
WRIGHT, F.W.
8332
WRIGHT, H.K.
7915*
WROCLAWSKI, E.R.
8312
WYATT, R.G.
8456*, 8481
WYNDER, E.L.
7998*, 8103*
WYNN, V.
8008*
YAGER, P.A.
8349*
YAKHONTOVA, O.I.
8139
YAMADA, G.
8357*
YAMAGISHI, T.
8095
YAMAMOTO, M.
7910, 8298*
YAMAOKA, Y.
8298*
YAMASAKI, M.
8130
YAMAZAKI, S.
8288*
YANGUNAEV, R.A.
8053
YANC, Y.
8134
YEH, K.Y.
8085*
YEH, S.D.J.
8329
YOSHIDA, N.
7954
YOSHIDA, T.
8264*
YOSHIDA, Y.
8480
ZABRODIN, O.N.
8189
ZAJICEK, G.
8094
ZALEWSKI, J.
8243
ZALUSKY, R.
8304*
ZANETTI, A.R.
8358*
ZAVODSKAYA, I.S.
8189
ZECCA, G.
8336*
ZELIKOVSKI, A.
8126
ZEMRZUSKI, K.
8501
ZEUSCHNER, M.
8244
ZEUSCHNER, Z.
8244
ZHARINOV, E.U.
8152
ZHUPAN, V.F.
8160
ZHURKIN, A.T.
8319
ZIGANSHIN, R.V.
8504
ZILIOTTO, A., JR.
8190*
ZIMA, P.I.
8449
ZIMMERMAN, H.J.
7996*, 8039*
ZIMMERMANN, H.G.
8248
ZONTA, N.
8341*
ZORZI, L.
8336*
ZOTTI, G.C.
8080
ZUBAIDI, G.
8142
ZUBROFF, J.
8047
ZUCKERMAN, A.J.
8354*
ZUHLKE, V.
8323

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

ABDOMEN
    CHILD
        DIAGNOSIS, 8290*
    COMPLICATIONS
        CHILD, 8290*
    LIVER CIRRHOSIS
        PAIN, 8405
    PSEUDOTUMORS
        ABSCESS, 8505
        ASCARIASIS, 8505
    SURGERY
        ABSCESS, 8459
        COMPLICATIONS, 8459

ABSCESS
    ABDOMEN
        PSEUDOTUMORS, 8505
        SURGERY, 8459
    BILIARY TRACT
        SURGERY, 8459
    LIVER
        DIAGNOSIS, 8451*
        SURVIVAL, 8451*
    PSEUDOTUMORS
        ASCARIASIS, 8505
    SCANNING, SCINTILLATION
        RADIONUCLIDES, 8448
    STOMACH
        SURGERY, 8459

ABSORPTION
    AMINO ACIDS
        KALLIKREIN, 7914*
        PANCREAS, 7933
        TECHNIQUES, 7929
    CARBOHYDRATES
        DRUG EFFECTS ON, 7931
        PANCREAS, 7933
    CYSTIC FIBROSIS
        IRON, 8268*
        PROTEINS, 8268*
        RADIONUCLIDES, 8268*
        VITAMIN B12, 8268*
    FATTY ACIDS, 7934
    GASTROINTESTINAL SYSTEM
        CHILD, 8109
        INFANT, 8109
    HORMONE EFFECTS ON
        ANGIOTENSIN, 7932
        NOREPINEPHRINE, 7932
    INTESTINE, SMALL
        AMINO ACIDS, 7912*, 7914*, 7929
        CARBOHYDRATES, 7931
        DRUG EFFECTS ON, 7931
        HORMONE EFFECTS ON, 7932
    INTESTINES
        AMINO ACIDS, 7913*
        NITROGEN, 7913*
        PROSTAGLANDINS, 7919*
    JEJUNUM
        AMINO ACIDS, 7912*, 8083*
        HORMONE EFFECTS ON, 7932
    LIPIDS
        ALCOHOLS, 7916*
        DETERGENTS, 7927
        DRUG EFFECTS ON, 7916*
    LIVER CIRRHOSIS
        SALT, 8044*
        WATER, 8044*

ABSORPTION (continued)
    MOUTH
        CARBOHYDRATES, 7931
        DRUG EFFECTS ON, 7931
    PROSTAGLANDINS
        CALCIUM, 7919*

ACID SECRETION
    SEE ALSO HYPERCHLORHYDRIA, SECRETION
    DRUG EFFECTS ON
        ULCER, PEPTIC, 8183
    DUODENUM
        ULCER, PEPTIC, 7976
    GASTRIN
        SERUM, 7970
    GASTRITIS, 8169
    HEIDENHAIN POUCH
        PENTAGASTRIN, 7965*
        TEMPERATURE, 7965*
    HIATAL HERNIA
        STOMACH, 8146*
        SURGERY, 8146*
    HISTAMINE
        H2 RECEPTOR ANTAGONISTS, 7964*
        TRACER STUDY, 7964*
    STOMACH
        ADENOSINE CYCLIC 3',5'
          MONOPHOSPHATE, 7961*
        ANESTHESIA, 7962*
        ATROPINE, 7962*, 7967*, 8183
        CATECHOLAMINES, 8171
        CELLS, 7978
        CHILD, 8171
        DRUG EFFECTS ON, 7959*, 7962*,
          7963*, 7966*, 8183
        EPINEPHRINE, 8171
        FOOD, 7968*
        H2 RECEPTOR ANTAGONISTS, 7963*
        HISTAMINE, 7964*
        HISTOCHEMISTRY, 7978
        HORMONE EFFECTS ON, 7977
        MORPHOLOGY, 8169
        MORPHOMETRY, 7978
        NERVOUS CONTROL, 7967*, 7968*
        NOREPINEPHRINE, 8171
        PAIN, 7980
        PENTAGASTRIN, 7962*
        TEMPERATURE, 7965*
        ULCER, PEPTIC, 7976
    ULCER, PEPTIC
        DRUG EFFECTS ON, 7976

ACIDITY
    ULCER
        PERFUSION, 8105*
    ULCER, PEPTIC
        DUODENUM, 8180*

ACIDS
    STOMACH
        MOTILITY, 7940*

ACRODERMATITIS
    INTESTINE, SMALL
        MORPHOLOGY, 8225*
        ZINC, 8225*

- ACYLTRANSFERASES
  - LIVER
    - METABOLISM, 8000*
    - SECRETION, 8000*

- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - CECUM
    - DRUG EFFECTS ON, 7947
    - MOTILITY, 7947
  - GASTROINTESTINAL SYSTEM
    - SECRETION, 7957
  - SECRETION
    - AMYLASES, 7985*
  - STOMACH
    - ACID SECRETION, 7961*

- ADENOSINE TRIPHOSPHATE
  - LIVER
    - ELECTROPHYSIOLOGY, 8041*

- ADOLESCENCE
  - HEPATITIS, INFECTIOUS
    - TRANSMISSION, 8366

- AFLATOXINS
  - PROTEINS
    - SYNTHESIS, 8010*

- ALCOHOL OXIDOREDUCTASES
  - LIVER, 8055
    - SYNTHESIS, 8059

- ALCOHOLIC LIVER DISEASE
  - SEE LIVER DISEASES, ALCOHOLIC

- ALCOHOLISM
  - GASTROINTESTINAL SYSTEM, 8068
  - GLYCOGEN
    - METABOLISM, 8067
  - LIVER
    - GLYCOGEN, 8067
    - LIPIDS, 8016*
    - SIDEROSIS, 8389*
  - LIVER CIRRHOSIS
    - ETIOLOGY, 8408
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 8282*
  - SERUM
    - ALKALINE PHOSPHATASE, 8391
    - AMINO TRANSFERASES, 8391
    - ENZYMES, 8391
    - IMMUNOGLOBULINS, 8391

- ALCOHOLS
  - ABSORPTION
    - LIPIDS, 7916*
  - LYMPH
    - LIPIDS, 7916*
  - LYMPHATIC SYSTEM
    - LIPIDS, 7916*
  - PROTEINS
    - SYNTHESIS, 8011*

- ALDOLASE
  - LIVER
    - ISOENZYMES, 8292*
    - NEOPLASMS, MALIGNANT, 8292*
  - NEOPLASMS, MALIGNANT
    - ISOENZYMES, 8292*

- ALKALINE PHOSPHATASE
  - ALCOHOLISM
    - SERUM, 8391
  - HEPATITIS, CHRONIC
    - DRUG THERAPY, 8387
  - INTESTINE, SMALL
    - SURGERY, 8087*
    - TRANSPORT, 8087*
  - LIVER CIRRHOSIS
    - DRUG THERAPY, 8387

- ALKALOIDS
  - DUODENUM
    - MOTILITY, 7941
  - INTESTINE, SMALL
    - MOTILITY, 7941

- ALLERGY
  - SEE HYPERSENSITIVITY

- ALPHA 1 ANTITRYPSIN
  - DEFICIENCY
    - LIVER DISEASES, 8287*
  - HEPATITIS, INFECTIOUS
    - DEFICIENCY, 8286*
  - HYPERBILIRUBINEMIA
    - DEFICIENCY, 8286*
    - NEONATE, 8286*
  - LIVER CIRRHOSIS
    - DEFICIENCY, 8412
  - LIVER DISEASES
    - GENETICS, 8287*
    - INFANT, 8287*

- ALPHA FETOPROTEIN
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 8345
  - NUTRITION DISORDERS, 8484
  - REVIEW, 8334

- AMEBIASIS
  - TRANSMISSION, 8473
    - REVIEW, 8472

- AMINO ACIDS
  - ABSORPTION
    - KALLIKREIN, 7914*
    - PANCREAS, 7933
    - TECHNIQUES, 7929
  - COLLAGEN
    - METABOLISM, 8023*
  - FATTY LIVER
    - DEFICIENCY, 8017*
  - HEPATITIS, CHRONIC
    - CHILD, 8327
    - METABOLISM, 8327
  - HEPATITIS, INFECTIOUS
    - CHILD, 8370
  - INTESTINAL ABSORPTION
    - BILE ACIDS AND SALTS, 7911*

AMINO ACIDS (continued)
- INTESTINE, SMALL
  - ABSORPTION, 7912*, 7914*, 7929
  - TRANSPORT, 7914*, 7929
- INTESTINES
  - ABSORPTION, 7913*
  - TRANSPORT, 7913*
- JEJUNUM
  - ABSORPTION, 7912*, 8083*
  - METABOLISM, 8083*
- LIVER
  - LIPIDS, 8017*
  - METABOLISM, 7993*, 8048, 8049
  - SCHISTOSOMIASIS, 8048, 8049
- LIVER CIRRHOSIS
  - CHILD, 8327
  - METABOLISM, 8327
- METABOLISM
  - GLUTATHIONE, 7993*
  - SCHISTOSOMIASIS, 8048, 8049
- PANCREAS
  - TRANSPORT, 7987*
- PORTACAVAL SHUNT, 8081
- STOMACH
  - MOTILITY, 7940*
  - SECRETION, 7969*
- TRANSPORT
  - KALLIKREIN, 7914*
  - TECHNIQUES, 7929
- WILSON'S DISEASE
  - LIVER FUNCTION TESTS, 8314
  - METABOLISM, 8314

AMINO TRANSFERASES
- ALCOHOLISM
  - SERUM, 8391
- CELL CULTURE
  - CARBON TETRACHLORIDE, 8024*
- LIVER DISEASES
  - DIAGNOSIS, 8145

AMMONIA
- JAUNDICE
  - METABOLISM, 8298*
- LIVER
  - METABOLISM, 8298*
- LIVER CIRRHOSIS
  - METABOLISM, 8141
- LIVER COMA
  - ETIOLOGY, 8416
  - METABOLISM, 8141

AMYLASES
- PANCREAS
  - HORMONE CONTROL, 7985*
  - SECRETION, 7984*, 7985*
- PANCREATITIS, CHRONIC
  - DIAGNOSIS, 8272*
  - ISOENZYMES, 8272*
- SECRETION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7985*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 7985*
  - HORMONE CONTROL, 7985*

AMYLOIDOSIS
- DRUG THERAPY, 8043

ANALGESICS AND ANTIPYRETICS
- LIVER
  - DRUG METABOLISM, 8029*
  - MORPHOLOGY, 8339*
- LIVER FUNCTION TESTS
  - DRUG EFFECTS ON, 8339*
- SERUM
  - BILE ACIDS AND SALTS, 8339*

ANDROGENS
- ILEUM
  - MOTILITY, 7952
- INTESTINE, SMALL
  - MOTILITY, 7952
- PELIOSIS HEPATIS
  - DRUG-INDUCED, 8299*

ANEMIA
- FOLIC ACID
  - DEFICIENCY, 8482
- MITOCHONDRIA
  - ULTRASTRUCTURE, 8282*
- PARENTERAL ALIMENTATION
  - COMPLICATIONS, 8482
- VITAMIN B12
  - DEFICIENCY, 8482
- YERSINIA
  - DISEASES ASSOCIATED WITH, 8202

ANEMIA, HEMOLYTIC
- LIVER DISEASES, ALCOHOLIC
  - ERYTHROCYTES, 8390*

ANEMIA, PERNICIOUS
- COLLAGEN
  - DISEASE, 8480
- DISEASES ASSOCIATED WITH, 8480
- STOMACH
  - PATHOLOGY, 8492

ANEMIA, SICKLE CELL
- COMPLICATIONS
  - LIVER CIRRHOSIS, 8302*
- LIVER
  - COMPLICATIONS, 8302*
  - EPIDEMIOLOGY, 8302*

ANESTHESIA
- LIVER
  - ENZYMES, 8343
  - PROTEINS, 8343
  - SURGERY, 8343
- STOMACH
  - ACID SECRETION, 7962*

ANGIOGRAPHY
- STOMACH
  - BLEEDING, 8128
  - ULCER, 8128

ANGIOMA
- SEE HEMANGIOMA

ANGIOTENSIN
- ABSORPTION
  - HORMONE EFFECTS ON, 7932
- TRANSPORT
  - HORMONE EFFECTS ON, 7932

- ANOMALY
  - BILE DUCTS
    - VEINS, 8440
  - COLON
    - SIGMOID, 8260
  - INTESTINES
    - SURGERY, 8219
  - SIGMOID
    - FAMILIAL FACTORS, 8260

- ANOMALY, CONGENITAL
  - INTESTINES, 8210

- ANORECTUM
  - SEE ALSO ANUS, RECTUM
  - CROHN'S DISEASE
    - ELECTROPHYSIOLOGY, 8508*

- ANOXIA
  - LIVER
    - ELECTROPHYSIOLOGY, 8041*

- ANTACIDS
  - INTESTINAL ABSORPTION
    - HEMODIALYSIS, 8230
    - IRON, 8230
  - STOMACH
    - ENDOSCOPY, 7973
  - ULCER, PEPTIC
    - DRUG THERAPY, 8187

- ANTI-INFLAMMATORY AGENTS
  - HEPATITIS, INFECTIOUS
    - CHOLINESTERASES, 8371
  - INFLAMMATION
    - LIVER, 8032*
  - INTESTINES
    - ULCER, 8102*
  - LIVER
    - MICROSOMES, 8032*
  - PERITONITIS
    - DRUG-INDUCED, 8102*
  - STOMACH
    - MORPHOLOGY, 8164*
  - ULCER
    - DRUG-INDUCED, 8102*

- ANTIBIOTICS
  - HEPATITIS
    - DRUG-INDUCED, 8340*
  - HYPERBILIRUBINEMIA
    - BINDING, 8320
  - INTESTINE, SMALL
    - BACTERIA, 8454*
  - LIVER DISEASES
    - BINDING, 8320
  - LIVER INJURY
    - METABOLISM, 8076
  - PROTEINS
    - BINDING, 8320
  - SALMONELLOSIS
    - DRUG THERAPY, 8474, 8475

- ANTIBODIES
  - HEPATITIS, 8351*
    - CARRIER STATE, 8359*
  - HEPATITIS, INFECTIOUS, 8351*
  - INTESTINES
    - ESCHERICHIA COLI, 8100*

- ANTICHOLINERGIC AGENTS
  - SEE PARASYMPATHOLYTICS

- ANTICONVULSANTS
  - FOLIC ACID
    - METABOLISM, 7923
  - INTESTINAL ABSORPTION
    - FOLIC ACID, 7923

- ANTIDIABETIC AGENTS
  - SEE HYPOGLYCEMIA AGENTS

- ANTIEMETICS
  - NAUSEA
    - REVIEW, 8479
  - VOMITING
    - REVIEW, 8479

- ANTIGEN, AUSTRALIA
  - SEE AUSTRALIA ANTIGEN

- ANTIGEN, CARCINOEMBRYONIC
  - SEE CARCINOEMBRYONIC ANTIGEN

- ANTIGENS
  - COLITIS, ULCERATIVE
    - EPIDEMIOLOGY, 8264*
    - GENETICS, 8263*
  - CROHN'S DISEASE
    - GENETICS, 8263*
  - HEPATITIS, 8358*
  - HEPATITIS, INFECTIOUS, 8358*
    - IMMUNOGLOBULINS, 8355*
    - VIRUSES, 8349*
  - INFLAMMATORY BOWEL DISEASES
    - GENETICS, 8263*
  - INTESTINE, SMALL
    - BACTERIA, 8454*
  - LIVER
    - MORPHOLOGY, 8357*
    - ULTRASTRUCTURE, 8357*

- ANTIHYPERTENSIVE AGENTS
  - LIVER
    - DRUG METABOLISM, 8029*

- ANTITHYROID AGENTS
  - SEE THYROID ANTAGONISTS

- ANTITRYPSIN
  - SEE TRYPSIN INHIBITORS

- ANTITRYPSIN, ALPHA
  - SEE ALPHA 1 ANTITRYPSIN

- ANTRUM
  - DISTENTION
    - GASTRIN, 7971

ANTRUM (continued)
    MORPHOLOGY
        ULCER, PEPTIC, 8165*
    MOTILITY
        NERVOUS CONTROL, 8120
    NERVOUS CONTROL
        VAGOTOMY, 8120
    ULCER
        GASTRIN, 8181*

ANUS
    SEE ALSO ANORECTUM RECTUM
    CROHN'S DISEASE
        ELECTROPHYSIOLOGY, 8508*
    FISTULA
        CROHN'S DISEASE, 8514

APLASIA
    GALLBLADDER, 8438

APPENDICITIS
    DIAGNOSIS
        TECHNIQUES, 8251

APPENDIX
    INTESTINE, LARGE
        ENEMA, 8239
        RADIOLOGY, 8239

ASCARIASIS
    ABDOMEN
        PSEUDOTUMORS, 8505
    DRUG THERAPY, 8503
    EPIDEMIOLOGY, 8502
    PREVENTION, 8503
    PSEUDOTUMORS
        ABSCESS, 8505

ASCITES
    LAPAROSCOPY
        DIAGNOSIS, 8410
    LIVER CIRRHOSIS
        SURVIVAL, 8394

ASCORBIC ACID
    SEE VITAMIN C

ATRESIA
    BILIARY TRACT
        ULTRASTRUCTURE, 8421*

ATROPHY
    INTESTINE, SMALL
        VILLI, 8099*

ATROPINE
    PANCREAS
        BICARBONATE SECRETION, 8182
    SECRETION
        GASTRIN, 7967*
    STOMACH
        ACID SECRETION, 7962*, 7967*, 8183
        GASTRIN, 7967*

AUSTRALIA ANTIGEN
    BLOOD
        TRANSMISSION, 8361
    CARBOHYDRATES
        CHROMATOGRAPHY, 8121
    CARRIER STATE, 8358*
    ELECTROPHORESIS, 8379
    HEMODIALYSIS
        OCCUPATIONAL FACTORS, 8363
    HEPATITIS, INFECTIOUS
        BLOOD GROUPS, 8352*
        CHILD, 8380
        DIAGNOSIS, 8378
        EPIDEMIOLOGY, 8352*, 8364
        PROGNOSIS, 8378, 8380
    HEPATITIS, SERUM
        CHILD, 8380
        PROGNOSIS, 8380
    IMMUNITY
        HEPATITIS, INFECTIOUS, 8354*
    IMMUNOLOGY, 8379
    LIVER
        MORPHOLOGY, 8357*
        ULTRASTRUCTURE, 8357*
    RADIOIMMUNOASSAY, 8379
    TRANSFUSION
        TRANSMISSION, 8362
    TRANSMISSION
        RISK FACTORS, 8361

BACTERIA
    COLON
        NEOPLASMS, 8234*
    ILEUM, 8464
    INTESTINE, SMALL, 8464
        ANTIBIOTICS, 8454*
        ANTIGENS, 8454*
    INTESTINES
        ULCER, 8102*

BACTERIAL INFECTIONS
    GASTROINTESTINAL SYSTEM
        YERSINIA, 8203
    HEPATITIS
        VENEREAL DISEASES, 8054
    PERIHEPATITIS
        VENEREAL DISEASES, 8054

BARIUM
    COLON
        NEOPLASMS, 8256
    INTESTINE, LARGE
        ENEMA, 8239
    STOMACH
        MOTILITY, 7953

BEHCET'S SYNDROME
    MOUTH
        REVIEW, 8465

BICARBONATE SECRETION
    SEE ALSO SECRETION
    PANCREAS
        ATROPINE, 8182
        ULCER, PEPTIC, 8182

- BILE
  - BILE ACIDS AND SALTS
    - DIETARY FACTORS, 7998*
    - FATS, 7998*
  - CALCIUM
    - CHEMICAL COMPOSITION, 8427*
    - GALLSTONES, 8420*
  - CHEMICAL COMPOSITION
    - BILE ACIDS AND SALTS, 8419*
    - DRUG EFFECTS ON, 8419*
  - CHOLESTEROL
    - CONTRAST MEDIA, 8069
  - GALLBLADDER DISEASES
    - BIOCHEMISTRY, 8420*
  - LIVER
    - ENDOTOXINS, 7996*
    - SYNTHESIS, 7996*, 8062
  - SYNTHESIS
    - REVIEW, 8062

- BILE ACIDS AND SALTS
  - BILE
    - CHEMICAL COMPOSITION, 8419*
    - DIETARY FACTORS, 7998*
    - FATS, 7998*
  - BILE DUCTS
    - CALCULI, 8425*
  - BILIARY TRACT
    - SECRETION, 8004*
  - CHOLERESIS
    - VAGOTOMY, 8108*
  - CHOLESTASIS
    - METABOLISM, 8432*
  - COLON
    - NEOPLASMS, MALIGNANT, 8103*
  - COMMON BILE DUCT CALCULI
    - DRUG THERAPY, 8425*
    - THERAPY, 8425*
  - DIETARY FACTORS
    - FATS, 7998*
  - FECES
    - DIETARY FACTORS, 7998*
    - FATS, 7998*
  - ILEUM
    - TRANSPORT, 7915*
  - INTESTINAL ABSORPTION
    - AMINO ACIDS, 7911*
  - LIVER CIRRHOSIS
    - SECRETION, 8398*
  - LIVER DISEASES, ALCOHOLIC
    - SECRETION, 8398*
  - SECRETIN
    - VAGOTOMY, 8108*
  - SECRETION
    - ESTROGENS, 8004*
    - HORMONE EFFECTS ON, 8004*
  - SERUM
    - ANALGESICS AND ANTIPYRETICS, 8339*
    - DRUG EFFECTS ON, 8339*
    - TECHNIQUES, 7997*
  - STOMACH, 8104*
  - TRANSPORT
    - ENTERECTOMY, 7915*

- BILE DUCTS
  - ANOMALY
    - VEINS, 8440
  - CALCULI
    - BILE ACIDS AND SALTS, 8425*

- BILE DUCTS (continued)
  - CALCULI (continued)
    - DRUG THERAPY, 8425*
    - HEPARIN, 8425*
    - THERAPY, 8425*
  - CHOLECYSTECTOMY
    - TECHNIQUES, 8443
  - DRAINAGE
    - TECHNIQUES, 8442
  - MORPHOLOGY
    - CHOLECYSTITIS, 8071
  - OBSTRUCTION
    - CHOLECYSTECTOMY, 8443

- BILE SALTS
  - SEE BILE ACIDS AND SALTS

- BILIARY CIRRHOSIS
  - SEE LIVER CIRRHOSIS, OBSTRUCTIVE

- BILIARY TRACT
  - ATRESIA
    - ULTRASTRUCTURE, 8421*
  - CALCULI
    - ENDOSCOPY, 8437
  - FISTULA
    - SURGERY, 8441
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 8274*
  - SECRETION, 8113
    - BILE ACIDS AND SALTS, 8004*
    - CHOLESTEROL, 8004*
  - STRICTURE
    - PANCREATITIS, CHRONIC, 8274*
  - SURGERY
    - ABSCESS, 8459
    - COMPLICATIONS, 8213, 8459
    - INTESTINAL OBSTRUCTION, 8213
    - TECHNIQUES, 8435

- BILIARY TRACT DISEASES
  - CHOLECYSTOGRAPHY
    - REVIEW, 8423*
  - DIAGNOSIS
    - CHOLECYSTOGRAPHY, 8423*
    - DRAINAGE, 8431*
    - REVIEW, 8423*
    - ULTRASONOGRAPHY, 6132
  - DUODENOSCOPY
    - DIAGNOSIS, 8439
    - THERAPY, 8439
  - HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 8376

- BILIRUBIN
  - HEPATITIS, CHRONIC
    - METABOLISM, 8385*
  - LIVER
    - ENZYMES, 7999*
    - INFANT, 7999*
  - LIVER CIRRHOSIS
    - METABOLISM, 8399*
  - METABOLISM
    - DRUG EFFECTS ON, 8385*
    - ESTROGENS, 8077
    - HORMONE EFFECTS ON, 8077, 8385*
    - HORMONES, ADRENAL CORTEX, 8385*
    - KINETICS, 8399*

- BIRTH
  - SEE PREGNANCY
- BLADDER
  - SEE UROGENITAL SYSTEM
- BLEEDING
  - SEE ALSO HEMORRHAGE
  - STOMACH
    - ANGIOGRAPHY, 8128
    - DIAGNOSIS, 8128
    - INFANT, 8128
- BLOOD
  - AUSTRALIA ANTIGEN
    - TRANSMISSION, 8361
  - HEPATITIS, CHRONIC
    - COMPLEMENT, 8382*
    - DRUG THERAPY, 8387
  - HEPATITIS, INFECTIOUS
    - TRANSMISSION, 8361
  - LIVER CIRRHOSIS
    - DRUG THERAPY, 8387
  - NEOPLASMS, MALIGNANT
    - CLOTTING, 8326
- BLOOD FLOW
  - SEE CIRCULATION
- BLOOD GROUPS
  - HEPATITIS, INFECTIOUS
    - AUSTRALIA ANTIGEN, 8352*
- BOMBESIN
  - SEE HORMONES, GASTROINTESTINAL
- BREAST FEEDING
  - ENTEROCOLITIS, NECROTIZING
    - INFANT, 8469
- BUDD-CHIARI SYNDROME
  - RADIOLOGY
    - ETIOLOGY, 8315
- BURNS, CHEMICAL
  - ESOPHAGUS
    - STENOSIS, 8152
- CALCITONIN
  - SEE THYROCALCITONIN
- CALCIUM
  - ABSORPTION
    - PROSTAGLANDINS, 7919*
  - BILE
    - CHEMICAL COMPOSITION, 8427*
    - GALLSTONES, 8420*
  - GALLSTONES
    - CHEMICAL COMPOSITION, 8427*
- CALCULI
  - SEE ALSO COMMON BILE DUCT CALCULI
  - BILE DUCTS
    - BILE ACIDS AND SALTS, 8425*
    - DRUG THERAPY, 8425*
    - HEPARIN, 8425*
    - THERAPY, 8425*
  - BILIARY TRACT
    - ENDOSCOPY, 8437
- CALCULI (continued)
  - HEMATOBILIA
    - ETIOLOGY, 8446
  - ILEAL DISEASES
    - OXALATES, 8227*
  - SHUNT, INTESTINAL
    - OXALATES, 8227*
- CANCER
  - SEE NEOPLASMS
- CARBOHYDRATES
  - ABSORPTION
    - DRUG EFFECTS ON, 7931
    - PANCREAS, 7933
  - AUSTRALIA ANTIGEN
    - CHROMATOGRAPHY, 8121
  - DIGESTION
    - PANCREAS, 7933
  - HORMONE CONTROL
    - REVIEW, 8019*
  - INTESTINE, SMALL
    - ABSORPTION, 7931
    - TRANSPORT, 7920*
  - LIVER
    - ESTROGENS, 8008*
    - HORMONE CONTROL, 8019*
  - LIVER DISEASES
    - METABOLISM, 8335
  - METABOLISM
    - ENZYMES, 7986*
    - HORMONE CONTROL, 8019*
  - MOUTH
    - ABSORPTION, 7931
  - STOMACH
    - SECRETION, 7969*
- CARBON TETRACHLORIDE
  - AMINO TRANSFERASES
    - CELL CULTURE, 8024*
  - HEPATOCYTES
    - LIPIDS, 8021*
    - MORPHOLOGY, 8021*
  - LIVER
    - CYTOCHROMES, 8022*
  - LIVER INJURY, 8076
    - ALPHA FETOPROTEIN, 8345
    - COLLAGEN, 8023*
- CARCINOEMBRYONIC ANTIGEN
  - COLON
    - NEOPLASMS, 8252
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, MALIGNANT, 8126
  - RECTUM
    - NEOPLASMS, 8252
- CARCINOID TUMOR
  - CECUM
    - DIAGNOSIS, 8249
    - REVIEW, 8249
- CARDIOVASCULAR SYSTEM
  - SEE ALSO CIRCULATION
  - LIVER, 8159
  - MALLORY-WEISS SYNDROME
    - DISEASES ASSOCIATED WITH, 8149

CATALASE
    LIVER
        SYNTHESIS, 8018*
    SYNTHESIS
        DRUG EFFECTS ON, 8018*
        HYPOLIPEMIC AGENTS, 8018*

CATECHOLAMINES
    COLON
        MOTILITY, 7950
    DUODENUM
        MOTILITY, 7950
    SECRETION
        PEPSIN, 8171
    STOMACH
        ACID SECRETION, 8171

CECUM
    SEE ALSO COLON, INTESTINE, LARGE
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
        DRUG EFFECTS ON, 7947
    CARCINOID TUMOR
        DIAGNOSIS, 8249
        REVIEW, 8249
    ESOPHAGUS, ARTIFICIAL, 8160
    GANGRENE
        PSEUDO-OBSTRUCTION, 8236*
    MOTILITY
        ADENOSINE CYCLIC 3',5'
          MONOPHOSPHATE, 7947
        DRUG EFFECTS ON, 7947
    MUSCLES
        DRUG EFFECTS ON, 7947
    PERFORATION
        PSEUDO-OBSTRUCTION, 8236*
        SURGERY, 8211
        THERAPY, 8211
    YERSINIA
        PSEUDOTUMORS, 8223

CELIAC DISEASE
    CHILD
        REVIEW, 8228

CELL CULTURE
    AMINO TRANSFERASES
        CARBON TETRACHLORIDE, 8024*
    HEPATOCYTES
        TECHNIQUES, 7992*
    PROTEINS
        TOXICITY, 8477

CHELATING AGENTS
    LIVER
        DRUG METABOLISM, 8033*

CHEMICAL BURNS
    SEE BURNS, CHEMICAL

CHEMOTHERAPY
    SEE DRUG THERAPY

CHENODEOXYCHOLIC ACID
    CHOLELITHIASIS
        DRUG THERAPY, 8429*

CHILD
    ABDOMEN
        COMPLICATIONS, 8290*
        DIAGNOSIS, 8290*
    CELIAC DISEASE
        REVIEW, 8228
    COLITIS, ULCERATIVE
        SURGERY, 8265
    DIARRHEA
        YERSINIA, 8202
    DUODENITIS
        DIAGNOSIS, 8205
        ENDOSCOPY, 8206
    DUODENUM
        NEOPLASMS, MALIGNANT, 8198
    ESOPHAGUS
        VARICES, 8157
    FRUCTOSE
        INTOLERANCE, 8229
    GASTROENTERITIS
        COMPLICATIONS, 8483
        THERAPY, 8483
    GASTROINTESTINAL SYSTEM
        ABSORPTION, 8109
        MOTILITY, 8109
    GLYCOGENOSIS
        DIAGNOSIS, 8290*
    HEPATITIS, CHRONIC
        AMINO ACIDS, 8327
    HEPATITIS, INFECTIOUS
        AMINO ACIDS, 8370
        AUSTRALIA ANTIGEN, 8380
        EPIDEMIOLOGY, 8352*
        LIVER FUNCTION TESTS, 8370
        PROTEINS, 8373
        SEASONAL FACTORS, 8352*
        TRANSMISSION, 8366
    HEPATITIS, SERUM
        AUSTRALIA ANTIGEN, 8380
    LIVER CIRRHOSIS
        AMINO ACIDS, 8327
    LIVER INJURY
        DIAGNOSIS, 8323
        SCANNING, SCINTILLATION, 8324
    NEOPLASMS, BENIGN
        DIAGNOSIS, 8290*
    NEOPLASMS, MALIGNANT
        DIAGNOSIS, 8290*
    RECTUM
        BIOPSY, 8133
    SALIVARY GLANDS
        NEOPLASMS, 8485
    STOMACH
        ACID SECRETION, 8171
    ULCER, PEPTIC
        SURGERY, 8185
        THERAPY, 8185
    VIRUS DISEASES
        GASTROENTERITIS, 8455*

CHOLANGIOGRAPHY
    ENDOSCOPY
        COMPLICATIONS, 8142
        REVIEW, 8142
    PANCREAS
        SECRETION, 8267*
    REVIEW, 8138

- CHOLANGITIS
  - JAUNDICE
    - DRAINAGE, 8422*
    - INTUBATION, 8422*
    - LAPAROTOMY, 8422*

- CHOLECYSTECTOMY
  - BILE DUCTS
    - OBSTRUCTION, 8443
    - TECHNIQUES, 8443
  - COMPLICATIONS
    - SEPSIS, 8430*
  - GALLBLADDER DISEASES
    - SEQUELAE, 8444
  - SEPSIS
    - PREVENTION, 8430*

- CHOLECYSTITIS
  - BILE DUCTS
    - MORPHOLOGY, 8071
  - CHOLECYSTOGRAPHY
    - REVIEW, 8423*
  - DIAGNOSIS
    - CHOLECYSTOGRAPHY, 8423*
    - REVIEW, 8423*
  - LIVER FUNCTION TESTS
    - BIOCHEMISTRY, 8450
  - SURGERY
    - PROGNOSIS, 8447
  - THERAPY
    - SEQUELAE, 8449
  - ULTRASONOGRAPHY
    - CHOLECYSTOGRAPHY, 8123*

- CHOLECYSTOGRAPHY
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 8423*
    - REVIEW, 8423*
  - CHOLECYSTITIS
    - DIAGNOSIS, 8423*
    - REVIEW, 8423*
    - ULTRASONOGRAPHY, 8123*
  - CHOLELITHIASIS
    - ULTRASONOGRAPHY, 8123*
  - CONTRAST MEDIA, 8130, 8140

- CHOLEDOCHOLITHIASIS
  - SEE COMMON BILE DUCT CALCULI

- CHOLELITHIASIS
  - SEE ALSO GALLSTONES
  - DRUG THERAPY
    - CHENODEOXYCHOLIC ACID, 8429*
  - ETIOLOGY
    - DIETARY FACTORS, 8072
  - HYPERLIPOPROTEINEMIA, 8428*
  - INTESTINE, SMALL
    - MORPHOLOGY, 8194*
  - REVIEW, 8051
  - ULTRASONOGRAPHY
    - CHOLECYSTOGRAPHY, 8123*

- CHOLERESIS
  - BILE ACIDS AND SALTS
    - VAGOTOMY, 8108*

- CHOLESTASIS
  - BILE ACIDS AND SALTS
    - METABOLISM, 8432*
  - DRUG-INDUCED
    - BIOCHEMISTRY, 8294*
    - REVIEW, 8294*
  - HEPATITIS
    - DIAGNOSIS, 8369
    - ETIOLOGY, 8369
  - HEPATITIS, INFECTIOUS
    - DIAGNOSIS, 8369
    - ETIOLOGY, 8369
  - IMMUNITY
    - PLASMA, 8433*
  - LIVER
    - PATHOLOGY, 8316
    - ULTRASTRUCTURE, 8316
  - PROTHROMBIN
    - METABOLISM, 8073

- CHOLESTEROL
  - BILE
    - CONTRAST MEDIA, 8069
  - BILIARY TRACT
    - SECRETION, 8004*
  - GALLSTONES
    - SOLUBILITY, 8001*
  - HEPATOCYTES
    - LIPOPROTEINS, 8013*
  - LIVER
    - DIETARY FACTORS, 8015*
    - FATTY ACIDS, 8003*
  - SECRETION
    - ESTROGENS, 8004*
    - HORMONE EFFECTS ON, 8004*

- CHOLINERGIC AGENTS
  - SEE PARASYMPATHOMIMETICS

- CHOLINESTERASES
  - HEPATITIS, INFECTIOUS
    - ANTI-INFLAMMATORY AGENTS, 8371
    - DRUG EFFECTS ON, 8371
    - SERUM, 8371

- CHROMATOGRAPHY
  - AUSTRALIA ANTIGEN
    - CARBOHYDRATES, 8121

- CHYLOMICRONS
  - INTESTINAL ABSORPTION
    - SYNTHESIS, 7924

- CHYMOTRYPSIN
  - PANCREAS
    - SECRETION, 7982*

- CIRCULATION
  - SEE ALSO CARDIOVASCULAR SYSTEM
  - GASTROINTESTINAL DISEASES
    - DIAGNOSIS, 8490
    - PROGNOSIS, 8491
    - SURGERY, 8491
  - INTESTINAL DISEASES
    - DIAGNOSIS, 8489
    - ETIOLOGY, 8489
    - THERAPY, 8489

CIRCULATION (continued)
    LIVER
        METABOLISM, 8082
        NEOPLASM METASTASIS, 8045*
        TECHNIQUES, 8107*
        VASOPRESSIN, 8006*
    LIVER CIRRHOSIS
        HYPERTENSION, PORTAL, 8402*

CIRCULATORY SYSTEM
    COLON
        INFLAMMATION, 8262
    ESOPHAGUS
        MORPHOMETRY, 7901*
        STOMACH, 7901*
    STOMACH
        MORPHOMETRY, 7901*

CIRRHOSIS
    SEE LIVER CIRRHOSIS

COENZYMES
    LIVER INJURY
        VITAMINS, 8295*

COLITIS
    COLON
        URTICARIA PIGMENTOSA, 8242
    DIAGNOSIS
        ALLERGENS, 8261
    DRUG-INDUCED
        DIAGNOSIS, 8261
    GIARDIASIS
        COMPLICATIONS, 8506

COLITIS, ULCERATIVE
    ANTIGENS
        EPIDEMIOLOGY, 8264*
    CHILD
        SURGERY, 8265
    DRUG THERAPY
        SURGERY, 8266

COLLAGEN
    DISEASE
        ANEMIA, PERNICIOUS, 8480
    FATTY LIVER
        ENZYMES, 8296*
    HEPATITIS, CHRONIC
        ENZYMES, 8296*
    HEPATITIS, INFECTIOUS
        ENZYMES, 8296*
    LIVER CIRRHOSIS
        ENZYMES, 8296*
    LIVER DISEASES
        ENZYMES, 8296*
    LIVER INJURY
        CARBON TETRACHLORIDE, 8023*
        DRUG-INDUCED, 8023*
        ENZYMES, 8296*
        METABOLISM, 8023*
    METABOLISM
        AMINO ACIDS, 8023*

COLON
    SEE ALSO CECUM, INTESTINE, LARGE
    CIRCULATORY SYSTEM
        INFLAMMATION, 8262

COLON (continued)
    COLITIS
        URTICARIA PIGMENTOSA, 8242
    CROHN'S DISEASE
        DIAGNOSIS, 8513
        DRUG THERAPY, 8517
        HORMONES, ADRENAL CORTEX, 8517
        IMMUNOTHERAPY, 8516
        STEROIDS, 8517
        THERAPY, 8516
    ESOPHAGUS, ARTIFICIAL, 8153
    INFLAMMATION
        CYTOLOGY, 8238
        DIAGNOSIS, 8238
        THROMBOSIS, 8262
    ION TRANSPORT
        DRUG EFFECTS ON, 7922
        HORMONE EFFECTS ON, 7922
        HORMONES, ADRENAL CORTEX, 7922
        POTASSIUM, 7918*
        STEROIDS, 7922
    MOTILITY
        CATECHOLAMINES, 7950
        DRUG EFFECTS ON, 7950
        EPINEPHRINE, 7950
    NEOPLASMS
        BACTERIA, 8234*
        BARIUM, 8256
        CARCINOEMBRYONIC ANTIGEN, 8252
        DIET, 8234*
        DRUG THERAPY, 8233*
        EPIDEMIOLOGY, 8234*
        FECES, 8234*
        FIBERS, 8234*
        PROTEINS, 8243
        RADIOLOGY, 8256
        RISK FACTORS, 8234*
        STEROIDS, 8234*
    NEOPLASMS, MALIGNANT
        BILE ACIDS AND SALTS, 8103*
        RADIOLOGY, 8258
    PROCTITIS
        IMMUNOCHEMISTRY, 8237*
        PATHOLOGY, 8237*
    PSEUDO-OBSTRUCTION
        ETIOLOGY, 8236*
        GANGRENE, 8236*
        PERFORATION, 8236*
    RECTUM
        NEOPLASMS, 8233*, 8252
    SIGMOID
        ANOMALY, 8260
        DUPLICATION, 8260
    SURGERY
        TECHNIQUES, 8122, 8255
    TRANSPORT
        POTASSIUM, 7918*
    WOUNDS AND INJURIES
        HEALING, 8122

COMMON BILE DUCT
    ENDOSCOPY
        TECHNIQUES, 8424*
    STENOSIS
        IATROGENESIS, 8434*
        THERAPY, 8434*

COMMON BILE DUCT CALCULI
    SEE ALSO CALCULI

COMMON BILE DUCT CALCULI (continued)
- DIAGNOSIS
  - ENDOSCOPY, 8424*
- DRUG THERAPY
  - BILE ACIDS AND SALTS, 8425*
  - HEPARIN, 8425*
- THERAPY
  - BILE ACIDS AND SALTS, 8425*
  - HEPARIN, 8425*

COMPLEMENT
- GASTROINTESTINAL SYSTEM
  - NEOPLASMS, MALIGNANT, 8462
- HEPATITIS, CHRONIC
  - BLOOD, 8382*

COMPUTERS
- LIVER
  - TOMOGRAPHY, 8124*

CONSTIPATION
- DIAGNOSIS
  - REVIEW, 8471
- ETIOLOGY
  - REVIEW, 8471
- THERAPY
  - REVIEW, 8471

CONTRACEPTIVES, ORAL
- LIVER
  - HYPERPLASIA, 8297*
  - NEOPLASMS, 8293*

CONTRAST MEDIA
- BILE
  - CHOLESTEROL, 8069
- CHOLECYSTOGRAPHY, 8130, 8140
- LIVER, 8070

CROHN'S DISEASE
- SEE ALSO ENTERITIS, ENTERITIS, REGIONAL
- ANORECTUM
  - ELECTROPHYSIOLOGY, 8508*
- ANTIGENS
  - GENETICS, 8263*
- ANUS
  - ELECTROPHYSIOLOGY, 8508*
  - FISTULA, 8514
- COLON
  - DIAGNOSIS, 8513
  - DRUG THERAPY, 8517
  - HORMONES, ADRENAL CORTEX, 8517
  - IMMUNOTHERAPY, 8516
  - STEROIDS, 8517
  - THERAPY, 8516
- COMPLICATIONS, 8514
- DRUG THERAPY, 8512
  - HORMONES, ADRENAL CORTEX, 8517
  - STEROIDS, 8517
  - SURGERY, 8266
- DUODENUM
  - FISTULA, 8509*
- ETIOLOGY
  - PROSTAGLANDINS, 8510
- FISTULA
  - THERAPY, 8509*

CROHN'S DISEASE (continued)
- ILEUM
  - FISTULA, 8509*
- IMMUNOTHERAPY, 8515, 8516
- RECTUM
  - DIAGNOSIS, 8513
  - DRUG THERAPY, 8517
  - HORMONES, ADRENAL CORTEX, 8517
  - STEROIDS, 8517
- RECURRENCE, 8511
- THERAPY, 8515, 8516
- TRANSMISSION, 8507*

CRUVEILHIER-BAUMGARTEN SYNDROME
- SEE LIVER CIRRHOSIS

CUSHING'S SYNDROME
- LIVER
  - NEOPLASMS, 8291*

CYCLIC ADENOSINE MONOPHOSPHATE
- SEE ADENOSINE CYCLIC 3',5' MONOPHOSPHATE

CYCLIC GUANOSINE MONOPHOSPHATE
- SEE GUANOSINE CYCLIC 3',5' MONOPHOSPHATE

CYSTIC FIBROSIS
- ABSORPTION
  - IRON, 8268*
  - PROTEINS, 8268*
  - RADIONUCLIDES, 8268*
  - VITAMIN B12, 8268*
- GLYCOPROTEINS
  - SYNTHESIS, 8090*
- RECTUM
  - GLYCOPROTEINS, 8090*
- SECRETION
  - GLYCOPROTEINS, 8090*
- TRANSPORT
  - GLYCOPROTEINS, 8090*

CYSTS
- LIVER
  - DIAGNOSIS, 8132
  - ULTRASONOGRAPHY, 8132

CYTOCHROMES
- LIVER
  - CARBON TETRACHLORIDE, 8022*
  - DRUG EFFECTS ON, 8025*
  - TOXICITY, 8022*

DEFECATION
- SEE ALSO EXCRETION

DEFOLIANTS
- SEE HERBICIDES

DEGLUTITION DISORDERS
- REVIEW, 8478

DEHYDRATION
- DIARRHEA
  - THERAPY, 8453*

DEHYDROGENASES
- SEE OXIDOREDUCTASES

- DETERGENTS
  - ABSORPTION
    - LIPIDS, 7927
- DETOXIFICATION
  - LIVER
    - DRUG THERAPY, 8317
- DIABETES
  - HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 8376
  - PANCREAS
    - ENZYMES, 7986*
- DIARRHEA
  - DEHYDRATION
    - THERAPY, 8453*
  - FOOD, 8458
  - NEONATE
    - REVIEW, 8457
  - YERSINIA
    - CHILD, 8202
    - COMPLICATIONS, 8201
    - DISEASES ASSOCIATED WITH, 8202
- DIET
  - COLON
    - NEOPLASMS, 8234*
  - FIBERS, 8461
    - REVIEW, 8467
  - LIVER
    - LIPIDS, 8020*
- DIGESTION
  - CARBOHYDRATES
    - PANCREAS, 7933
  - ENZYMES, 7984*
  - PANCREATITIS, CHRONIC, 8279
  - PROTEINS
    - PANCREAS, 7933
- DISACCHARIDASES
  - DEFICIENCY
    - BREATH TEST, 8136
    - DIAGNOSIS, 8136
  - INTESTINE, SMALL
    - ENTERITIS, 8207
  - MALABSORPTION SYNDROMES
    - DEFICIENCY, 8136
- DISACCHARIDES
  - MALABSORPTION SYNDROMES
    - BREATH TEST, 8136
    - DIAGNOSIS, 8136
- DISTENTION
  - ANTRUM
    - GASTRIN, 7971
  - STOMACH
    - GASTRIN, 7971
- DIURETICS
  - LIVER
    - DRUG METABOLISM, 8029*
- DIVERTICULUM
  - DUODENUM
    - DIAGNOSIS, 8199
  - ESOPHAGUS
    - REVIEW, 8147*
    - SIMULATION, 8147*
- L-DOPA
  - DUODENUM
    - ULCER, PEPTIC, 8189
  - STOMACH
    - ULCER, PEPTIC, 8189
  - ULCER, PEPTIC
    - DRUG THERAPY, 8189
- DRAINAGE
  - BILE DUCTS
    - TECHNIQUES, 8442
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 8431*
  - CHOLANGITIS
    - JAUNDICE, 8422*
  - LIVER
    - TRANSPLANTATION, 8307*
  - PANCREATITIS
    - LYMPH, 7990
- DRUG DEPENDENCE
  - DISEASES ASSOCIATED WITH
    - LIVER DISEASES, ALCOHOLIC, 8285*
- DRUG-INDUCED
  - CHOLESTASIS
    - BIOCHEMISTRY, 8294*
    - REVIEW, 8294*
  - COLITIS
    - DIAGNOSIS, 8261
  - HEPATITIS
    - ANTIBIOTICS, 8340*
    - GALACTOSAMINE, 8028*
    - PREVENTION, 8028*
  - HEPATITIS, TOXIC
    - AGE FACTORS, 8375
  - HYPERBILIRUBINEMIA
    - PREGNANCY, 8336*
  - INTESTINES
    - ULCER, 8102*
  - JAUNDICE
    - TOXICITY, 8344
  - JAUNDICE, CHOLESTATIC
    - SEDATIVES, 8346
  - LIVER INJURY
    - COLLAGEN, 8023*
    - GALACTOSAMINE, 8028*
    - PREVENTION, 8028*
    - SEDATIVES, 8346
  - PELIOSIS HEPATIS
    - ANDROGENS, 8299*
  - PERITONITIS
    - ANTI-INFLAMMATORY AGENTS, 8102*
  - PORPHYRIA
    - SIMULATION, 8026*
  - ULCER
    - ANTI-INFLAMMATORY AGENTS, 8102*

- DRUG METABOLISM
  - HORMONE EFFECTS ON
    - ENZYMES, 8007*
  - LIVER, 8066
    - ANALGESICS AND ANTIPYRETICS, 8029*
    - ANTIHYPERTENSIVE AGENTS, 8029*
    - CHELATING AGENTS, 8033*
    - DIURETICS, 8029*
    - ENZYMES, 8065
    - HORMONE EFFECTS ON, 8007*
    - MICROSOMES, 8029*
    - PERFUSION, 8031*
    - TECHNIQUES, 8031*
  - LIVER CIRRHOSIS
    - KINETICS, 8310
  - LIVER DISEASES
    - ENZYMES, 8034*
    - PROTEINS, 8283*
    - REVIEW, 8283*
    - SEDATIVES, 8325
  - LIVER INJURY
    - ENZYMES, 8034*

- DRUG THERAPY
  - ASCARIASIS, 8503
  - BILE DUCTS
    - CALCULI, 8425*
  - CHOLELITHIASIS
    - CHENODEOXYCHOLIC ACID, 8429*
  - COLITIS, ULCERATIVE
    - SURGERY, 8266
  - COLON
    - CROHN'S DISEASE, 8517
    - NEOPLASMS, 8233*
  - COMMON BILE DUCT CALCULI
    - BILE ACIDS AND SALTS, 8425*
    - HEPARIN, 8425*
  - CROHN'S DISEASE, 8512
    - HORMONES, ADRENAL CORTEX, 8517
    - STEROIDS, 8517
    - SURGERY, 8266
  - DUODENUM
    - ULCER, PEPTIC, 8189
  - GALLSTONES
    - CHEMICAL PROPERTIES, 8002*
  - HELMINTHIASIS, 8503
  - HEPATITIS
    - LIVER INJURY, 8374
  - HEPATITIS, CHRONIC
    - ALKALINE PHOSPHATASE, 8387
    - BLOOD, 8387
    - HORMONES, ADRENAL CORTEX, 8384*, 8385*
    - PROGNOSIS, 8388
  - LIVER
    - DETOXIFICATION, 8317
    - DYSTROPHY, 8074
    - NEOPLASMS, 8289*
    - PORPHYRIA, 8311
  - LIVER CIRRHOSIS
    - ALKALINE PHOSPHATASE, 8387
    - BLOOD, 8387
  - LIVER DISEASES, 8308
  - LIVER INJURY, 8074
  - NAUSEA
    - REVIEW, 8479
  - PORPHYRIA, 8300*

- DRUG THERAPY (continued)
  - RECTUM
    - CROHN'S DISEASE, 8517
    - NEOPLASMS, 8233*
  - SALIVARY GLANDS
    - NEOPLASMS, MALIGNANT, 8452*
  - SALMONELLOSIS
    - ANTIBIOTICS, 8474, 8475
  - STOMACH
    - ULCER, PEPTIC, 8189
  - ULCER, PEPTIC
    - ANTACIDS, 8187
    - L-DOPA, 8189
    - H2 RECEPTOR ANTAGONISTS, 8188
  - VOMITING
    - REVIEW, 8479

- DUBIN-JOHNSON SYNDROME
  - SEE JAUNDICE, CHRONIC IDIOPATHIC

- DUODENITIS
  - CHILD
    - DIAGNOSIS, 8205
    - ENDOSCOPY, 8206
  - DIAGNOSIS
    - REVIEW, 8204
  - DISEASES ASSOCIATED WITH
    - REVIEW, 8204
  - ETIOLOGY
    - REVIEW, 8204
  - INFLAMMATION
    - CELLS, 8191*
    - MORPHOLOGY, 8191*
  - REVIEW, 8208

- DUODENOSCOPY
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 8439
    - THERAPY, 8439
  - PANCREATIC DISEASES
    - DIAGNOSIS, 8439
    - THERAPY, 8439

- DUODENUM
  - SEE ALSO ILEUM, INTESTINE, SMALL, JEJUNUM
  - BRUNNER'S GLANDS
    - HYPERTROPHY, 8212
  - CROHN'S DISEASE
    - FISTULA, 8509*
  - DIVERTICULUM
    - DIAGNOSIS, 8199
  - ENDOSCOPY
    - COMPLICATIONS, 8142
    - REVIEW, 8142
  - FERRITIN
    - TRANSPORT, 7917*
  - HORMONES
    - GROWTH FACTORS, 8085*
  - HORMONES, ADRENAL CORTEX
    - GROWTH FACTORS, 8085*
  - HORMONES, GASTROINTESTINAL
    - INSULIN, 7956*
  - IMMUNOGLOBULINS
    - TRANSPORT, 7917*
  - INTESTINE, SMALL, 8197
  - MOTILITY
    - ALKALOIDS, 7941

- DUODENUM (continued)
  - MOTILITY (continued)
    - CATECHOLAMINES, 7950
    - DRUG EFFECTS ON, 7941, 7950
    - ELECTROPHYSIOLOGY, 7938*
    - EPINEPHRINE, 7950
    - MORPHOLOGY, 7938*
  - NEOPLASMS, BENIGN, 8196
    - DIAGNOSIS, 8197
    - ENDOSCOPY, 8197
  - NEOPLASMS, MALIGNANT
    - CHILD, 8198
    - ENDOSCOPY, 8195
    - SURGERY, 8198
  - OBSTRUCTION, 8213
  - PARASITES AND PARASITIC DISEASES
    - OBSTRUCTION, 8190*
  - STOMACH
    - ELECTROPHYSIOLOGY, 7940*
    - MOTILITY, 7940*
  - ULCER
    - PYLOROPLASTY, 8181*
    - SURGERY, 8276
    - VAGOTOMY, 8181*
  - ULCER, PEPTIC
    - ACID SECRETION, 7976
    - ACIDITY, 8180*
    - COMPLICATIONS, 8488
    - L-DOPA, 8189
    - DRUG THERAPY, 8189
    - HYPERCHLORHYDRIA, 7976
    - PENTAGASTRIN, 8180*
    - THERAPY, 8186

- DYES
  - ESOPHAGUS
    - VARICES, 8155
  - VARICES
    - DIAGNOSIS, 8155

- DYSPHAGIA
  - SEE DEGLUTITION DISORDERS

- DYSTROPHY
  - LIVER
    - DRUG THERAPY, 8074
    - THERAPY, 8078
    - VITAMIN E, 8078

- ECHINOCOCCOSIS
  - EPIDEMIOLOGY
    - SOCIOECONOMIC FACTORS, 8500*
    - TRANSMISSION, 8500*
  - SERUM
    - PROTEINS, 8170
  - TRANSMISSION
    - SOCIOECONOMIC FACTORS, 8500*

- ECHOGRAPHY
  - SEE ULTRASONOGRAPHY

- ELECTROLYTES
  - ESOPHAGUS
    - METABOLISM, 8152
    - STENOSIS, 8152

- ELECTRON TRANSPORT
  - SEE ALSO ION TRANSPORT

- ELECTROPHORESIS
  - AUSTRALIA ANTIGEN, 8379

- ELECTROPHYSIOLOGY
  - CROHN'S DISEASE
    - ANORECTUM, 8508*
    - ANUS, 8508*
  - DUODENUM
    - MOTILITY, 7938*
  - ILEUM
    - ION TRANSPORT, 7925
  - INTESTINE, LARGE
    - DRUG EFFECTS ON, 7922, 7951
    - VASODILATOR AGENTS, 7951
  - INTESTINE, SMALL, 7920*
    - ION TRANSPORT, 7925
    - MOTILITY, 7938*
  - LIVER
    - ADENOSINE TRIPHOSPHATE, 8041*
    - ANOXIA, 8041*
  - RECTUM
    - DRUG EFFECTS ON, 7955
    - NERVOUS CONTROL, 7955
    - PARASYMPATHOMIMETICS, 7955
  - STOMACH
    - DUODENUM, 7940*
    - FATS, 7940*
    - GLUCOSE, 7940*

- EMESIS
  - SEE VOMITING

- ENDOSCOPY
  - BILIARY TRACT
    - CALCULI, 8437
  - CHOLANGIOGRAPHY
    - COMPLICATIONS, 8142
    - REVIEW, 8142
  - COMMON BILE DUCT
    - TECHNIQUES, 8424*
  - COMMON BILE DUCT CALCULI
    - DIAGNOSIS, 8424*
  - DUODENITIS
    - CHILD, 8206
  - DUODENUM
    - COMPLICATIONS, 8142
    - NEOPLASMS, BENIGN, 8197
    - NEOPLASMS, MALIGNANT, 8195
    - REVIEW, 8142
  - GASTROINTESTINAL SYSTEM
    - REVIEW, 8144
  - PANCREATOGRAPHY
    - COMPLICATIONS, 8142
    - REVIEW, 8142
  - STOMACH
    - ANTACIDS, 7973
    - NEOPLASMS, MALIGNANT, 8174, 8175
  - STOMACH DISEASES, 8166

- ENDOTOXINS
  - INTESTINAL ABSORPTION, 8101*
  - LIVER
    - BILE, 7996*
    - SALMONELLOSIS, 8039*

- ENEMA
  - INTESTINE, LARGE
    - APPENDIX, 8239
    - BARIUM, 8239

ENTERECTOMY
  TRANSPORT
    BILE ACIDS AND SALTS, 7915*

ENTERITIS
  SEE ALSO CROHN'S DISEASE
  CLASSIFICATION, 8208
  INTESTINE, SMALL
    DISACCHARIDASES, 8207
  REVIEW, 8208

ENTERITIS, REGIONAL
  SEE ALSO CROHN'S DISEASE

ENTEROCOLITIS
  RENAL INSUFFICIENCY, 8091*

ENTEROCOLITIS, NECROTIZING
  INFANT
    BREAST FEEDING, 8469
  UROGENITAL SYSTEM
    SURGERY, 8246

EPINEPHRINE
  COLON
    MOTILITY, 7950
  DUODENUM
    MOTILITY, 7950
  SECRETION
    PEPSIN, 8171
  STOMACH
    ACID SECRETION, 8171
    GASTRIN, 7972

ERYTHROCYTES
  LIVER DISEASES, ALCOHOLIC
    ANEMIA, HEMOLYTIC, 8390*
  ZIEVE'S SYNDROME
    MEMBRANES, 8390*
    METABOLISM, 8390*

ESCHERICHIA COLI
  INTESTINES
    ANTIBODIES, 8100*

ESOPHAGUS
  BURNS, CHEMICAL
    STENOSIS, 8152
  CIRCULATORY SYSTEM
    MORPHOMETRY, 7901*
  DIVERTICULUM
    REVIEW, 8147*
    SIMULATION, 8147*
  ELECTROLYTES
    METABOLISM, 8152
  HEMORRHAGE
    THERAPY, 8156, 8157
  HORMONE EFFECTS ON
    GASTRIN, 7936*
    SOMATOSTATIN, 7936*
  HYPERTENSION, PORTAL
    MORPHOMETRY, 7901*
  HYPERTROPHY
    RUPTURE, 8148*
  MOTILITY
    GASTRIN, 7936*
    HORMONE EFFECTS ON, 7936*
    MUSCLES, 7937*
    NERVOUS CONTROL, 7937*
    SOMATOSTATIN, 7936*

ESOPHAGUS (continued)
  PERISTALSIS
    MUSCLES, 7937*
    NERVOUS CONTROL, 7937*
  POTASSIUM
    DEFICIENCY, 8152
  SPHINCTER
    GASTRIN, 7936*
    HORMONE EFFECTS ON, 7936*
    PRESSURE STUDY, 7936*
    SOMATOSTATIN, 7936*
    SPASM, 8150
  STENOSIS
    ELECTROLYTES, 8152
    POTASSIUM, 8152
    SURGERY, 8151
  STOMACH
    CIRCULATORY SYSTEM, 7901*
  STRICTURE
    SURGERY, 8114, 8153
  ULCER, PEPTIC
    STENOSIS, 8151
    SURGERY, 8151, 8154
  VARICES, 8159
    CHILD, 8157
    DIAGNOSIS, 8155
    DYES, 8155
    HEMORRHAGE, 8156, 8157
    SPLENORENAL SHUNT, 8158
    SURGERY, 8158
    THERAPY, 8156, 8157, 8158
  VEINS
    EMBOLIZATION, 8402*

ESOPHAGUS, ARTIFICIAL
  CECUM, 8160
  COLON, 8153
  ILEUM, 8160
  INTESTINE, LARGE, 8160, 8161
  INTESTINE, SMALL, 8153, 8160

ESTROGENS
  BILIRUBIN
    METABOLISM, 8077
  ILEUM
    MOTILITY, 7952
  INTESTINE, SMALL
    MOTILITY, 7952
  LIVER
    CARBOHYDRATES, 8008*
    FATTY ACIDS, 8003*
    GLUCAGON, 8008*
    INSULIN, 8008*
    LIPIDS, 8008*
  SECRETION
    BILE ACIDS AND SALTS, 8004*
    CHOLESTEROL, 8004*

EXCRETION
  SEE ALSO DEFECATION
  PORPHYRIN
    DRUG EFFECTS ON, 8025*
    URINE, 8025*

FATS
  SEE ALSO LIPIDS, TRIGLYCERIDES
  BILE
    BILE ACIDS AND SALTS, 7998*

- FATS (continued)
  - BILE ACIDS AND SALTS
    - DIETARY FACTORS, 7998*
  - FECES
    - BILE ACIDS AND SALTS, 7998*
  - LIVER
    - DIETARY FACTORS, 8015*
    - LIPIDS, 8020*
  - STEROLS
    - DIETARY FACTORS, 7998*
  - STOMACH
    - ELECTROPHYSIOLOGY, 7940*
    - MOTILITY, 7940*

- FATTY ACIDS
  - ABSORPTION, 7934
  - INTESTINE, SMALL, 7926
    - LYMPHATIC SYSTEM, 7926
  - INTESTINES
    - METABOLISM, 8096
  - LIVER
    - CHOLESTEROL, 8003*
    - ESTROGENS, 8003*
  - LYMPHATIC SYSTEM, 7926

- FATTY LIVER
  - AMINO ACIDS
    - DEFICIENCY, 8017*
  - COLLAGEN
    - ENZYMES, 8296*
  - HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 8376
  - LIVER INJURY
    - AGE FACTORS, 8281*

- FECES
  - BILE ACIDS AND SALTS
    - DIETARY FACTORS, 7998*
    - FATS, 7998*
  - COLON
    - NEOPLASMS, 8234*

- FERRITIN
  - DUODENUM
    - TRANSPORT, 7917*
  - ILEUM
    - TRANSPORT, 7917*
  - INTESTINAL ABSORPTION
    - PROTEINS, 7917*

- FETOPROTEIN, ALPHA
  - SEE ALPHA FETOPROTEIN

- FIBERS
  - COLON
    - NEOPLASMS, 8234*
  - DIET, 8461
    - REVIEW, 8467

- FIBRINOLYSIS
  - LIVER
    - REGENERATION, 8038*

- FIBROSIS
  - HEPATITIS, CHRONIC
    - LIVER CIRRHOSIS, 8288*
    - PRECANCEROUS CONDITIONS, 8288*

- FIBROSIS (continued)
  - LIVER
    - ETIOLOGY, 8396*
    - MORPHOLOGY, 8396*
    - ULTRASONOGRAPHY, 8330

- FISTULA
  - ANUS
    - CROHN'S DISEASE, 8514
  - BILIARY TRACT
    - SURGERY, 8441
  - CROHN'S DISEASE
    - DUODENUM, 8509*
    - ILEUM, 8509*
    - THERAPY, 8509*
  - ILEUM
    - SURGERY, 8211
    - THERAPY, 8211
  - INTESTINES
    - SURGERY, 8211
    - THERAPY, 8211

- FLUID BALANCE
  - SEE WATER, ELECTROLYTE BALANCE

- FOLIC ACID
  - ANEMIA
    - DEFICIENCY, 8482
  - INTESTINAL ABSORPTION
    - ANTICONVULSANTS, 7923
    - DRUG EFFECTS ON, 7923
    - METABOLISM, 7923
  - METABOLISM
    - ANTICONVULSANTS, 7923
    - DRUG EFFECTS ON, 7923

- FOOD
  - DIARRHEA, 8458
  - STOMACH
    - ACID SECRETION, 7968*

- FRUCTOSE
  - INTOLERANCE
    - BIOCHEMISTRY, 8232
    - CHILD, 8229
    - GENETICS, 8232
    - PATHOLOGY, 8232

- FUNGUS DISEASES
  - SEE MYCOSES

- GALACTOSAMINE
  - HEPATITIS
    - DRUG-INDUCED, 8028*
  - HEPATITIS, TOXIC, 8341*
  - LIVER INJURY
    - DRUG-INDUCED, 8028*

- GALLBLADDER
  - APLASIA, 8438
  - GASES
    - GANGRENE, 8445
  - HYPOPLASIA, 8438

- GALLBLADDER DISEASES
  - BILE
    - BIOCHEMISTRY, 8420*
  - CHOLECYSTECTOMY
    - SEQUELAE, 8444

- GALLSTONES
  - SEE ALSO CHOLELITHIASIS
  - BILE
    - CALCIUM, 8420*
  - CALCIUM
    - CHEMICAL COMPOSITION, 8427*
  - CHOLESTEROL
    - SOLUBILITY, 8001*
  - DRUG THERAPY
    - CHEMICAL PROPERTIES, 8002*
  - PIGMENTS
    - CHEMICAL PROPERTIES, 8426*
    - SYNTHESIS, 8426*

- GAMMA GLUTAMYLCYCLOTRANSFERASE
  - SEE ACYLTRANSFERASES

- GANGRENE
  - CECUM
    - PSEUDO-OBSTRUCTION, 8236*
  - COLON
    - PSEUDO-OBSTRUCTION, 8236*
  - GALLBLADDER
    - GASES, 8445

- GASES
  - GALLBLADDER
    - GANGRENE, 8445
  - PERITONEUM
    - DIAGNOSIS, 8466

- GASTRIC INHIBITORY POLYPEPTIDE
  - SEE HORMONES, GASTROINTESTINAL

- GASTRIN
  - ANTRUM
    - DISTENTION, 7971
    - ULCER, 8181*
  - ESOPHAGUS
    - HORMONE EFFECTS ON, 7936*
    - MOTILITY, 7936*
    - SPHINCTER, 7936*
  - KIDNEY DISEASES
    - SERUM, 8499
  - LIVER CIRRHOSIS
    - CELLS, 8418
    - SERUM, 8418
  - PYLOROPLASTY
    - ULTRASTRUCTURE, 8181*
  - SECRETION
    - ATROPINE, 7967*
    - NERVOUS CONTROL, 7967*
  - SERUM
    - ACID SECRETION, 7970
    - NERVOUS CONTROL, 7970
  - STOMACH
    - ATROPINE, 7967*
    - DISTENTION, 7971
    - EPINEPHRINE, 7972
    - NERVOUS CONTROL, 7967*
    - SECRETION, 7972
    - SYNTHESIS, 7972
  - ULCER
    - ULTRASTRUCTURE, 8181*
  - VAGOTOMY
    - ULTRASTRUCTURE, 8181*

- GASTRITIS
  - ACID SECRETION, 8169

- GASTRODUODENAL ULCER
  - SEE ULCER, PEPTIC

- GASTROENTERITIS
  - CHILD
    - COMPLICATIONS, 8483
    - THERAPY, 8483
  - EPIDEMIOLOGY, 8456*
  - ETIOLOGY
    - YERSINIA, 8203
  - INFANT
    - COMPLICATIONS, 8483
    - REVIEW, 8460
    - THERAPY, 8483
  - VIRUS DISEASES
    - CHILD, 8455*
    - DISEASES ASSOCIATED WITH, 8481
    - INFANT, 8460
    - SEASONAL FACTORS, 8455*
  - VIRUSES, 8456*

- GASTROINTESTINAL DISEASES
  - CIRCULATION
    - DIAGNOSIS, 8490
    - PROGNOSIS, 8491
    - SURGERY, 8491
  - DIAGNOSIS, 8494
  - DIETARY FACTORS, 8495
  - EPIDEMIOLOGY, 8495
  - HORMONES, GASTROINTESTINAL, 8497
  - HYPERSENSITIVITY
    - IMMUNOLOGY, 8231
  - IMMUNITY, 8167
  - MAGNESIUM
    - DEFICIENCY, 8498
  - SERUM
    - PROTEINS, 8170

- GASTROINTESTINAL SYSTEM
  - ABSORPTION
    - CHILD, 8109
    - INFANT, 8109
  - ALCOHOLISM, 8068
  - BACTERIAL INFECTIONS
    - YERSINIA, 8203
  - CELLS
    - REVIEW, 8111
  - ENDOSCOPY
    - REVIEW, 8144
  - HEMANGIOMA
    - SURGERY, 8235*
  - MALLORY-WEISS SYNDROME
    - DISEASES ASSOCIATED WITH, 8149
  - MOTILITY
    - CHILD, 8109
    - INFANT, 8109
    - NERVOUS CONTROL, 7942
    - RADIOTELEMETRY, 7935*
    - TECHNIQUES, 7935*
  - NEOPLASMS
    - REVIEW, 8111
  - NEOPLASMS, MALIGNANT
    - CARCINOEMBRYONIC ANTIGEN, 8126
    - COMPLEMENT, 8462
    - CYTOLOGY, 8137
    - DIAGNOSIS, 8137, 8493
  - PRECANCEROUS CONDITIONS
    - REVIEW, 8111

- GASTROINTESTINAL SYSTEM (continued)
  - RADIOLOGY
    - TECHNIQUES, 8118
  - RADIOTELEMETRY
    - TECHNIQUES, 7935*
  - RECTUM
    - SURGERY, 8247
  - SECRETION
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7957
  - SIGMOID
    - SURGERY, 8247
  - SURGERY
    - MAGNESIUM, 8496

- GENETICS
  - ALPHA 1 ANTITRYPSIN
    - LIVER DISEASES, 8287*
  - CROHN'S DISEASE
    - ANTIGENS, 8263*
  - FRUCTOSE
    - INTOLERANCE, 8232

    - ANTIGENS, 8263*
  - HEPATITIS, CHRONIC, 8381*
  - INFLAMMATORY BOWEL DISEASES
    - ANTIGENS, 8263*

- GIARDIASIS
  - COLITIS
    - COMPLICATIONS, 8506
  - COMPLICATIONS
    - MEGACOLON, 8506
  - TRANSMISSION, 8473
    - REVIEW, 8472

- GLOBULINS
  - HEPATITIS, INFECTIOUS, 8350*

- GLUCAGON
  - LIVER
    - ESTROGENS, 8008*
    - METABOLISM, 8008*

- GLUCOSE
  - INTESTINE, SMALL
    - OSMOTIC PRESSURE, 8095
  - JEJUNUM
    - ENZYMES, 8084*
    - OSMOTIC PRESSURE, 8095
    - PERFUSION, 8084*
  - LIVER, 8061
  - STOMACH
    - ELECTROPHYSIOLOGY, 7940*
    - MOTILITY, 7940*

- GLUTATHIONE
  - AMINO ACIDS
    - METABOLISM, 7993*
  - LIVER, 7993*
  - WILSON'S DISEASE
    - HEMOLYSIS, 8304*

- GLYCOGEN
  - HEPATOCYTES, 8063
  - LIVER
    - ALCOHOLISM, 8067
    - HORMONE CONTROL, 8005*
    - METABOLISM, 8005*

- GLYCOGEN (continued)
  - METABOLISM
    - ALCOHOLISM, 8067

- GLYCOGEN STORAGE DISEASE
  - SEE GLYCOGENOSIS

- GLYCOGENOSIS
  - CHILD
    - DIAGNOSIS, 8290*

- GLYCOPROTEINS
  - RECTUM
    - CELLS, 8090*
    - CYSTIC FIBROSIS, 8090*
    - SECRETION, 8090*
    - SYNTHESIS, 8090*
    - TRANSPORT, 8090*
  - SECRETION
    - CYSTIC FIBROSIS, 8090*
  - STOMACH
    - SECRETION, 7969*
  - SYNTHESIS
    - CYSTIC FIBROSIS, 8090*
  - TRANSPORT
    - CYSTIC FIBROSIS, 8090*

- GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
  - SECRETION
    - AMYLASES, 7985*

- H2 RECEPTOR ANTAGONISTS
  - ACID SECRETION
    - HISTAMINE, 7964*
  - STOMACH
    - ACID SECRETION, 7963*
  - ULCER, PEPTIC
    - DRUG THERAPY, 8188

- HEIDENHAIN POUCH
  - PENTAGASTRIN
    - ACID SECRETION, 7965*
    - TEMPERATURE, 7965*
  - TEMPERATURE
    - ACID SECRETION, 7965*

- HELMINTHIASIS
  - DRUG THERAPY, 8503
  - EPIDEMIOLOGY, 8502
  - PREVENTION, 8503

- HEMANGIOMA
  - GASTROINTESTINAL SYSTEM
    - SURGERY, 8235*

- HEMATIN
  - SEE HEME

- HEMATOBILIA
  - CALCULI
    - ETIOLOGY, 8446

- HEME
  - HYPERTENSION, PORTAL
    - METABOLISM, 8400*
    - SHUNT, 8400*
    - SPLENECTOMY, 8400*
  - LIVER CIRRHOSIS
    - HYPERTENSION, PORTAL, 8400*
    - METABOLISM, 8400*

HEME (continued)
    SPLENECTOMY
        METABOLISM, 8400*

HEMOBILIA
    SEE HEMATOBILIA

HEMOCHROMATOSIS
    LIVER CIRRHOSIS
        REVIEW, 8397*

HEMODIALYSIS
    AUSTRALIA ANTIGEN
        OCCUPATIONAL FACTORS, 8363
    HEPATITIS, INFECTIOUS
        DIAGNOSIS, 8365
        OCCUPATIONAL FACTORS, 8363
        TRANSMISSION, 8353*
    INTESTINAL ABSORPTION
        ANTACIDS, 8230
        IRON, 8230
    STOMACH
        MORPHOLOGY, 8172

HEMOLYSIS
    WILSON'S DISEASE
        GLUTATHIONE, 8304*

HEMORRHAGE
    SEE ALSO BLEEDING
    ESOPHAGUS
        THERAPY, 8156, 8157
        VARICES, 8156, 8157
    LIVER
        SURGERY, 8321
    LIVER CIRRHOSIS
        SURVIVAL, 8394
    LIVER COMA
        PREVENTION, 8417
    MECKEL'S DIVERTICULUM
        SURGERY, 8221

HEPARIN
    BILE DUCTS
        CALCULI, 8425*
    COMMON BILE DUCT CALCULI
        DRUG THERAPY, 8425*
        THERAPY, 8425*

HEPATECTOMY
    HUMORAL FACTORS
        SYNTHESIS, 8036
    LIVER
        HYPERPLASIA, 8035*
        REGENERATION, 8035*
    REGENERATION
        MORPHOLOGY, 8080

HEPATIC VEIN THROMBOSIS
    SEE ALSO BUDD-CHIARI SYNDROME

HEPATITIS
    ANTIBODIES, 8351*
        CARRIER STATE, 8359*
    ANTIGENS, 8358*
    BACTERIAL INFECTIONS
        VENEREAL DISEASES, 8054

HEPATITIS (continued)
    CHOLESTASIS
        DIAGNOSIS, 8369
        ETIOLOGY, 8369
    DRUG-INDUCED
        ANTIBIOTICS, 8340*
        GALACTOSAMINE, 8028*
        PREVENTION, 8028*
    ETIOLOGY
        YERSINIA, 8203
    HEPATITIS, TOXIC
        DRUG THERAPY, 8027*
    IMMUNOGLOBULINS, 8351*
    LIVER CIRRHOSIS
        ETIOLOGY, 8408
    LIVER INJURY
        DRUG THERAPY, 8374
    OCCUPATIONAL FACTORS
        DIAGNOSIS, 8348*
        THERAPY, 8348*
    THERAPY
        OXYGEN, 8075

HEPATITIS, CHRONIC
    AMINO ACIDS
        METABOLISM, 8327
    BILIRUBIN
        METABOLISM, 8385*
    BLOOD
        COMPLEMENT, 8382*
    CHILD
        AMINO ACIDS, 8327
    COLLAGEN
        ENZYMES, 8296*
    DIAGNOSIS, 8139
    DRUG THERAPY
        ALKALINE PHOSPHATASE, 8387
        BLOOD, 8387
        HORMONES, ADRENAL CORTEX, 8384*, 8385*
        PROGNOSIS, 8388
    FIBROSIS
        LIVER CIRRHOSIS, 8288*
    GENETICS, 8381*
    HEPATITIS, INFECTIOUS
        COMPLICATIONS, 8376
    IMMUNOLOGY, 8383*
    LIPIDS
        PEROXIDATION, 8058
    LIVER
        NEOPLASMS, 8288*
    LIVER COMA
        SURVIVAL, 8319
    PRECANCEROUS CONDITIONS
        FIBROSIS, 8288*
    PROGNOSIS
        MORPHOLOGY, 8386*
        SEX FACTORS, 8386*

HEPATITIS, CHRONIC INTERSTITIAL
    SEE LIVER CIRRHOSIS

HEPATITIS, INFECTIOUS
    ADOLESCENCE
        TRANSMISSION, 8366
    AGE FACTORS, 8375
    ALPHA 1 ANTITRYPSIN
        DEFICIENCY, 8286*
    ANTIBODIES, 8351*

HEPATITIS, INFECTIOUS (continued)
- ANTIGENS, 8358*
- AUSTRALIA ANTIGEN
  - BLOOD GROUPS, 8352*
  - CHILD, 8380
  - DIAGNOSIS, 8378
  - EPIDEMIOLOGY, 8352*, 8364
  - IMMUNITY, 8354*
  - PROGNOSIS, 8378, 8380
- BIOCHEMISTRY
  - REVIEW, 8367
- BLOOD
  - TRANSMISSION, 8361
- CARRIER STATE
  - EPIDEMIOLOGY, 8364
- CHILD
  - AMINO ACIDS, 8370
  - EPIDEMIOLOGY, 8352*
  - LIVER FUNCTION TESTS, 8370
  - PROTEINS, 8373
  - SEASONAL FACTORS, 8352*
  - TRANSMISSION, 8366
- CHOLESTASIS
  - DIAGNOSIS, 8369
  - ETIOLOGY, 8369
- CHOLINESTERASES
  - ANTI-INFLAMMATORY AGENTS, 8371
  - DRUG EFFECTS ON, 8371
- COLLAGEN
  - ENZYMES, 8296*
- COMPLICATIONS
  - HEPATITIS, CHRONIC, 8376
  - HYPERBILIRUBINEMIA, 8376
  - LIVER CIRRHOSIS, 8376
- DIAGNOSIS
  - PROTEINS, 8373
- DIETARY FACTORS
  - EPIDEMIOLOGY, 8352*
- DISEASES ASSOCIATED WITH
  - BILIARY TRACT DISEASES, 8376
  - DIABETES, 8376
  - FATTY LIVER, 8376
  - PANCREATITIS, 8376
  - ULCER, 8376
- EPIDEMIOLOGY
  - REVIEW, 8367
- GLOBULINS, 8350*
- HEMODIALYSIS
  - DIAGNOSIS, 8365
  - OCCUPATIONAL FACTORS, 8363
  - TRANSMISSION, 8353*
- HYPERBILIRUBINEMIA
  - NEONATE, 8286*
  - TRANSMISSION, 8286*
- IMMUNOGLOBULINS, 8350*, 8351*, 8372
  - ANTIGENS, 8355*
  - HEPATOCYTES, 8356*
- IMMUNOLOGY, 8354*
  - REVIEW, 8367
- JAUNDICE, OBSTRUCTIVE
  - LIPOPROTEINS, 8368
- LIPOPROTEINS
  - IMMUNITY, 8354*
- MORPHOLOGY
  - REVIEW, 8367
- PLASMA
  - LIPOPROTEINS, 8368
- PREVENTION
  - REVIEW, 8367

HEPATITIS, INFECTIOUS (continued)
- PROGNOSIS, 8376
- SERUM
  - CHOLINESTERASES, 8371
- THERAPY, 8377
- TRANSFUSION
  - TRANSMISSION, 8362
- TRANSMISSION
  - RISK FACTORS, 8361
  - SALIVA, 8360*
  - SEX FACTORS, 8353*
  - UROGENITAL SYSTEM, 8360*
- VIRUSES
  - ANTIGENS, 8349*
  - IMMUNOLOGY, 8349*

HEPATITIS, SERUM
- AUSTRALIA ANTIGEN
  - CHILD, 8380
  - PROGNOSIS, 8380

HEPATITIS, TOXIC
- DRUG-INDUCED
  - AGE FACTORS, 8375
- GALACTOSAMINE, 8341*
- HEPATITIS
  - DRUG THERAPY, 8027*
- THERAPY
  - OXYGEN, 8075

HEPATITIS, VIRAL
- SEE HEPATITIS, INFECTIOUS

HEPATOCYTES
- CARBON TETRACHLORIDE
  - MORPHOLOGY, 8021*
- CELL CULTURE
  - TECHNIQUES, 7992*
- CHOLESTEROL
  - LIPOPROTEINS, 8013*
- GLYCOGEN, 8063
- HEPATITIS, INFECTIOUS
  - IMMUNOGLOBULINS, 8356*
- HORMONE EFFECTS ON
  - THYROID GLAND, 8053
- LIPIDS
  - CARBON TETRACHLORIDE, 8021*
- LIPOPROTEINS
  - SYPHILIS, 8056
- NUCLEIC ACIDS, 8063
- PROTEINS, 8063
  - SYNTHESIS, 8011*
- SIDEROSIS
  - IRON, 8389*
- TRANSPORT
  - SULFOBROMOPHTHALEIN, 7930

HEPATOLENTICULAR DEGENERATION
- SEE WILSON'S DISEASE

HERNIA
- INTESTINE, SMALL
  - MORPHOLOGY, 8194*
- PNEUMATOSIS
  - STOMACH, 8163*

HIATAL HERNIA
- ACID SECRETION
  - SURGERY, 8146*

- HIATAL HERNIA (continued)
  - STOMACH
    - ACID SECRETION, 8146*

- HIRSCHSPRUNG'S DISEASE
  - SEE ALSO MEGACOLON

- HISTAMINE
  - ACID SECRETION
    - H2 RECEPTOR ANTAGONISTS, 7964*
    - TRACER STUDY, 7964*
  - STOMACH
    - ACID SECRETION, 7964*
    - SECRETION, 7969*

- HORMONE CONTROL
  - CARBOHYDRATES
    - METABOLISM, 8019*
    - REVIEW, 8019*
  - LIPIDS
    - REVIEW, 8019*
  - LIVER
    - CARBOHYDRATES, 8019*
    - GLYCOGEN, 8005*
    - LIPIDS, 8019*
    - OXYGEN, 7995*
  - PANCREAS
    - AMYLASES, 7985*
    - SECRETION, 7985*
  - SECRETION
    - AMYLASES, 7985*

- HORMONES
  - DUODENUM
    - GROWTH FACTORS, 8085*
  - INTESTINE, SMALL
    - GROWTH FACTORS, 8085*
  - JAUNDICE
    - TOXICITY, 8344
  - LIVER
    - HYPERPLASIA, 8297*
  - PANCREAS, 7983*
    - REVIEW, 8125

- HORMONES, ADRENAL CORTEX
  - BILIRUBIN
    - METABOLISM, 8385*
  - COLON
    - CROHN'S DISEASE, 8517
    - ION TRANSPORT, 7922
  - CROHN'S DISEASE
    - DRUG THERAPY, 8517
  - DUODENUM
    - GROWTH FACTORS, 8085*
  - HEPATITIS, CHRONIC
    - DRUG THERAPY, 8384*, 8385*
  - INTESTINE, LARGE
    - ION TRANSPORT, 7922
  - INTESTINE, SMALL
    - GROWTH FACTORS, 8085*
  - LIVER
    - NEOPLASMS, 8291*
  - NEOPLASMS
    - SECRETION, 8291*
  - RECTUM
    - CROHN'S DISEASE, 8517

- HORMONES, GASTROINTESTINAL
  - DUODENUM
    - INSULIN, 7956*
  - GASTROINTESTINAL DISEASES, 8497

- HYDROCARBONS
  - LIVER INJURY
    - OCCUPATIONAL FACTORS, 8342

- HYDROGEN
  - BREATH TEST
    - SMOKING, 8136

- HYPERBILIRUBINEMIA
  - ALPHA 1 ANTITRYPSIN
    - DEFICIENCY, 8286*
  - ANTIBIOTICS
    - BINDING, 8320
  - HEPATITIS, INFECTIOUS
    - COMPLICATIONS, 8376
    - TRANSMISSION, 8286*
  - INFANT
    - ENZYMES, 7999*
  - NEONATE
    - ALPHA 1 ANTITRYPSIN, 8286*
    - HEPATITIS, INFECTIOUS, 8286*
    - HYPERTENSION, PORTAL, 8286*
    - PHOTOTHERAPY, 8337*
    - REYE'S SYNDROME, 8286*
    - THERAPY, 8286*
  - PHOTOTHERAPY
    - IMMUNOGLOBULINS, 8337*
    - IMMUNOLOGY, 8337*
  - PREGNANCY
    - DRUG-INDUCED, 8336*

- HYPERCHLORHYDRIA
  - SEE ALSO ACID SECRETION, SECRETION
  - DUODENUM
    - ULCER, PEPTIC, 7976
  - STOMACH
    - ULCER, PEPTIC, 7976
  - ULCER, PEPTIC
    - DRUG EFFECTS ON, 7976

- HYPERGLYCEMIA
  - PANCREAS
    - ENZYMES, 7986*

- HYPERLIPEMIA
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 8282*
  - THERAPY
    - SHUNT, INTESTINAL, 8217

- HYPERLIPOPROTEINEMIA
  - CHOLELITHIASIS, 8428*

- HYPERPLASIA
  - LIVER
    - CONTRACEPTIVES, ORAL, 8297*
    - HEPATECTOMY, 8035*
    - HORMONES, 8297*
    - SHUNT, 8035*

HYPERSENSITIVITY
    GASTROINTESTINAL DISEASES
        IMMUNOLOGY, 8231
    INTESTINE, SMALL, 8099*

HYPERTENSION, PORTAL
    ESOPHAGUS
        MORPHOMETRY, 7901*
    HEME
        METABOLISM, 8400*
    HYPERBILIRUBINEMIA
        NEONATE, 8286*
    JAUNDICE, OBSTRUCTIVE, 8436
    LIVER CIRRHOSIS
        CIRCULATION, 8402*
        DIAGNOSIS, 8392
        HEME, 8400*
    LIVER DISEASES, ALCOHOLIC
        DIAGNOSIS, 8392
    PREGNANCY
        COMPLICATIONS, 8403*
    SHUNT
        HEME, 8400*
    SPLENECTOMY
        HEME, 8400*
    VEINS
        EMBOLIZATION, 8402*

HYPERTHERMIA
    YERSINIA, 8476

HYPERTROPHY
    DUODENUM
        BRUNNER'S GLANDS, 8212
    ESOPHAGUS
        RUPTURE, 8148*

HYPOLIPEMIC AGENTS
    CATALASE
        SYNTHESIS, 8018*
    LIVER
        DRUG EFFECTS ON, 8018*

HYPOPLASIA
    GALLBLADDER, 8438

HYPOTHERMIA
    LIVER COMA
        TRANSFUSION, 8322

ICTERUS
    SEE JAUNDICE

ILEAL DISEASES
    OXALATES
        CALCULI, 8227*

ILEITIS
    ISCHEMIA, 8209
    REVIEW, 8208

ILEUM
    SEE ALSO DUODENUM, INTESTINE, SMALL, JEJUNUM
    BACTERIA, 8464
    CROHN'S DISEASE
        FISTULA, 8509*
    ESOPHAGUS, ARTIFICIAL, 8160

ILEUM (continued)
    FERRITIN
        TRANSPORT, 7917*
    FISTULA
        SURGERY, 8211
        THERAPY, 8211
    IMMUNOGLOBULINS
        TRANSPORT, 7917*
    ION TRANSPORT
        ELECTROPHYSIOLOGY, 7925
        NERVOUS CONTROL, 7925
    MOTILITY
        ANDROGENS, 7952
        DRUG EFFECTS ON, 7939*, 7948
        ESTROGENS, 7952
        HORMONE EFFECTS ON, 7952
        PROSTAGLANDINS, 7939*
        PURINES, 7946
        SOLVENTS, 7948
        TRANQUILIZING AGENTS, 7948
    PERFORATION
        SURGERY, 8211
        THERAPY, 8211
    PERISTALSIS
        PURINES, 7946
    TRANSPORT
        BILE ACIDS AND SALTS, 7915*
    YERSINIA
        PSEUDOTUMORS, 8223

ILEUS
    SEE INTESTINAL OBSTRUCTION

IMMUNITY
    AUSTRALIA ANTIGEN
        HEPATITIS, INFECTIOUS, 8354*
    CHOLESTASIS
        PLASMA, 8433*
    GASTROINTESTINAL DISEASES, 8167
    LIPOPROTEINS
        HEPATITIS, INFECTIOUS, 8354*
    LIVER
        NEOPLASMS, MALIGNANT, 8414
    LIVER CIRRHOSIS, 8414
        PLASMA, 8433*
    SALMONELLOSIS, 8116

IMMUNOGLOBULINS
    ALCOHOLISM
        SERUM, 8391
    DUODENUM
        TRANSPORT, 7917*
    HEPATITIS, 8351*
    HEPATITIS, INFECTIOUS, 8350*, 8351*, 8372
        ANTIGENS, 8355*
        HEPATOCYTES, 8356*
    HYPERBILIRUBINEMIA
        PHOTOTHERAPY, 8337*
    ILEUM
        TRANSPORT, 7917*
    INTESTINAL ABSORPTION
        PROTEINS, 7917*
    INTESTINE, SMALL
        BINDING, 7902*
    JAUNDICE
        PHOTOTHERAPY, 8337*
    LIVER
        NEOPLASMS, 8356*
    MALABSORPTION SYNDROMES, 8226*

- IMMUNOTHERAPY
  - COLON
    - CROHN'S DISEASE, 8516
  - CROHN'S DISEASE, 8515, 8516

- INFANT
  - ENTEROCOLITIS, NECROTIZING
    - BREAST FEEDING, 8469
  - GASTROENTERITIS
    - COMPLICATIONS, 8483
    - REVIEW, 8460
    - THERAPY, 8483
  - GASTROINTESTINAL SYSTEM
    - ABSORPTION, 8109
    - MOTILITY, 8109
  - HYPERBILIRUBINEMIA
    - ENZYMES, 7999*
  - INTESTINES
    - INFECTION, 8200
  - LIVER
    - BILIRUBIN, 7999*
  - LIVER DISEASES
    - ALPHA 1 ANTITRYPSIN, 8287*
  - RECTUM
    - BIOPSY, 8133
  - STOMACH
    - BLEEDING, 8128
    - ULCER, 8128
  - VIRUS DISEASES
    - GASTROENTERITIS, 8460

- INFECTION
  - INTESTINES
    - INFANT, 8200
  - ULCER, PEPTIC
    - COMPLICATIONS, 8488

- INFECTION, BACTERIA
  - SEE BACTERIAL INFECTIONS

- INFECTION, FUNGUS
  - SEE MYCOSES

- INFECTION, RICKETTSIAL
  - SEE RICKETTSIAL DISEASES

- INFECTION, VIRUS
  - SEE VIRUS DISEASES

- INFLAMMATION
  - COLON
    - CIRCULATORY SYSTEM, 8262
    - CYTOLOGY, 8238
    - DIAGNOSIS, 8238
    - THROMBOSIS, 8262
  - DUODENITIS
    - CELLS, 8191*
    - MORPHOLOGY, 8191*
  - LIVER
    - ANTI-INFLAMMATORY AGENTS, 8032*
    - TRANQUILIZING AGENTS, 8032*
  - MICROSOMES
    - LIVER, 8032*
  - RECTUM
    - CYTOLOGY, 8238
    - DIAGNOSIS, 8238
  - SHUNT, INTESTINAL
    - COMPLICATIONS, 8193*

- INFLAMMATION (continued)
  - SIGMOID
    - CYTOLOGY, 8238
    - DIAGNOSIS, 8238

- INFLAMMATORY BOWEL DISEASES
  - ANTIGENS
    - GENETICS, 8263*

- INSULIN
  - DUODENUM
    - HORMONES, GASTROINTESTINAL, 7956*
  - LIVER
    - ESTROGENS, 8008*
    - METABOLISM, 8008*

- INTESTINAL ABSORPTION
  - AMINO ACIDS
    - BILE ACIDS AND SALTS, 7911*
  - ANTACIDS
    - HEMODIALYSIS, 8230
  - CHYLOMICRONS
    - SYNTHESIS, 7924
  - ENDOTOXINS, 8101*
  - FOLIC ACID
    - ANTICONVULSANTS, 7923
    - DRUG EFFECTS ON, 7923
    - METABOLISM, 7923
  - IRON
    - ANTACIDS, 8230
    - HEMODIALYSIS, 8230
  - PHOSPHOLIPIDS, 7924
  - PROTEINS
    - FERRITIN, 7917*
    - IMMUNOGLOBULINS, 7917*

- INTESTINAL DISEASES
  - CIRCULATION
    - DIAGNOSIS, 8489
    - ETIOLOGY, 8489
    - THERAPY, 8489

- INTESTINAL OBSTRUCTION
  - BILIARY TRACT
    - SURGERY, 8213
  - SIGMOID
    - SURGERY, 8240
  - SURGERY
    - COMPLICATIONS, 8240

- INTESTINE, LARGE
  - SEE ALSO CECUM, COLON
  - BARIUM
    - ENEMA, 8239
  - ELECTROPHYSIOLOGY
    - DRUG EFFECTS ON, 7922, 7951
    - STEROIDS, 7922
    - VASODILATOR AGENTS, 7951
  - ENEMA
    - APPENDIX, 8239
  - ESOPHAGUS, ARTIFICIAL, 8160, 8161
  - INTUSSUSCEPTION
    - RADIOLOGY, 8244
  - ION TRANSPORT
    - DRUG EFFECTS ON, 7922
    - HORMONE EFFECTS ON, 7922
    - HORMONES, ADRENAL CORTEX, 7922
    - STEROIDS, 7922

INTESTINE, LARGE (continued)
    MORPHOMETRY
        RENAL INSUFFICIENCY, 8091*
    MOTILITY
        DRUG EFFECTS ON, 7949, 7951
        POTASSIUM, 7949
        VASODILATOR AGENTS, 7949, 7951
    MUSCLES
        MOTILITY, 7949, 7951
    RADIOLOGY
        APPENDIX, 8239
        MASSAE, 8259

INTESTINE, SMALL
    SEE ALSO DUODENUM, ILEUM, JEJUNUM
    ABSORPTION
        AMINO ACIDS, 7912*, 7914*, 7929
        CARBOHYDRATES, 7931
        DRUG EFFECTS ON, 7931
        HORMONE EFFECTS ON, 7932
    ALKALINE PHOSPHATASE
        TRANSPORT, 8087*
    BACTERIA, 8464
        ANTIBIOTICS, 8454*
        ANTIGENS, 8454*
    CELLS
        ENZYMES, 8989*
        ULTRASTRUCTURE, 7904
    CHOLELITHIASIS
        MORPHOLOGY, 8194*
    DISACCHARIDASES
        ENTERITIS, 8207
    DUODENUM, 8197
    ELECTROPHYSIOLOGY, 7920*
    ENZYMES
        TEMPERATURE, 8097
    ESOPHAGUS, ARTIFICIAL, 8153, 8160
    FATTY ACIDS, 7926
    HERNIA
        MORPHOLOGY, 8194*
    HORMONES
        GROWTH FACTORS, 8085*
    HORMONES, ADRENAL CORTEX
        GROWTH FACTORS, 8085*
    HYPERSENSITIVITY, 8099*
    IMMUNOGLOBULINS
        BINDING, 7902*
    ION TRANSPORT
        ELECTROPHYSIOLOGY, 7925
        NERVOUS CONTROL, 7925
    LYMPHANGIECTASIS, 8214
    LYMPHATIC SYSTEM
        DISEASE, 8215
        FATTY ACIDS, 7926
        TRIGLYCERIDES, 7926
    MALABSORPTION SYNDROMES
        VILLI, 8226*
    MECKEL'S DIVERTICULUM
        HEALING, 8224
    MORPHOLOGY
        ACRODERMATITIS, 8225*
    MORPHOMETRY
        RENAL INSUFFICIENCY, 8091*
    MOTILITY
        ALKALOIDS, 7941
        ANDROGENS, 7952
        DRUG EFFECTS ON, 7939*, 7941, 7948
        ELECTROPHYSIOLOGY, 7938*
        ESTROGENS, 7952

INTESTINE, SMALL (continued)
    MOTILITY (continued)
        HORMONE EFFECTS ON, 7952
        MORPHOLOGY, 7938*
        PROSTAGLANDINS, 7939*
        PURINES, 7946
        SOLVENTS, 7948
        SURGERY, 8218
        TEMPERATURE, 7944
        TRANQUILIZING AGENTS, 7948
    MUSCLES
        NERVOUS CONTROL, 7910
    NEONATE
        SURGERY, 8220
    NEOPLASMS, BENIGN, 8196
    NERVOUS CONTROL
        ULTRASTRUCTURE, 7910
    OBESITY
        MORPHOLOGY, 8194*
    OBSTRUCTION, 8213
    ORGAN CULTURE
        MORPHOLOGY, 7903*
        MORPHOMETRY, 7903*
        ULTRASTRUCTURE, 7903*
    OSMOTIC PRESSURE
        GLUCOSE, 8095
    PERISTALSIS
        PURINES, 7946
        SURGERY, 8218
    PNEUMATOSIS
        PATHOLOGY, 8163*
    SHUNT, INTESTINAL
        MORPHOLOGY, 8194*
    SODIUM
        BINDING, 8088*
    SURFACTANTS
        ULTRASTRUCTURE, 8086*
        WATER, 8086*
    SURGERY
        ALKALINE PHOSPHATASE, 8087*
        HEALING, 8224
        MECKEL'S DIVERTICULUM, 8224
    TRANSPORT
        AMINO ACIDS, 7914*, 7929
        CARBOHYDRATES, 7920*
        HORMONE EFFECTS ON, 7932
    TRIGLYCERIDES, 7926
    VILLI
        ATROPHY, 8099*
    WATER
        TRANSPORT, 8086*
    ZINC
        ACRODERMATITIS, 8225*

INTESTINES
    ABSORPTION
        AMINO ACIDS, 7913*
        NITROGEN, 7913*
        PROSTAGLANDINS, 7919*
    ANOMALY
        SURGERY, 8219
    ANOMALY, CONGENITAL, 8210
    CELLS
        MITOSIS, 8094
    CYSTS
        NEONATE, 8210
    ENZYMES, 8092
    ESCHERICHIA COLI
        ANTIBODIES, 8100*

- INTESTINES (continued)
  - FATTY ACIDS
    - METABOLISM, 8096
  - FISTULA
    - SURGERY, 8211
    - THERAPY, 8211
  - INFECTION
    - INFANT, 8200
  - NARCOTICS
    - METABOLISM, 8093
  - PARASITES AND PARASITIC DISEASES
    - PROSTAGLANDINS, 8119
  - PERFORATION
    - SURGERY, 8211
    - THERAPY, 8211
  - PROTEINS
    - METABOLISM, 8200
  - SALMONELLOSIS
    - DRUG EFFECTS ON, 7921*
  - TRANSPORT
    - AMINO ACIDS, 7913*
    - NITROGEN, 7913*
    - PEPTIDES, 7913*
    - WATER, 7921*
  - ULCER
    - ANTI-INFLAMMATORY AGENTS, 8102*
    - BACTERIA, 8102*
    - DRUG-INDUCED, 8102*
    - PROSTAGLANDINS, 8102*

- INTOLERANCE
  - FRUCTOSE
    - BIOCHEMISTRY, 8232
    - CHILD, 8229
    - GENETICS, 8232
    - PATHOLOGY, 8232

- INTUBATION
  - CHOLANGITIS
    - JAUNDICE, 8422*

- INTUSSUSCEPTION
  - INTESTINE, LARGE
    - RADIOLOGY, 8244

- ION TRANSPORT
  - COLON
    - DRUG EFFECTS ON, 7922
    - HORMONE EFFECTS ON, 7922
    - HORMONES, ADRENAL CORTEX, 7922
    - POTASSIUM, 7918*
    - STEROIDS, 7922
  - ILEUM
    - ELECTROPHYSIOLOGY, 7925
    - NERVOUS CONTROL, 7925
  - INTESTINE, LARGE
    - DRUG EFFECTS ON, 7922
    - HORMONE EFFECTS ON, 7922
    - HORMONES, ADRENAL CORTEX, 7922
    - STEROIDS, 7922
  - INTESTINE, SMALL
    - ELECTROPHYSIOLOGY, 7925
    - NERVOUS CONTROL, 7925
  - STOMACH, 7928
    - NEOPLASMS, MALIGNANT, 8176

- IRON
  - CYSTIC FIBROSIS
    - ABSORPTION, 8268*
  - INTESTINAL ABSORPTION
    - ANTACIDS, 8230
    - HEMODIALYSIS, 8230
  - LIVER
    - TRANSFERRIN, 7994*
  - PORPHYRIA
    - METABOLISM, 8319
  - SIDEROSIS
    - HEPATOCYTES, 8389*
  - STOMACH
    - DEFICIENCY, 7909

- ISCHEMIA
  - ILEITIS, 8209
  - LIVER
    - ENZYMES, 8042*
  - STOMACH
    - ULCER, 8106*

- ISOENZYMES
  - LIVER
    - ALDOLASE, 8292*
    - NEOPLASMS, MALIGNANT, 8292*
  - NEOPLASMS, MALIGNANT
    - ALDOLASE, 8292*
  - PANCREATITIS, CHRONIC
    - AMYLASES, 8272*
    - DIAGNOSIS, 8272*

- ISOTHIOCYANATES
  - SEE THIOCYANATES

- JAUNDICE
  - AMMONIA
    - METABOLISM, 8298*
  - CHOLANGITIS
    - DRAINAGE, 8422*
    - INTUBATION, 8422*
    - LAPAROTOMY, 8422*
  - DIAGNOSIS
    - ULTRASONOGRAPHY, 8135
  - DRUG-INDUCED
    - TOXICITY, 8344
  - HORMONES
    - TOXICITY, 8344
  - LIVER CIRRHOSIS
    - SURVIVAL, 8394
  - NEONATE
    - ETIOLOGY, 8338
    - PHOTOTHERAPY, 8337*
  - PHOTOTHERAPY
    - IMMUNOGLOBULINS, 8337*
    - IMMUNOLOGY, 8337*

- JAUNDICE, CHOLESTATIC
  - DRUG-INDUCED
    - SEDATIVES, 8346

- JAUNDICE, OBSTRUCTIVE
  - HEPATITIS, INFECTIOUS
    - LIPOPROTEINS, 8368
  - HYPERTENSION, PORTAL, 8436
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 8274*
  - PLASMA
    - LIPOPROTEINS, 8368

JEJUNUM
  SEE ALSO DUODENUM, ILEUM, INTESTINE, SMALL
  ABSORPTION
    AMINO ACIDS, 7912*
    HORMONE EFFECTS ON, 7932
  AMINO ACIDS
    ABSORPTION, 8083*
    METABOLISM, 8083*
  GLUCOSE
    ENZYMES, 8084*
    PERFUSION, 8084*
  NEOPLASMS, MALIGNANT
    NEOPLASM METASTASIS, 8222
  ORGAN CULTURE
    MORPHOLOGY, 7903*
    MORPHOMETRY, 7903*
    ULTRASTRUCTURE, 7903*
  OSMOTIC PRESSURE
    GLUCOSE, 8095
  TRANSPORT
    HORMONE EFFECTS ON, 7932

KALLIKREIN
  ABSORPTION
    AMINO ACIDS, 7914*
  TRANSPORT
    AMINO ACIDS, 7914*

KIDNEY DISEASES
  SERUM
    GASTRIN, 8499
  ULTRASONOGRAPHY, 8330

KIDNEYS
  DISEASE
    STOMACH, 8172

LACTASE DEFICIENCY
  SEE LACTOSE INTOLERANCE

LACTIC ACID
  SEE LACTATES

LAMBLIASIS
  SEE GIARDIASIS

LAPAROSCOPY
  ASCITES
    DIAGNOSIS, 8410
  LIVER
    BIOPSY, 8131
    NEOPLASMS, 8318
  LIVER CIRRHOSIS
    DIAGNOSIS, 8392
  LIVER DISEASES, ALCOHOLIC
    DIAGNOSIS, 8392
  NEOPLASMS
    TECHNIQUES, 8318

LAPAROTOMY
  CHOLANGITIS
    JAUNDICE, 8422*

LARGE INTESTINE
  SEE INTESTINE, LARGE

LAXATIVES
  SEE CATHARTICS

LECTINS
  SEE PLANT AGGLUTININS

LIPIDS
  SEE ALSO FATS, TRIGLYCERIDES
  ABSORPTION
    ALCOHOLS, 7916*
    DETERGENTS, 7927
    DRUG EFFECTS ON, 7916*
  HEPATITIS, CHRONIC
    PEROXIDATION, 8058
  HEPATOCYTES
    CARBON TETRACHLORIDE, 8021*
  HORMONE CONTROL
    REVIEW, 8019*
  LIVER
    ALCOHOLISM, 8016*
    AMINO ACIDS, 8017*
    DIET, 8020*
    DIETARY FACTORS, 8015*, 8016*
    DRUG EFFECTS ON, 8016*
    ESTROGENS, 8008*
    FATS, 8020*
    HORMONE CONTROL, 8019*
    METABOLISM, 8303*
    SUCROSE, 8020*
    SYNTHESIS, 8020*
  LYMPH
    ALCOHOLS, 7916*
    DRUG EFFECTS ON, 7916*
  LYMPHATIC SYSTEM
    ALCOHOLS, 7916*
    DRUG EFFECTS ON, 7916*
  METABOLISM
    ENZYMES, 7986*
    OBESITY, 8303*
  PLASMA
    PORTACAVAL SHUNT, 8046

LIPOPROTEINS
  HEPATITIS, INFECTIOUS
    JAUNDICE, OBSTRUCTIVE, 8368
    PLASMA, 8368
  HEPATOCYTES
    CHOLESTEROL, 8013*
    SYPHILIS, 8056
  IMMUNITY
    HEPATITIS, INFECTIOUS, 8354*
  JAUNDICE, OBSTRUCTIVE
    PLASMA, 8368
  LIVER
    BODY COMPOSITION, 8014*
  PLASMA
    PORTACAVAL SHUNT, 8046

LIVER
  ABSCESS
    DIAGNOSIS, 8451*
    SURVIVAL, 8451*
  ACYLTRANSFERASES
    METABOLISM, 8000*
    SECRETION, 8000*
  ALCOHOL OXIDOREDUCTASES, 8055
    SYNTHESIS, 8059
  ALDOLASE
    ISOENZYMES, 8292*
  AMINO ACIDS
    METABOLISM, 7993*, 8048, 8049
    SCHISTOSOMIASIS, 8048, 8049

LIVER (continued)
- AMMONIA
  - METABOLISM, 8298*
- ANEMIA, SICKLE CELL
  - COMPLICATIONS, 8302*
  - EPIDEMIOLOGY, 8302*
- ANESTHESIA
  - SURGERY, 8343
- ANTIGENS
  - MORPHOLOGY, 8357*
  - ULTRASTRUCTURE, 8357*
- AUSTRALIA ANTIGEN
  - MORPHOLOGY, 8357*
  - ULTRASTRUCTURE, 8357*
- BILE
  - ENDOTOXINS, 7996*
  - SYNTHESIS, 7996*, 8062
- BILIRUBIN
  - ENZYMES, 7999*
- BIOPSY
  - LAPAROSCOPY, 8131
- CARDIOVASCULAR SYSTEM, 8159
- CATALASE
  - SYNTHESIS, 8018*
- CHOLESTASIS
  - PATHOLOGY, 8316
  - ULTRASTRUCTURE, 8316
- CHOLESTEROL
  - DIETARY FACTORS, 8015*
  - FATTY ACIDS, 8003*
- CIRCULATION
  - METABOLISM, 8082
  - TECHNIQUES, 8107*
  - VASOPRESSIN, 8006*
- CONTRACEPTIVES, ORAL
  - NEOPLASMS, 8293*
- CONTRAST MEDIA, 8070
- CUSHING'S SYNDROME
  - NEOPLASMS, 8291*
- CYSTS
  - DIAGNOSIS, 8132
  - ULTRASONOGRAPHY, 8132
- CYTOCHROMES
  - CARBON TETRACHLORIDE, 8022*
  - DRUG EFFECTS ON, 8025*
- DETOXIFICATION
  - DRUG THERAPY, 8317
- DRUG EFFECTS ON
  - HYPOLIPEMIC AGENTS, 8018*
- DRUG METABOLISM, 8066
  - ANALGESICS AND ANTIPYRETICS, 8029*
  - ANTIHYPERTENSIVE AGENTS, 8029*
  - CHELATING AGENTS, 8033*
  - DIURETICS, 8029*
  - ENZYMES, 8065
  - HORMONE EFFECTS ON, 8007*
  - TECHNIQUES, 8031*
- DYSTROPHY
  - DRUG THERAPY, 8074
  - THERAPY, 8078
  - VITAMIN E, 8078
- ELECTROPHYSIOLOGY
  - ADENOSINE TRIPHOSPHATE, 8041*
  - ANOXIA, 8041*
- ENZYMES, 8052, 8064
  - ANESTHESIA, 8343
  - SCHISTOSOMIASIS, 8048, 8049
  - UREA, 8009*

LIVER (continued)
- ESTROGENS
  - CARBOHYDRATES, 8008*
  - FATTY ACIDS, 8003*
  - GLUCAGON, 8008*
  - INSULIN, 8008*
  - LIPIDS, 8008*
- FATS
  - DIETARY FACTORS, 8015*
- FIBRINOLYSIS
  - REGENERATION, 8038*
- FIBROSIS
  - ETIOLOGY, 8396*
  - MORPHOLOGY, 8396*
  - ULTRASONOGRAPHY, 8330
- GLUCOSE, 8061
- GLUTATHIONE, 7993*
- GLYCOGEN
  - ALCOHOLISM, 8067
  - HORMONE CONTROL, 8005*
  - METABOLISM, 8005*
- GLYCOSAMINOGLYCANS
  - SYNTHESIS, 8030*
- HEPATECTOMY
  - HYPERPLASIA, 8035*
  - REGENERATION, 8035*
- HORMONE EFFECTS ON
  - PEPTIDES, 7995*
  - PITUITARY GLAND, 7995*
  - THYROID GLAND, 8053
- HYPERPLASIA
  - CONTRACEPTIVES, ORAL, 8297*
  - HORMONES, 8297*
- INFANT
  - BILIRUBIN, 7999*
- INFLAMMATION
  - ANTI-INFLAMMATORY AGENTS, 8032*
  - MICROSOMES, 8032*
  - TRANQUILIZING AGENTS, 8032*
- ISCHEMIA
  - ENZYMES, 8042*
- LIPIDS
  - ALCOHOLISM, 8016*
  - AMINO ACIDS, 8017*
  - DIET, 8020*
  - DIETARY FACTORS, 8015*, 8016*
  - DRUG EFFECTS ON, 8016*
  - FATS, 8020*
  - HORMONE CONTROL, 8019*
  - METABOLISM, 8303*
  - SUCROSE, 8020*
  - SYNTHESIS, 8020*
- LIPOPROTEINS
  - BODY COMPOSITION, 8014*
- METABOLISM
  - GLUCAGON, 8008*
  - INSULIN, 8008*
- MICROSOMES
  - ANTI-INFLAMMATORY AGENTS, 8032*
  - DRUG METABOLISM, 8029*
  - TRANQUILIZING AGENTS, 8032*
- MORPHOLOGY
  - ANALGESICS AND ANTIPYRETICS, 8339*
  - DRUG EFFECTS ON, 8339*
  - NUTRITION DISORDERS, 7907
- NEOPLASM METASTASIS
  - CIRCULATION, 8045*
  - EMBOLIZATION, 8045*

LIVER (continued)
- NEOPLASMS, 8313
  - CLASSIFICATION, 8331
  - DIAGNOSIS, 8132, 8318
  - DRUG THERAPY, 8289*
  - HEPATITIS, CHRONIC, 8288*
  - HORMONES, ADRENAL CORTEX, 8291*
  - IMMUNOGLOBULINS, 8356*
  - LAPAROSCOPY, 8318
  - MORPHOLOGY, 8331
  - PATHOLOGY, 8331
  - REVIEW, 8331
  - THYROCALCITONIN, 8291*
  - ULTRASONOGRAPHY, 8132
- NEOPLASMS, BENIGN
  - CLOTTING, 8326
  - PATHOLOGY, 8312
  - SEX FACTORS, 8312
  - SURGERY, 8326
- NEOPLASMS, MALIGNANT
  - ALDOLASE, 8292*
  - CLOTTING, 8326
  - DIAGNOSIS, 8292*, 8493
  - ETIOLOGY, 8396*
  - IMMUNITY, 8414
  - ISOENZYMES, 8292*
  - MORPHOLOGY, 8396*
  - MYELOMA, 8333
  - SURGERY, 8326
- NUCLEIC ACIDS
  - DRUG EFFECTS ON, 8047
- OXYGEN
  - HORMONE CONTROL, 7995*
  - PEPTIDES, 7995*
  - PITUITARY GLAND, 7995*
- PERFUSION
  - DRUG METABOLISM, 8031*
- PORPHYRIA
  - DRUG THERAPY, 8311
- PROTEINS
  - ANESTHESIA, 8343
  - SURGERY, 8343
  - SYNTHESIS, 8010*
- REGENERATION
  - ENZYMES, 8038*
  - ESSENTIAL OILS, 8037
  - MORPHOLOGY, 8080
  - VITAMINS, 8079
- RESPIRATORY SYSTEM
  - NEOPLASM METASTASIS, 8329
- REYE'S SYNDROME
  - ULTRASTRUCTURE, 8301*
- SALMONELLOSIS
  - ENDOTOXINS, 8039*
- SCANNING, SCINTILLATION
  - REVIEW, 8332
- SHUNT
  - HYPERPLASIA, 8035*
  - REGENERATION, 8035*
- SIDEROSIS
  - ALCOHOLISM, 8389*
- STRESS
  - PRESSURE STUDY, 7943
- SURGERY
  - COMPLICATIONS, 8328
  - HEMORRHAGE, 8321
  - REVIEW, 8328
  - TECHNIQUES, 8321, 8328

LIVER (continued)
- TOMOGRAPHY
  - COMPUTERS, 8124*
- TOXICITY
  - CYTOCHROMES, 8022*
- TRANSFERRIN
  - IRON, 7994*
  - SYNTHESIS, 7994*
- TRANSPLANTATION, 8050
  - COMPLICATIONS, 8306*
  - DRAINAGE, 8307*
  - PROGNOSIS, 8306*
  - SURVIVAL, 8306*, 8307*
  - TECHNIQUES, 8306*, 8307*
- TRIGLYCERIDES
  - DIETARY FACTORS, 8015*
- ULTRASONOGRAPHY
  - REVIEW, 8132
- UREA
  - PROTEINS, 8009*
- WOUNDS AND INJURIES
  - PRESSURE STUDY, 7943
- ZINC, 8134

LIVER CIRRHOSIS
- ABDOMEN
  - PAIN, 8405
- ABSORPTION
  - SALT, 8044*
  - WATER, 8044*
- ALCOHOLISM
  - ETIOLOGY, 8408
- ALPHA 1 ANTITRYPSIN
  - DEFICIENCY, 8412
- AMINO ACIDS
  - METABOLISM, 8327
- AMMONIA
  - METABOLISM, 8141
- ANEMIA, SICKLE CELL
  - COMPLICATIONS, 8302*
- ASCITES
  - SURVIVAL, 8394
- BILE ACIDS AND SALTS
  - SECRETION, 8398*
- BILIRUBIN
  - METABOLISM, 8399*
- BIOCHEMISTRY
  - DIAGNOSIS, 8411
- BIOPSY
  - DIAGNOSIS, 8407
- CHILD
  - AMINO ACIDS, 8327
- CIRCULATION
  - HYPERTENSION, PORTAL, 8402*
- COLLAGEN
  - ENZYMES, 8296*
- COMPLICATIONS
  - LIVER COMA, 8415
- DIAGNOSIS, 8139
  - BIOCHEMISTRY, 8141
  - HYPERTENSION, PORTAL, 8392
  - LAPAROSCOPY, 8392
- DISEASES ASSOCIATED WITH
  - ULCER, PEPTIC, 8418
- DRUG METABOLISM
  - KINETICS, 8310
- DRUG THERAPY
  - ALKALINE PHOSPHATASE, 8387
  - BLOOD, 8387

- LIVER CIRRHOSIS (continued)
  - ETIOLOGY, 8396*
  - GASTRIN
    - CELLS, 8418
  - HEME
    - METABOLISM, 8400*
  - HEMOCHROMATOSIS
    - REVIEW, 8397*
  - HEMORRHAGE
    - SURVIVAL, 8394
    - THERAPY, 8395
  - HEPATITIS
    - ETIOLOGY, 8408
  - HEPATITIS, CHRONIC
    - FIBROSIS, 8288*
  - HEPATITIS, INFECTIOUS
    - COMPLICATIONS, 8376
  - HYPERTENSION, PORTAL
    - HEME, 8400*
  - IMMUNITY, 8414
    - PLASMA, 8433*
  - IMMUNOLOGY, 8383*
  - JAUNDICE
    - SURVIVAL, 8394
  - LIVER COMA
    - SURVIVAL, 8319
  - LIVER DISEASES, ALCOHOLIC
    - BIOPSY, 8407
    - DIAGNOSIS, 8392, 8407
    - HEMORRHAGE, 8395
    - PROGNOSIS, 8393
    - SURVIVAL, 8394
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 8282*
  - MORPHOLOGY, 8396*
  - PAIN
    - DIAGNOSIS, 8405
  - PANCREAS
    - PANCREOZYMIN, 8401*
    - SECRETIN, 8401*
  - POLYPEPTIDES
    - SYNTHESIS, 8012*
  - PORTACAVAL SHUNT
    - PROGNOSIS, 8404
  - SERUM
    - GASTRIN, 8418
  - THERAPY, 8377, 8409
  - VEINS
    - EMBOLIZATION, 8402*
  - WILSON'S DISEASE
    - REVIEW, 8397*

- LIVER CIRRHOSIS, POSTNECROTIC
  - PATHOLOGY, 8413

- LIVER COMA
  - AMMONIA
    - METABOLISM, 8141
  - ETIOLOGY
    - AMMONIA, 8416
  - HEMORRHAGE
    - PREVENTION, 8417
  - HEPATITIS, CHRONIC
    - SURVIVAL, 8319
  - LIVER CIRRHOSIS
    - COMPLICATIONS, 8415
    - SURVIVAL, 8319
  - PREVENTION, 8377
  - THERAPY, 8416

- LIVER COMA (continued)
  - TRANSFUSION
    - HYPOTHERMIA, 8322
    - THERAPY, 8322

- LIVER DISEASES
  - ALPHA 1 ANTITRYPSIN
    - DEFICIENCY, 8287*
    - GENETICS, 8287*
  - ANTIBIOTICS
    - BINDING, 8320
  - CARBOHYDRATES
    - METABOLISM, 8335
  - COLLAGEN
    - ENZYMES, 8296*
  - DIAGNOSIS
    - AMINO TRANSFERASES, 8145
    - BIOCHEMISTRY, 8141
  - DRUG METABOLISM
    - ENZYMES, 8034*
    - REVIEW, 8283*
  - DRUG THERAPY, 8308
  - INFANT
    - ALPHA 1 ANTITRYPSIN, 8287*
  - PROTEINS
    - BINDING, 8283*
    - DRUG METABOLISM, 8283*
  - SEDATIVES
    - DRUG METABOLISM, 8325
  - SURGERY
    - PROGNOSIS, 8284*
    - REVIEW, 8284*

- LIVER DISEASES, ALCOHOLIC
  - ANEMIA, HEMOLYTIC
    - ERYTHROCYTES, 8390*
  - BILE ACIDS AND SALTS
    - SECRETION, 8398*
  - BIOPSY
    - DIAGNOSIS, 8407
  - DIAGNOSIS
    - HYPERTENSION, PORTAL, 8392
    - LAPAROSCOPY, 8392
  - DRUG DEPENDENCE
    - DISEASES ASSOCIATED WITH, 8285*
  - LIVER CIRRHOSIS
    - BIOPSY, 8407
    - DIAGNOSIS, 8392, 8407
    - HEMORRHAGE, 8395
    - PROGNOSIS, 8393
    - SURVIVAL, 8394

- LIVER FUNCTION TESTS
  - CHOLECYSTITIS
    - BIOCHEMISTRY, 8450
  - DRUG EFFECTS ON
    - ANALGESICS AND ANTIPYRETICS, 8339*
  - HEPATITIS, INFECTIOUS
    - CHILD, 8370
  - REVIEW, 8057
  - WILSON'S DISEASE
    - AMINO ACIDS, 8314

- LIVER INJURY
  - ANTIBIOTICS
    - METABOLISM, 8076
  - CARBON TETRACHLORIDE, 8076
    - ALPHA FETOPROTEIN, 8345
    - COLLAGEN, 8023*

LIVER INJURY (continued)
    CHILD
        DIAGNOSIS, 8323
        SCANNING, SCINTILLATION, 8324
    COLLAGEN
        ENZYMES, 8296*
        METABOLISM, 8023*
    DRUG-INDUCED
        COLLAGEN, 8023*
        GALACTOSAMINE, 8028*
        PREVENTION, 8028*
        SEDATIVES, 8346
    DRUG METABOLISM
        ENZYMES, 8034*
    DRUG THERAPY, 8074
    FATTY LIVER
        AGE FACTORS, 8281*
    GLYCOSAMINOGLYCANS
        SYNTHESIS, 8030*
    HEPATITIS
        DRUG THERAPY, 8374
    HISTOLOGY, 8281*
    HYDROCARBONS
        OCCUPATIONAL FACTORS, 8342
    SALMONELLOSIS
        ZINC, 8040*
    SIMULATION, 8060
    THERAPY
        OXYGEN, 8075
        REVIEW, 8347
    VITAMIN B1
        THERAPY, 8295*
    VITAMINS
        COENZYMES, 8295*
        THERAPY, 8295*

LUNG
    SEE RESPIRATORY SYSTEM

LYMPH
    LIPIDS
        ALCOHOLS, 7916*
        DRUG EFFECTS ON, 7916*
    PANCREATITIS
        DRAINAGE, 7990

LYMPHANGIECTASIS
    INTESTINE, SMALL, 8214

LYMPHATIC SYSTEM
    FATTY ACIDS, 7926
    INTESTINE, SMALL
        DISEASE, 8215
        FATTY ACIDS, 7926
        TRIGLYCERIDES, 7926
    LIPIDS
        ALCOHOLS, 7916*
        DRUG EFFECTS ON, 7916*
    TRIGLYCERIDES, 7926

MAGNESIUM
    DEFICIENCY
        ETIOLOGY, 8498
    GASTROINTESTINAL DISEASES
        DEFICIENCY, 8498
    GASTROINTESTINAL SYSTEM
        SURGERY, 8496

MALABSORPTION SYNDROMES
    DISACCHARIDASES
        DEFICIENCY, 8136
    DISACCHARIDES
        BREATH TEST, 8136
        DIAGNOSIS, 8136
    IMMUNOGLOBULINS, 8226*
    INTESTINE, SMALL
        VILLI, 8226*
    NEONATE
        REVIEW, 8457
    PANCREATITIS, CHRONIC
        COMPLICATIONS, 8279

MALLORY-WEISS SYNDROME
    DIAGNOSIS, 8149
    DISEASES ASSOCIATED WITH
        CARDIOVASCULAR SYSTEM, 8149
        GASTROINTESTINAL SYSTEM, 8149
        RESPIRATORY SYSTEM, 8149
    PROGNOSIS, 8149
    THERAPY, 8149

MALNUTRITION
    SEE NUTRITION DISORDERS

MECKEL'S DIVERTICULUM
    HEMORRHAGE
        SURGERY, 8221
    INTESTINE, SMALL
        HEALING, 8224
        SURGERY, 8224

MEGACOLON
    GIARDIASIS
        COMPLICATIONS, 8506

MEGAESOPHAGUS
    SEE ACHALASIA

MERCAPTANS
    SEE SULFHYDRYL COMPOUNDS

METASTASIS
    SEE NEOPLASM METASTASIS

MICROSOMES
    INFLAMMATION
        LIVER, 8032*
    LIVER
        ANTI-INFLAMMATORY AGENTS, 8032*
        DRUG METABOLISM, 8029*
        TRANQUILIZING AGENTS, 8032*

MITOCHONDRIA
    ALCOHOLISM
        ULTRASTRUCTURE, 8282*
    ANEMIA
        ULTRASTRUCTURE, 8282*
    HYPERLIPEMIA
        ULTRASTRUCTURE, 8282*
    LIVER CIRRHOSIS
        ULTRASTRUCTURE, 8282*
    NEOPLASMS, MALIGNANT
        ULTRASTRUCTURE, 8282*
    PORPHYRIA
        ULTRASTRUCTURE, 8282*
    STOMACH
        DRUG EFFECTS ON, 7981

- MITOSIS
  - INTESTINES
    - CELLS, 8094

- MONOAMINE OXIDASE
  - STOMACH
    - ULCER, 7974
  - ULCER
    - DRUG EFFECTS ON, 7974

- MOTILITY
  - ANTRUM
    - NERVOUS CONTROL, 8120
  - CECUM
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7947
    - DRUG EFFECTS ON, 7947
  - COLON
    - CATECHOLAMINES, 7950
    - DRUG EFFECTS ON, 7950
    - EPINEPHRINE, 7950
  - DUODENUM
    - ALKALOIDS, 7941
    - CATECHOLAMINES, 7950
    - DRUG EFFECTS ON, 7941, 7950
    - ELECTROPHYSIOLOGY, 7938*
    - EPINEPHRINE, 7950
    - MORPHOLOGY, 7938*
  - ESOPHAGUS
    - GASTRIN, 7936*
    - HORMONE EFFECTS ON, 7936*
    - MUSCLES, 7937*
    - NERVOUS CONTROL, 7937*
    - SOMATOSTATIN, 7936*
  - GASTROINTESTINAL SYSTEM
    - CHILD, 8109
    - INFANT, 8109
    - NERVOUS CONTROL, 7942
    - RADIOTELEMETRY, 7935*
    - TECHNIQUES, 7935*
  - ILEUM
    - ANDROGENS, 7952
    - DRUG EFFECTS ON, 7939*, 7948
    - ESTROGENS, 7952
    - HORMONE EFFECTS ON, 7952
    - PROSTAGLANDINS, 7939*
    - PURINES, 7946
    - SOLVENTS, 7948
    - TRANQUILIZING AGENTS, 7948
  - INTESTINE, LARGE
    - DRUG EFFECTS ON, 7949, 7951
    - MUSCLES, 7949, 7951
    - POTASSIUM, 7949
    - VASODILATOR AGENTS, 7949, 7951
  - INTESTINE, SMALL
    - ALKALOIDS, 7941
    - ANDROGENS, 7952
    - DRUG EFFECTS ON, 7939*, 7941, 7948
    - ELECTROPHYSIOLOGY, 7938*
    - ESTROGENS, 7952
    - HORMONE EFFECTS ON, 7952
    - MORPHOLOGY, 7938*
    - PROSTAGLANDINS, 7939*
    - PURINES, 7946
    - SOLVENTS, 7948
    - SURGERY, 8218
    - TEMPERATURE, 7944
    - TRANQUILIZING AGENTS, 7948

- MOTILITY (continued)
  - PYLORUS
    - NERVOUS CONTROL, 8120
  - RECTUM
    - DRUG EFFECTS ON, 7955
    - MANGANESE, 7954
    - NERVOUS CONTROL, 7955
    - PARASYMPATHOMIMETICS, 7955
  - STOMACH
    - ACIDS, 7940*
    - AMINO ACIDS, 7940*
    - BARIUM, 7953
    - DRUG EFFECTS ON, 7945, 7949, 7953
    - DUODENUM, 7940*
    - FATS, 7940*
    - GLUCOSE, 7940*
    - PARASITES AND PARASITIC DISEASES, 8162*
    - POTASSIUM, 7949
    - VAGOTOMY, 7940*
    - VASODILATOR AGENTS, 7949

- MOUTH
  - ABSORPTION
    - CARBOHYDRATES, 7931
    - DRUG EFFECTS ON, 7931
  - BEHCET'S SYNDROME
    - REVIEW, 8465

- MUCUS
  - PYLORUS
    - CELLS, 7905*
    - SECRETION, 7905*
  - STOMACH
    - CELLS, 7905*
    - SECRETION, 7905*, 7969*

- MUSCLES
  - CECUM
    - DRUG EFFECTS ON, 7947
  - ESOPHAGUS
    - MOTILITY, 7937*
    - PERISTALSIS, 7937*
  - INTESTINE, LARGE
    - MOTILITY, 7949, 7951
  - INTESTINE, SMALL
    - NERVOUS CONTROL, 7910
  - RECTUM
    - NEOPLASMS, BENIGN, 8245
  - STOMACH
    - NERVOUS CONTROL, 7910

- MYCOSES
  - STOMACH, 8173

- MYELOMA
  - LIVER
    - NEOPLASMS, MALIGNANT, 8333

- NARCOTICS
  - INTESTINES
    - METABOLISM, 8093

- NAUSEA
  - ANTIEMETICS
    - REVIEW, 8479
  - DRUG THERAPY
    - REVIEW, 8479
  - ETIOLOGY
    - REVIEW, 8479

- NECROSIS
  - PANCREAS, 8270
- NEONATE
  - DIARRHEA
    - REVIEW, 8457
  - HYPERBILIRUBINEMIA
    - ALPHA 1 ANTITRYPSIN, 8286*
    - HEPATITIS, INFECTIOUS, 8286*
    - HYPERTENSION, PORTAL, 8286*
    - PHOTOTHERAPY, 8337*
    - REYE'S SYNDROME, 8286*
    - THERAPY, 8286*
  - JAUNDICE
    - ETIOLOGY, 8338
    - PHOTOTHERAPY, 8337*
  - MALABSORPTION SYNDROMES
    - REVIEW, 8457
  - PARENTERAL ALIMENTATION
    - REVIEW, 8486
- NEOPLASM METASTASIS
  - JEJUNUM
    - NEOPLASMS, MALIGNANT, 8222
  - LIVER
    - CIRCULATION, 8045*
    - EMBOLIZATION, 8045*
  - RECTUM
    - NEOPLASMS, MALIGNANT, 8241
  - RESPIRATORY SYSTEM
    - LIVER, 8329
    - SCANNING, SCINTILLATION, 8329
  - STOMACH, 8177, 8178
- NEOPLASMS
  - COLON
    - BACTERIA, 8234*
    - BARIUM, 8256
    - CARCINOEMBRYONIC ANTIGEN, 8252
    - DIET, 8234*
    - DRUG THERAPY, 8233*
    - EPIDEMIOLOGY, 8234*
    - FECES, 8234*
    - FIBERS, 8234*
    - PROTEINS, 8243
    - RADIOLOGY, 8256
    - RECTUM, 8233*, 8252
    - RISK FACTORS, 8234*
    - STEROIDS, 8234*
  - CONTRACEPTIVES, ORAL
    - LIVER, 8293*
  - CUSHING'S SYNDROME
    - LIVER, 8291*
  - GASTROINTESTINAL SYSTEM
    - REVIEW, 8111
  - LAPAROSCOPY
    - TECHNIQUES, 8318
  - LIVER, 8313
    - CLASSIFICATION, 8331
    - DIAGNOSIS, 8132, 8318
    - DRUG THERAPY, 8289*
    - HEPATITIS, CHRONIC, 8288*
    - HORMONES, ADRENAL CORTEX, 8291*
    - IMMUNOGLOBULINS, 8356*
    - LAPAROSCOPY, 8318
    - MORPHOLOGY, 8331
    - PATHOLOGY, 8331
    - REVIEW, 8331
    - THYROCALCITONIN, 8291*
    - ULTRASONOGRAPHY, 8132
- NEOPLASMS (continued)
  - PANCREAS
    - SECRETION, 8267*
  - PROTEINS
    - SERUM, 8243
  - RECTUM
    - CARCINOEMBRYONIC ANTIGEN, 8252
    - DRUG THERAPY, 8233*
    - SURGERY, 8248
  - SALIVARY GLANDS
    - CHILD, 8485
    - REVIEW, 8485
  - SECRETION
    - HORMONES, ADRENAL CORTEX, 8291*
    - THYROCALCITONIN, 8291*
- NEOPLASMS, BENIGN
  - CHILD
    - DIAGNOSIS, 8290*
  - DUODENUM, 8196
    - DIAGNOSIS, 8197
    - ENDOSCOPY, 8197
  - INTESTINE, SMALL, 8196
  - LIVER
    - CLOTTING, 8326
    - PATHOLOGY, 8312
    - SEX FACTORS, 8312
    - SURGERY, 8326
  - RECTUM
    - MUSCLES, 8245
  - SALIVARY GLANDS
    - DIAGNOSIS, 8463
  - STOMACH
    - DIAGNOSIS, 8179
    - THERAPY, 8179
- NEOPLASMS, MALIGNANT
  - ALDOLASE
    - ISOENZYMES, 8292*
  - BLOOD
    - CLOTTING, 8326
  - CHILD
    - DIAGNOSIS, 8290*
  - COLON
    - BILE ACIDS AND SALTS, 8103*
    - RADIOLOGY, 8258
  - DUODENUM
    - CHILD, 8198
    - ENDOSCOPY, 8195
    - SURGERY, 8198
  - GASTROINTESTINAL SYSTEM
    - CARCINOEMBRYONIC ANTIGEN, 8126
    - COMPLEMENT, 8462
    - CYTOLOGY, 8137
    - DIAGNOSIS, 8137, 8493
  - JEJUNUM
    - NEOPLASM METASTASIS, 8222
  - LIVER
    - ALDOLASE, 8292*
    - CLOTTING, 8326
    - DIAGNOSIS, 8292*, 8493
    - ETIOLOGY, 8396*
    - IMMUNITY, 8414
    - ISOENZYMES, 8292*
    - MORPHOLOGY, 8396*
    - MYELOMA, 8333
    - SURGERY, 8326
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 8282*

NEOPLASMS, MALIGNANT (continued)
  PANCREAS
    DIAGNOSIS, 8493
  RECTUM
    NEOPLASM METASTASIS, 8241
  SALIVARY GLANDS
    DIAGNOSIS, 8468
    DRUG THERAPY, 8452*
    REVIEW, 8452*
    ULTRASTRUCTURE, 8487
  STOMACH, 8177, 8178
    BIOPSY, 8174, 8175
    DIAGNOSIS, 8174, 8175
    ENDOSCOPY, 8174, 8175
    ION TRANSPORT, 8176
    RADIOLOGY, 8174

NERVOUS CONTROL
  ANTRUM
    MOTILITY, 8120
    VAGOTOMY, 8120
  ESOPHAGUS
    MOTILITY, 7937*
    PERISTALSIS, 7937*
  GASTRIN
    SERUM, 7970
  GASTROINTESTINAL SYSTEM
    MOTILITY, 7942
  ILEUM
    ION TRANSPORT, 7925
  INTESTINE, SMALL
    ION TRANSPORT, 7925
    MUSCLES, 7910
    ULTRASTRUCTURE, 7910
  PYLORUS
    MOTILITY, 8120
    VAGOTOMY, 8120
  RECTUM
    ELECTROPHYSIOLOGY, 7955
    MOTILITY, 7955
  SECRETION
    GASTRIN, 7967*
  STOMACH
    ACID SECRETION, 7967*, 7968*
    GASTRIN, 7967*
    MUSCLES, 7910
    ULTRASTRUCTURE, 7910

NERVOUS SYSTEM
  PORTACAVAL SHUNT, 8110

NITROGEN
  INTESTINES
    ABSORPTION, 7913*
    TRANSPORT, 7913*

NOREPINEPHRINE
  ABSORPTION
    HORMONE EFFECTS ON, 7932
  SECRETION
    PEPSIN, 8171
  STOMACH
    ACID SECRETION, 8171
  TRANSPORT
    HORMONE EFFECTS ON, 7932

NUCLEIC ACIDS
  HEPATOCYTES, 8063
  LIVER
    DRUG EFFECTS ON, 8047

NUTRITION DISORDERS
  ALPHA FETOPROTEIN, 8484
  LIVER
    MORPHOLOGY, 7907

OBESITY
  INTESTINE, SMALL
    MORPHOLOGY, 8194*
  LIPIDS
    METABOLISM, 8303*
  SHUNT, INTESTINAL, 8216
    MORPHOLOGY, 8098

OBSTRUCTION
  BILE DUCTS
    CHOLECYSTECTOMY, 8443
  DUODENUM, 8213
  INTESTINE, SMALL, 8213
  PARASITES AND PARASITIC DISEASES
    DUODENUM, 8190*

OBSTRUCTIVE JAUNDICE
  SEE JAUNDICE, OBSTRUCTIVE

ORAL CONTRACEPTIVES
  SEE CONTRACEPTIVES, ORAL

ORGAN CULTURE
  INTESTINE, SMALL
    MORPHOLOGY, 7903*
    MORPHOMETRY, 7903*
    ULTRASTRUCTURE, 7903*
  JEJUNUM
    MORPHOLOGY, 7903*
    MORPHOMETRY, 7903*
    ULTRASTRUCTURE, 7903*

OSMOTIC PRESSURE
  INTESTINE, SMALL
    GLUCOSE, 8095
  JEJUNUM
    GLUCOSE, 8095

OXALATES
  ILEAL DISEASES
    CALCULI, 8227*
  SHUNT, INTESTINAL
    CALCULI, 8227*

OXYGEN
  HEPATITIS
    THERAPY, 8075
  HEPATITIS, TOXIC
    THERAPY, 8075
  LIVER
    HORMONE CONTROL, 7995*
    PEPTIDES, 7995*
    PITUITARY GLAND, 7995*
  LIVER INJURY
    THERAPY, 8075

PAIN
  LIVER CIRRHOSIS
    ABDOMEN, 8405
  STOMACH
    ACID SECRETION, 7980
    SECRETION, 7980

PANCREAS
- ABSORPTION
  - AMINO ACIDS, 7933
  - CARBOHYDRATES, 7933
- AMYLASES
  - HORMONE CONTROL, 7985*
- BICARBONATE SECRETION
  - ATROPINE, 8182
  - ULCER, PEPTIC, 8182
- DIGESTION
  - CARBOHYDRATES, 7933
  - PROTEINS, 7933
- ENZYMES, 7989
  - DIABETES, 7986*
  - HYPERGLYCEMIA, 7986*
- HORMONES, 7983*
  - REVIEW, 8125
- LIVER CIRRHOSIS
  - PANCREOZYMIN, 8401*
  - SECRETIN, 8401*
- NECROSIS, 8270
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 8493
- PROTEINS
  - SYNTHESIS, 7987*
- PSEUDOCYSTS
  - DIAGNOSIS, 8269
  - ULTRASONOGRAPHY, 8269
- SCANNING, SCINTILLATION
  - REVIEW, 8332
- SECRETIN, 7983*
- SECRETION
  - AGE FACTORS, 7988
  - AMYLASES, 7984*, 7985*
  - CHOLANGIOGRAPHY, 8267*
  - CHYMOTRYPSIN, 7982*
  - DIAGNOSIS, 8267*
  - ENZYMES, 7984*
  - HORMONE CONTROL, 7985*
  - NEOPLASMS, 8267*
  - REVIEW, 8125
  - TRYPSIN, 7982*
- TRANSPORT
  - AMINO ACIDS, 7987*
- ULTRASONOGRAPHY
  - REVIEW, 8132
- ZINC, 8134

PANCREAS FUNCTION TESTS
- PANCREATITIS, CHRONIC
  - TECHNIQUES, 8271*
- REVIEW, 8125

PANCREATECTOMY
- PANCREATITIS, CHRONIC, 8280

PANCREATIC DISEASES
- DIAGNOSIS
  - ULTRASONOGRAPHY, 8132
- DUODENOSCOPY
  - DIAGNOSIS, 8439
  - THERAPY, 8439

PANCREATIC DUCT
- MORPHOLOGY
  - AGE FACTORS, 7906

PANCREATITIS
- HEMATOLOGY, 8273
- HEPATITIS, INFECTIOUS
  - DISEASES ASSOCIATED WITH, 8376
- LYMPH
  - DRAINAGE, 7990
- SURGERY
  - PROGNOSIS, 8277
- THERAPY, 7990
- ULCER
  - SURGERY, 8276

PANCREATITIS, CHRONIC
- AMYLASES
  - ISOENZYMES, 8272*
- BILIARY TRACT
  - STRICTURE, 8274*
- COMPLICATIONS
  - BILIARY TRACT, 8274*
  - JAUNDICE, OBSTRUCTIVE, 8274*
  - MALABSORPTION SYNDROMES, 8279
  - METABOLISM, 8279
  - STRICTURE, 8274*
- DIAGNOSIS
  - AMYLASES, 8272*
  - ISOENZYMES, 8272*
  - REVIEW, 8278
- DIGESTION, 8279
- ETIOLOGY
  - REVIEW, 8278
- IMMUNOLOGY, 7991
- METABOLISM, 8279
- PANCREAS FUNCTION TESTS
  - TECHNIQUES, 8271*
- PANCREATECTOMY, 8280
- SURGERY, 8275, 8280

PANCREATOGRAPHY
- ENDOSCOPY
  - COMPLICATIONS, 8142
  - REVIEW, 8142

PANCREOZYMIN
- LIVER CIRRHOSIS
  - PANCREAS, 8401*

PARASITES AND PARASITIC DISEASES
- DIAGNOSIS, 8504
- DUODENUM
  - OBSTRUCTION, 8190*
- GEOGRAPHICAL FACTORS, 8115
- INTESTINES
  - PROSTAGLANDINS, 8119
- STOMACH
  - MOTILITY, 8162*
  - SECRETION, 8162*
- TRANSMISSION, 8473
  - REVIEW, 8472

PARASYMPATHOMIMETICS
- RECTUM
  - ELECTROPHYSIOLOGY, 7955
  - MOTILITY, 7955

PARATYPHOID FEVERS
- SEE SALMONELLOSIS

- PARENTERAL ALIMENTATION
  - COMPLICATIONS
    - ANEMIA, 8482
  - NEONATE
    - REVIEW, 8486

- PELIOSIS HEPATIS
  - DRUG-INDUCED
    - ANDROGENS, 8299*

- PENTAGASTRIN
  - HEIDENHAIN POUCH
    - ACID SECRETION, 7965*
    - TEMPERATURE, 7965*
  - STOMACH
    - ACID SECRETION, 7962*
    - SECRETION, 7969*
  - ULCER, PEPTIC
    - DUODENUM, 8180*
    - SECRETION, 8180*

- PEPSIN
  - SECRETION
    - CATECHOLAMINES, 8171
    - EPINEPHRINE, 8171
    - NOREPINEPHRINE, 8171
  - STOMACH
    - SECRETION, 7977, 8171
  - TEMPERATURE
    - SECRETION, 7965*
  - ULCER
    - PERFUSION, 8105*

- PEPTIC ULCER
  - SEE ULCER, PEPTIC

- PEPTIDE HYDROLASES
  - STOMACH
    - ULCER, 7975

- PEPTIDES
  - INTESTINES
    - TRANSPORT, 7913*
  - LIVER
    - HORMONE EFFECTS ON, 7995*
    - OXYGEN, 7995*
  - PITUITARY GLAND, 7995*

- PERFORATION
  - CECUM
    - PSEUDO-OBSTRUCTION, 8236*
    - THERAPY, 8211
  - COLON
    - PSEUDO-OBSTRUCTION, 8236*
  - ILEUM
    - SURGERY, 8211
    - THERAPY, 8211
  - INTESTINES
    - SURGERY, 8211
    - THERAPY, 8211

- PERFUSION
  - JEJUNUM
    - GLUCOSE, 8084*
  - LIVER
    - DRUG METABOLISM, 8031*
  - STOMACH
    - ULCER, 8105*

- PERFUSION (continued)
  - ULCER
    - ACIDITY, 8105*
    - PEPSIN, 8105*
    - PRESSURE STUDY, 8105*

- PERIHEPATITIS
  - BACTERIAL INFECTIONS
    - VENEREAL DISEASES, 8054

- PERISTALSIS
  - ESOPHAGUS
    - MUSCLES, 7937*
    - NERVOUS CONTROL, 7937*
  - ILEUM
    - PURINES, 7946
  - INTESTINE, SMALL
    - PURINES, 7946
    - SURGERY, 8218

- PERITONEUM
  - GASES
    - DIAGNOSIS, 8466

- PERITONITIS
  - DRUG-INDUCED
    - ANTI-INFLAMMATORY AGENTS, 8102*

- PEROXIDATION
  - HEPATITIS, CHRONIC
    - LIPIDS, 8058

- PETIDASE
  - SEE PEPTIDE HYDROLASES

- PHOSPHOLIPIDS
  - INTESTINAL ABSORPTION, 7924

- PHOSPHORYLATION, OXIDATIVE
  - SEE OXIDATIVE PHOSPHORYLATION

- PHOTOTHERAPY
  - HYPERBILIRUBINEMIA
    - IMMUNOGLOBULINS, 8337*
    - IMMUNOLOGY, 8337*
    - NEONATE, 8337*
  - JAUNDICE
    - IMMUNOGLOBULINS, 8337*
    - IMMUNOLOGY, 8337*
    - NEONATE, 8337*
  - PLASMA, 8117

- PIGMENTS
  - GALLSTONES
    - CHEMICAL PROPERTIES, 8426*
    - SYNTHESIS, 8426*

- PITUITARY GLAND
  - LIVER
    - HORMONE EFFECTS ON, 7995*
    - OXYGEN, 7995*
  - PEPTIDES, 7995*

- PLASMA
  - CHOLESTASIS
    - IMMUNITY, 8433*
  - HEPATITIS, INFECTIOUS
    - LIPOPROTEINS, 8368

PLASMA (continued)
    JAUNDICE, OBSTRUCTIVE
        LIPOPROTEINS, 8368
    LIPIDS
        PORTACAVAL SHUNT, 8046
    LIPOPROTEINS
        PORTACAVAL SHUNT, 8046
    LIVER CIRRHOSIS
        IMMUNITY, 8433*
    PHOTOTHERAPY, 8117

PLATELETS
    SEE BLOOD PLATELETS

PNEUMATOSIS
    INTESTINE, SMALL
        PATHOLOGY, 8163*
    STOMACH
        HERNIA, 8163*

POLYPEPTIDES
    LIVER CIRRHOSIS
        SYNTHESIS, 8012*

PORPHYRIA
    DRUG THERAPY, 8300*
    IRON
        METABOLISM, 8309
    LIVER
        DRUG THERAPY, 8311
    MITOCHONDRIA
        ULTRASTRUCTURE, 8282*
    SIMULATION
        DRUG-INDUCED, 8026*
    THERAPY, 8300*

PORPHYRIN
    EXCRETION
        DRUG EFFECTS ON, 8025*
    URINE
        EXCRETION, 8025*

PORTACAVAL SHUNT
    AMINO ACIDS, 8081
    LIVER CIRRHOSIS
        PROGNOSIS, 8404
    NERVOUS SYSTEM, 8110
    PLASMA
        LIPIDS, 8046
        LIPOPROTEINS, 8046

PORTAL HYPERTENSION
    SEE HYPERTENSION, PORTAL

POTASSIUM
    COLON
        ION TRANSPORT, 7918*
        TRANSPORT, 7918*
    ESOPHAGUS
        DEFICIENCY, 8152
        STENOSIS, 8152
    INTESTINE, LARGE
        MOTILITY, 7949
    STOMACH
        MOTILITY, 7949

PRECANCEROUS CONDITIONS
    GASTROINTESTINAL SYSTEM
        REVIEW, 8111

PRECANCEROUS CONDITIONS (continued)
    HEPATITIS, CHRONIC
        FIBROSIS, 8288*

PREGNANCY
    HYPERBILIRUBINEMIA
        DRUG-INDUCED, 8336*
    HYPERTENSION, PORTAL
        COMPLICATIONS, 8403*
    WILSON'S DISEASE
        REVIEW, 8305*

PROCTITIS
    COLON
        IMMUNOCHEMISTRY, 8237*
        PATHOLOGY, 8237*

PROLAPSE
    RECTUM
        REVIEW, 8254
        STATISICAL STUDY, 8254
        SURGERY, 8253
        THERAPY, 8254

PROSTAGLANDINS
    ABSORPTION
        CALCIUM, 7919*
    CROHN'S DISEASE
        ETIOLOGY, 8510
    ILEUM
        MOTILITY, 7939*
    INTESTINE, SMALL
        MOTILITY, 7939*
    INTESTINES
        ABSORPTION, 7919*
        PARASITES AND PARASITIC DISEASES, 8119
        ULCER, 8102*
    STOMACH, 8104*

PROTEASE
    SEE PEPTIDE HYDROLASES

PROTEINS
    ANTIBIOTICS
        BINDING, 8320
    COLON
        NEOPLASMS, 8243
    CYSTIC FIBROSIS
        ABSORPTION, 8268*
    DIGESTION
        PANCREAS, 7933
    ECHINOCOCCOSIS
        SERUM, 8170
    GASTROINTESTINAL DISEASES
        SERUM, 8170
    HEPATITIS, INFECTIOUS
        CHILD, 8373
        DIAGNOSIS, 8373
    HEPATOCYTES, 8063
        SYNTHESIS, 8011*
    INTESTINAL ABSORPTION
        FERRITIN, 7917*
        IMMUNOGLOBULINS, 7917*
    INTESTINES
        METABOLISM, 8200
    LIVER
        ANESTHESIA, 8343
        SURGERY, 8343

PROTEINS (continued)
- LIVER (continued)
  - SYNTHESIS, 8010*
  - UREA, 8009*
- LIVER DISEASES
  - BINDING, 8283*
  - DRUG METABOLISM, 8283*
- NEOPLASMS
  - SERUM, 8243
- PANCREAS
  - SYNTHESIS, 7987*
- SYNTHESIS
  - AFLATOXINS, 8010*
  - ALCOHOLS, 8011*
  - DRUG EFFECTS ON, 8010*, 8011*
- TOXICITY
  - CELL CULTURE, 8477
- ULCER
  - SYNTHESIS, 7979
- ULCER, PEPTIC
  - STOMACH, 8180*

PROTHROMBIN
- CHOLESTASIS
  - METABOLISM, 8073
- METABOLISM
  - DRUG EFFECTS ON, 8073

PSEUDO-OBSTRUCTION
- CECUM
  - GANGRENE, 8236*
  - PERFORATION, 8236*
- COLON
  - ETIOLOGY, 8236*
  - GANGRENE, 8236*
  - PERFORATION, 8236*
- SHUNT, INTESTINAL
  - COMPLICATIONS, 8192*

PSEUDOCYSTS
- PANCREAS
  - DIAGNOSIS, 8269
  - ULTRASONOGRAPHY, 8269

PSEUDOTUMORS
- ABDOMEN
  - ABSCESS, 8505
  - ASCARIASIS, 8505
- ASCARIASIS
  - ABSCESS, 8505
- CECUM
  - YERSINIA, 8223
- ILEUM
  - YERSINIA, 8223
- YERSINIA
  - DISEASES ASSOCIATED WITH, 8202

PURINES
- ILEUM
  - MOTILITY, 7946
  - PERISTALSIS, 7946
- INTESTINE, SMALL
  - MOTILITY, 7946
  - PERISTALSIS, 7946

PYLOROPLASTY
- GASTRIN
  - ULTRASTRUCTURE, 8181*
- ULCER
  - DUODENUM, 8181*

PYLORUS
- CELLS
  - MORPHOLOGY, 7905*
  - MUCUS, 7905*
  - SECRETION, 7905*
  - ULTRASTRUCTURE, 7905*
- MORPHOLOGY
  - ULCER, PEPTIC, 8165*
- MOTILITY
  - NERVOUS CONTROL, 8120
- NERVOUS CONTROL
  - VAGOTOMY, 8120
- REVIEW, 7908
- SECRETION
  - MUCUS, 7905*

RADIOIMMUNOASSAY
- AUSTRALIA ANTIGEN, 8379
- REVIEW, 8127

RADIOLOGY
- BUDD-CHIARI SYNDROME
  - ETIOLOGY, 8315
- COLON
  - NEOPLASMS, 8256
  - NEOPLASMS, MALIGNANT, 8258
- GASTROINTESTINAL SYSTEM
  - TECHNIQUES, 8118
- INTESTINE, LARGE
  - APPENDIX, 8239
  - INTUSSUSCEPTION, 8244
  - MASSAE, 8259
- REVIEW, 8129
- STOMACH
  - NEOPLASMS, MALIGNANT, 8174

RADIONUCLIDES
- ABSCESS
  - SCANNING, SCINTILLATION, 8448
- CYSTIC FIBROSIS
  - ABSORPTION, 8268*

RADIOTELEMETRY
- GASTROINTESTINAL SYSTEM
  - MOTILITY, 7935*
  - TECHNIQUES, 7935*

RECTUM
- SEE ALSO ANORECTUM, ANUS
- BIOPSY
  - CHILD, 8133
  - INFANT, 8133
  - TECHNIQUES, 8133
- CELLS
  - GLYCOPROTEINS, 8090*
- COLON
  - NEOPLASMS, 8233*, 8252
- CROHN'S DISEASE
  - DIAGNOSIS, 8513
  - DRUG THERAPY, 8517
  - HORMONES, ADRENAL CORTEX, 8517
  - STEROIDS, 8517

RECTUM (continued)
    ELECTROPHYSIOLOGY
        DRUG EFFECTS ON, 7955
        NERVOUS CONTROL, 7955
        PARASYMPATHOMIMETICS, 7955
    GASTROINTESTINAL SYSTEM
        SURGERY, 8247
    GLYCOPROTEINS
        CYSTIC FIBROSIS, 8090*
        SYNTHESIS, 8090*
    INFLAMMATION
        CYTOLOGY, 8238
        DIAGNOSIS, 8238
    MOTILITY
        DRUG EFFECTS ON, 7955
        MANGANESE, 7954
        NERVOUS CONTROL, 7955
        PARASYMPATHOMIMETICS, 7955
    NEOPLASMS
        CARCINOEMBRYONIC ANTIGEN, 8252
        DRUG THERAPY, 8233*
        SURGERY, 8248
    NEOPLASMS, BENIGN
        MUSCLES, 8245
    NEOPLASMS, MALIGNANT
        NEOPLASM METASTASIS, 8241
    PROLAPSE
        REVIEW, 8254
        STATISICAL STUDY, 8254
        SURGERY, 8253
        THERAPY, 8254
    SECRETION
        GLYCOPROTEINS, 8090*
    SIGMOID
        SURGERY, 8247
    SURGERY
        COMPLICATIONS, 8250
        TECHNIQUES, 8248
    TRANSPORT
        GLYCOPROTEINS, 8090*
    UROGENITAL SYSTEM
        COMPLICATIONS, 8250

REGIONAL ENTERITIS
    SEE ENTERITIS, REGIONAL

RESPIRATORY SYSTEM
    MALLORY-WEISS SYNDROME
        DISEASES ASSOCIATED WITH, 8149
    NEOPLASM METASTASIS
        LIVER, 8329
        SCANNING, SCINTILLATION, 8329

REYE'S SYNDROME
    HYPERBILIRUBINEMIA
        NEONATE, 8286*
    LIVER
        ULTRASTRUCTURE, 8301*

RIBOFLAVIN
    SEE VITAMIN B2

RUPTURE
    ESOPHAGUS
        HYPERTROPHY, 8148*

SALIVA
    HEPATITIS, INFECTIOUS
        TRANSMISSION, 8360*

SALIVARY GLANDS
    NEOPLASMS
        CHILD, 8485
        REVIEW, 8485
    NEOPLASMS, BENIGN
        DIAGNOSIS, 8463
    NEOPLASMS, MALIGNANT
        DIAGNOSIS, 8468
        DRUG THERAPY, 8452*
        REVIEW, 8452*
        ULTRASTRUCTURE, 8487
    SECRETION
        BIOCHEMISTRY, 7958

SALMONELLOSIS
    DRUG THERAPY
        ANTIBIOTICS, 8474, 8475
    IMMUNITY, 8116
    INTESTINES
        DRUG EFFECTS ON, 7921*
    LIVER
        ENDOTOXINS, 8039*
    LIVER INJURY
        ZINC, 8040*
    TRANSPORT
        WATER, 7921*

SCANNING, SCINTILLATION
    ABSCESS
        RADIONUCLIDES, 8448
    LIVER
        REVIEW, 8332
    LIVER INJURY
        CHILD, 8324
    PANCREAS
        REVIEW, 8332
    RESPIRATORY SYSTEM
        NEOPLASM METASTASIS, 8329
    SPLEEN
        REVIEW, 8332

SCHISTOSOMIASIS
    AMINO ACIDS
        METABOLISM, 8048, 8049
    EPIDEMIOLOGY, 8502
    IMMUNOLOGY, 8112
    LIVER
        AMINO ACIDS, 8048, 8049
        ENZYMES, 8048, 8049
    SERUM
        ENZYMES, 8048

SECRETIN
    BILE ACIDS AND SALTS
        VAGOTOMY, 8108*
    LIVER CIRRHOSIS
        PANCREAS, 8401*
    PANCREAS, 7983*

SECRETION
    SEE ALSO ACID SECRETION,
      BICARBONATE SECRETION,
      HYPERCHLORHYDRIA
    AMYLASES
        ADENOSINE CYCLIC 3',5'
          MONOPHOSPHATE, 7985*
        GUANOSINE CYCLIC 3',5'
          MONOPHOSPHATE, 7985*
        HORMONE CONTROL, 7985*

SECRETION (continued)
- BILE ACIDS AND SALTS
  - ESTROGENS, 8004*
  - HORMONE EFFECTS ON, 8004*
- BILIARY TRACT, 8113
  - BILE ACIDS AND SALTS, 8004*
  - CHOLESTEROL, 8004*
- CHOLESTEROL
  - ESTROGENS, 8004*
  - HORMONE EFFECTS ON, 8004*
- GASTRIN
  - ATROPINE, 7967*
  - NERVOUS CONTROL, 7967*
- GASTROINTESTINAL SYSTEM
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7957
- GLYCOPROTEINS
  - CYSTIC FIBROSIS, 8090*
- LIVER
  - ACYLTRANSFERASES, 8000*
- LIVER CIRRHOSIS
  - BILE ACIDS AND SALTS, 8398*
- LIVER DISEASES, ALCOHOLIC
  - BILE ACIDS AND SALTS, 8398*
- NEOPLASMS
  - HORMONES, ADRENAL CORTEX, 8291*
  - THYROCALCITONIN, 8291*
- PANCREAS
  - AGE FACTORS, 7988
  - AMYLASES, 7984*, 7985*
  - CHOLANGIOGRAPHY, 8267*
  - CHYMOTRYPSIN, 7982*
  - DIAGNOSIS, 8267*
  - ENZYMES, 7984*
  - HORMONE CONTROL, 7985*
  - NEOPLASMS, 8267*
  - REVIEW, 8125
  - TRYPSIN, 7982*
- PEPSIN
  - CATECHOLAMINES, 8171
  - EPINEPHRINE, 8171
  - NOREPINEPHRINE, 8171
- PYLORUS
  - CELLS, 7905*
  - MUCUS, 7905*
- RECTUM
  - GLYCOPROTEINS, 8090*
- SALIVARY GLANDS
  - BIOCHEMISTRY, 7958
- STOMACH
  - AMINO ACIDS, 7969*
  - CARBOHYDRATES, 7969*
  - CELLS, 7905*, 7978
  - GASTRIN, 7972
  - GLYCOPROTEINS, 7969*
  - HISTAMINE, 7969*
  - HISTOCHEMISTRY, 7978
  - HORMONE EFFECTS ON, 7977
  - MORPHOMETRY, 7978
  - MUCUS, 7905*, 7969*
  - PAIN, 7980
  - PARASITES AND PARASITIC DISEASES, 8162*
  - PENTAGASTRIN, 7969*
  - PEPSIN, 7977, 8171
  - THYROID GLAND, 7969*
- TEMPERATURE
  - PEPSIN, 7965*

SECRETION (continued)
- ULCER, PEPTIC
  - PENTAGASTRIN, 8180*

SEDATIVES
- JAUNDICE, CHOLESTATIC
  - DRUG-INDUCED, 8346
- LIVER DISEASES
  - DRUG METABOLISM, 8325
- LIVER INJURY
  - DRUG-INDUCED, 8346

SEPSIS
- CHOLECYSTECTOMY
  - COMPLICATIONS, 8430*
  - PREVENTION, 8430*

SERUM
- ALCOHOLISM
  - ALKALINE PHOSPHATASE, 8391
  - AMINO TRANSFERASES, 8391
  - ENZYMES, 8391
  - IMMUNOGLOBULINS, 8391
- BILE ACIDS AND SALTS
  - ANALGESICS AND ANTIPYRETICS, 8339*
  - DRUG EFFECTS ON, 8339*
  - TECHNIQUES, 7997*
- ECHINOCOCCOSIS
  - PROTEINS, 8170
- ENZYMES
  - SCHISTOSOMIASIS, 8048
- GASTRIN
  - ACID SECRETION, 7970
  - NERVOUS CONTROL, 7970
- GASTROINTESTINAL DISEASES
  - PROTEINS, 8170
- HEPATITIS, INFECTIOUS
  - CHOLINESTERASES, 8371
- KIDNEY DISEASES
  - GASTRIN, 8499
- LIVER CIRRHOSIS
  - GASTRIN, 8418
- NEOPLASMS
  - PROTEINS, 8243

SHIGELLOSIS
- EPIDEMIOLOGY, 8470
- TRANSMISSION, 8473
  - REVIEW, 8472

SHUNT
- HYPERTENSION, PORTAL
  - HEME, 8400*
- LIVER
  - HYPERPLASIA, 8035*
  - REGENERATION, 8035*

SHUNT, INTESTINAL
- COMPLICATIONS
  - INFLAMMATION, 8193*
  - PSEUDO-OBSTRUCTION, 8192*
- HYPERLIPEMIA
  - THERAPY, 8217
- INTESTINE, SMALL
  - MORPHOLOGY, 8194*
- OBESITY, 8216
  - MORPHOLOGY, 8098
- OXALATES
  - CALCULI, 8227*

SHUNT, INTESTINAL (continued)
  PSEUDO-OBSTRUCTION
    ETIOLOGY, 8192*

SIDEROSIS
  HEPATOCYTES
    IRON, 8389*
  LIVER
    ALCOHOLISM, 8389*

SIGMOID
  ANOMALY
    FAMILIAL FACTORS, 8260
  COLON
    ANOMALY, 8260
    DUPLICATION, 8260
  DUPLICATION
    FAMILIAL FACTORS, 8260
  GASTROINTESTINAL SYSTEM
    SURGERY, 8247
  INFLAMMATION
    CYTOLOGY, 8238
    DIAGNOSIS, 8238
  INTESTINAL OBSTRUCTION
    SURGERY, 8240
  RECTUM
    SURGERY, 8247

SIGMOIDITIS
  SURGERY, 8257

SMALL INTESTINE
  SEE INTESTINE, SMALL

SMOKING
  HYDROGEN
    BREATH TEST, 8136

SODIUM
  BINDING
    PSYCHOTOMIMETICS, 8088*
    SUCRASE, 8088*
  INTESTINE, SMALL
    BINDING, 8088*

SOLVENTS
  ILEUM
    MOTILITY, 7948
  INTESTINE, SMALL
    MOTILITY, 7948

SOMATOSTATIN
  ESOPHAGUS
    HORMONE EFFECTS ON, 7936*
    MOTILITY, 7936*
    SPHINCTER, 7936*

SPASM
  ESOPHAGUS
    SPHINCTER, 8150

SPHINCTER
  ESOPHAGUS
    GASTRIN, 7936*
    HORMONE EFFECTS ON, 7936*
    PRESSURE STUDY, 7936*
    SOMATOSTATIN, 7936*
    SPASM, 8150

SPLEEN
  SCANNING, SCINTILLATION
    REVIEW, 8332

SPLENECTOMY
  HEME
    METABOLISM, 8400*
  HYPERTENSION, PORTAL
    HEME, 8400*

SPLENORENAL SHUNT
  ESOPHAGUS
    VARICES, 8158

STEATOSIS
  SEE FATTY LIVER

STENOSIS
  COMMON BILE DUCT
    IATROGENESIS, 8434*
    THERAPY, 8434*
  ESOPHAGUS
    BURNS, CHEMICAL, 8152
    ELECTROLYTES, 8152
    POTASSIUM, 8152
    SURGERY, 8151
    ULCER, PEPTIC, 8151

STEROIDS
  COLON
    CROHN'S DISEASE, 8517
    ION TRANSPORT, 7922
    NEOPLASMS, 8234*
  CROHN'S DISEASE
    DRUG THERAPY, 8517
  INTESTINE, LARGE
    ION TRANSPORT, 7922
  RECTUM
    CROHN'S DISEASE, 8517

STEROLS
  DIETARY FACTORS
    FATS, 7998*

STOMACH
  ACID SECRETION
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 7961*
    ANESTHESIA, 7962*
    ATROPINE, 7962*, 7967*, 8183
    CATECHOLAMINES, 8171
    CELLS, 7978
    CHILD, 8171
    DRUG EFFECTS ON, 7959*, 7962*,
      7963*, 7966*, 8183
    EPINEPHRINE, 8171
    FOOD, 7968*
    H2 RECEPTOR ANTAGONISTS, 7963*
    HISTAMINE, 7964*
    HISTOCHEMISTRY, 7978
    HORMONE EFFECTS ON, 7977
    MORPHOMETRY, 7978
    NERVOUS CONTROL, 7967*, 7968*
    NOREPINEPHRINE, 8171
    PAIN, 7980
    PENTAGASTRIN, 7962*
  ANTACIDS
    ENDOSCOPY, 7973

- STOMACH (continued)
  - ANTI-INFLAMMATORY AGENTS
    - MORPHOLOGY, 8164*
  - BILE ACIDS AND SALTS, 8104*
  - BLEEDING
    - ANGIOGRAPHY, 8128
    - DIAGNOSIS, 8128
    - INFANT, 8128
  - CELLS
    - DRUG EFFECTS ON, 7959*
    - MORPHOLOGY, 7905*
    - MUCUS, 7905*
    - SECRETION, 7905*
    - ULTRASTRUCTURE, 7905*
  - CIRCULATORY SYSTEM
    - MORPHOMETRY, 7901*
  - DISTENTION
    - GASTRIN, 7971
  - DRUG EFFECTS ON, 8104*
  - ELECTROPHYSIOLOGY
    - ACIDS, 7940*
    - DUODENUM, 7940*
    - FATS, 7940*
    - GLUCOSE, 7940*
  - ESOPHAGUS
    - CIRCULATORY SYSTEM, 7901*
  - GASTRIN
    - ATROPINE, 7967*
    - EPINEPHRINE, 7972
    - NERVOUS CONTROL, 7967*
    - SYNTHESIS, 7972
  - HEALING
    - MORPHOLOGY, 7960*
    - ULTRASTRUCTURE, 7960*
  - HIATAL HERNIA
    - ACID SECRETION, 8146*
  - ION TRANSPORT, 7928
  - IRON
    - DEFICIENCY, 7909
  - KIDNEYS
    - DISEASE, 8172
  - MITOCHONDRIA
    - DRUG EFFECTS ON, 7981
  - MORPHOLOGY, 7909
    - ACID SECRETION, 8169
    - DRUG EFFECTS ON, 7959*
    - HEMODIALYSIS, 8172
    - ULCER, PEPTIC, 8165*
  - MOTILITY
    - ACIDS, 7940*
    - AMINO ACIDS, 7940*
    - BARIUM, 7953
    - DRUG EFFECTS ON, 7945, 7949, 7953
    - DUODENUM, 7940*
    - FATS, 7940*
    - GLUCOSE, 7940*
    - PARASITES AND PARASITIC DISEASES, 8162*
    - POTASSIUM, 7949
    - VAGOTOMY, 7940*
    - VASODILATOR AGENTS, 7949
  - MUSCLES
    - NERVOUS CONTROL, 7910
  - MYCOSES, 8173
  - NEOPLASM METASTASIS, 8177, 8178
  - NEOPLASMS, BENIGN
    - DIAGNOSIS, 8179
    - THERAPY, 8179

- STOMACH (continued)
  - NEOPLASMS, MALIGNANT, 8177, 8178
    - BIOPSY, 8174, 8175
    - DIAGNOSIS, 8174, 8175
    - ENDOSCOPY, 8174, 8175
    - ION TRANSPORT, 8176
    - RADIOLOGY, 8174
  - NERVOUS CONTROL
    - ULTRASTRUCTURE, 7910
  - PATHOLOGY
    - ANEMIA, PERNICIOUS, 8492
  - PNEUMATOSIS
    - HERNIA, 8163*
  - PROSTAGLANDINS, 8104*
  - SECRETION
    - AMINO ACIDS, 7969*
    - CARBOHYDRATES, 7969*
    - CELLS, 7978
    - GASTRIN, 7972
    - GLYCOPROTEINS, 7969*
    - HISTAMINE, 7969*
    - HISTOCHEMISTRY, 7978
    - HORMONE EFFECTS ON, 7977
    - MORPHOMETRY, 7978
    - MUCUS, 7905*, 7969*
    - PAIN, 7980
    - PARASITES AND PARASITIC DISEASES, 8162*
    - PENTAGASTRIN, 7969*
    - PEPSIN, 7977, 8171
    - THYROID GLAND, 7969*
  - SURGERY
    - ABSCESS, 8459
    - COMPLICATIONS, 8459
  - TEMPERATURE
    - ACID SECRETION, 7965*
  - ULCER
    - ANGIOGRAPHY, 8128
    - DRUG EFFECTS ON, 7966*
    - DRUG THERAPY, 7979
    - INFANT, 8128
    - ISCHEMIA, 8106*
    - MONOAMINE OXIDASE, 7974
    - PEPTIDE HYDROLASES, 7975
    - PERFUSION, 8105*
    - SURGERY, 8276
  - ULCER, PEPTIC
    - ACID SECRETION, 7976
    - COMPLICATIONS, 8488
    - L-DOPA, 8189
    - DRUG THERAPY, 8189
    - HYPERCHLORHYDRIA, 7976
    - PROTEINS, 8180*
    - THERAPY, 8186
  - VEINS
    - EMBOLIZATION, 8402*

- STOMACH DISEASES
  - BIOPSY, 8166
  - DIAGNOSIS, 8143
  - DISEASES ASSOCIATED WITH, 8168
  - ENDOSCOPY, 8166

- STRESS
  - LIVER
    - PRESSURE STUDY, 7943

- STRICTURE
  - BILIARY TRACT
    - PANCREATITIS, CHRONIC, 8274*

- STRICTURE (continued)
  - ESOPHAGUS
    - SURGERY, 8114, 8153
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 8274*

- SUCRASE
  - SODIUM
    - BINDING, 8088*

- SUCROSE
  - LIVER
    - LIPIDS, 8020*

- SUGAR
  - SEE CARBOHYDRATES

- SULFOBROMOPHTHALEIN
  - HEPATOCYTES
    - TRANSPORT, 7930

- SURFACTANTS
  - INTESTINE, SMALL
    - ULTRASTRUCTURE, 8086*
    - WATER, 8086*

- SYPHILIS
  - HEPATOCYTES
    - LIPOPROTEINS, 8056

- TAENIASIS
  - EPIDEMIOLOGY, 8501

- TEMPERATURE
  - HEIDENHAIN POUCH
    - ACID SECRETION, 7965*
    - PENTAGASTRIN, 7965*
  - INTESTINE, SMALL
    - ENZYMES, 8097
    - MOTILITY, 7944
  - PEPSIN
    - SECRETION, 7965*
  - STOMACH
    - ACID SECRETION, 7965*

- THIAMINE
  - SEE VITAMIN B1

- THROMBOSIS
  - COLON
    - INFLAMMATION, 8262

- THYROCALCITONIN
  - LIVER
    - NEOPLASMS, 8291*
  - NEOPLASMS
    - SECRETION, 8291*

- THYROID GLAND
  - HEPATOCYTES
    - HORMONE EFFECTS ON, 8053
  - LIVER
    - HORMONE EFFECTS ON, 8053
  - STOMACH
    - SECRETION, 7969*

- TOMOGRAPHY
  - LIVER
    - COMPUTERS, 8124*

- TOXICITY
  - JAUNDICE
    - DRUG-INDUCED, 8344
    - HORMONES, 8344
  - LIVER
    - CYTOCHROMES, 8022*
  - PROTEINS
    - CELL CULTURE, 8477

- TRANQUILIZING AGENTS
  - ILEUM
    - MOTILITY, 7948
  - INFLAMMATION
    - LIVER, 8032*
  - INTESTINE, SMALL
    - MOTILITY, 7948
  - LIVER
    - MICROSOMES, 8032*

- TRANSAMINASE
  - SEE AMINO TRANSFERASES

- TRANSFERRIN
  - LIVER
    - IRON, 7994*
    - SYNTHESIS, 7994*

- TRANSFUSION
  - AUSTRALIA ANTIGEN
    - TRANSMISSION, 8362
  - HEPATITIS, INFECTIOUS
    - TRANSMISSION, 8362
  - LIVER COMA
    - HYPOTHERMIA, 8322
    - THERAPY, 8322

- TRANSPLANTATION
  - LIVER, 8050
    - COMPLICATIONS, 8306*
    - DRAINAGE, 8307*
    - PROGNOSIS, 8306*
    - SURVIVAL, 8306*, 8307*
    - TECHNIQUES, 8306*, 8307*

- TRANSPORT
  - AMINO ACIDS
    - KALLIKREIN, 7914*
    - TECHNIQUES, 7929
  - BILE ACIDS AND SALTS
    - ENTERECTOMY, 7915*
  - COLON
    - POTASSIUM, 7918*
  - DUODENUM
    - FERRITIN, 7917*
    - IMMUNOGLOBULINS, 7917*
  - GLYCOPROTEINS
    - CYSTIC FIBROSIS, 8090*
  - HEPATOCYTES
    - SULFOBROMOPHTHALEIN, 7930
  - HORMONE EFFECTS ON
    - ANGIOTENSIN, 7932
    - NOREPINEPHRINE, 7932
  - ILEUM
    - BILE ACIDS AND SALTS, 7915*
    - FERRITIN, 7917*
    - IMMUNOGLOBULINS, 7917*
  - INTESTINE, SMALL
    - ALKALINE PHOSPHATASE, 8087*
    - AMINO ACIDS, 7914*, 7929

- TRANSPORT (continued)
  - INTESTINE, SMALL (continued)
    - CARBOHYDRATES, 7920*
    - HORMONE EFFECTS ON, 7932
    - WATER, 8086*
  - INTESTINES
    - AMINO ACIDS, 7913*
    - NITROGEN, 7913*
    - PEPTIDES, 7913*
    - WATER, 7921*
  - JEJUNUM
    - HORMONE EFFECTS ON, 7932
  - PANCREAS
    - AMINO ACIDS, 7987*
  - RECTUM
    - GLYCOPROTEINS, 8090*
  - WATER
    - DRUG EFFECTS ON, 7921*
    - SALMONELLOSIS, 7921*

- TRAUMA
  - SEE STRESS, WOUNDS AND INJURIES

- TRIGLYCERIDES
  - SEE ALSO FATS, LIPIDS
  - INTESTINE, SMALL, 7926
    - LYMPHATIC SYSTEM, 7926
  - LIVER
    - DIETARY FACTORS, 8015*
  - LYMPHATIC SYSTEM, 7926

- TRYPSIN
  - PANCREAS
    - SECRETION, 7982*

- TYPHOID
  - SEE SALMONELLOSIS

- ULCER
  - ANTRUM
    - GASTRIN, 8181*
  - DRUG-INDUCED
    - ANTI-INFLAMMATORY AGENTS, 8102*
  - DUODENUM
    - PYLOROPLASTY, 8181*
    - SURGERY, 8276
    - VAGOTOMY, 8181*
  - GASTRIN
    - ULTRASTRUCTURE, 8181*
  - HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 8376
  - INTESTINES
    - ANTI-INFLAMMATORY AGENTS, 8102*
    - BACTERIA, 8102*
    - DRUG-INDUCED, 8102*
    - PROSTAGLANDINS, 8102*
  - MONOAMINE OXIDASE
    - DRUG EFFECTS ON, 7974
  - PERFUSION
    - ACIDITY, 8105*
    - PEPSIN, 8105*
    - PRESSURE STUDY, 8105*
  - PROTEINS
    - SYNTHESIS, 7979
  - STOMACH
    - ANGIOGRAPHY, 8128
    - DRUG EFFECTS ON, 7966*
    - DRUG THERAPY, 7979
    - INFANT, 8128

- ULCER (continued)
  - STOMACH (continued)
    - ISCHEMIA, 8106*
    - MONOAMINE OXIDASE, 7974
    - PEPTIDE HYDROLASES, 7975
    - PERFUSION, 8105*
    - SURGERY, 8276
  - SURGERY
    - COMPLICATIONS, 8276
    - PANCREATITIS, 8276

- ULCER, PEPTIC
  - ACID SECRETION
    - DRUG EFFECTS ON, 7976, 8183
  - ANTRUM
    - MORPHOLOGY, 8165*
  - CHILD
    - SURGERY, 8185
    - THERAPY, 8185
  - COMPLICATIONS
    - INFECTION, 8488
  - DRUG THERAPY
    - ANTACIDS, 8187
    - L-DOPA, 8189
    - H2 RECEPTOR ANTAGONISTS, 8188
  - DUODENUM
    - ACID SECRETION, 7976
    - ACIDITY, 8180*
    - COMPLICATIONS, 8488
    - L-DOPA, 8189
    - DRUG THERAPY, 8189
    - HYPERCHLORHYDRIA, 7976
    - PENTAGASTRIN, 8180*
    - THERAPY, 8186
  - ESOPHAGUS
    - STENOSIS, 8151
    - SURGERY, 8151, 8154
  - HYPERCHLORHYDRIA
    - DRUG EFFECTS ON, 7976
  - LIVER CIRRHOSIS
    - DISEASES ASSOCIATED WITH, 8418
  - PANCREAS
    - BICARBONATE SECRETION, 8182
  - PYLORUS
    - MORPHOLOGY, 8165*
  - SECRETION
    - PENTAGASTRIN, 8180*
  - STOMACH
    - ACID SECRETION, 7976
    - COMPLICATIONS, 8488
    - L-DOPA, 8189
    - DRUG THERAPY, 8189
    - HYPERCHLORHYDRIA, 7976
    - MORPHOLOGY, 8165*
    - PROTEINS, 8180*
    - THERAPY, 8186
  - THERAPY, 8184

- ULCERATIVE COLITIS
  - SEE COLITIS, ULCERATIVE

- ULCERATIVE ENTERITIS
  - SEE ENTERITIS, ULCERATIVE

- ULTRASONOGRAPHY
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 8132
  - CHOLECYSTITIS
    - CHOLECYSTOGRAPHY, 8123*

ULTRASONOGRAPHY (continued)
- CHOLELITHIASIS
  - CHOLECYSTOGRAPHY, 8123*
- JAUNDICE
  - DIAGNOSIS, 8135
- KIDNEY DISEASES, 8330
- LIVER
  - CYSTS, 8132
  - FIBROSIS, 8330
  - NEOPLASMS, 8132
  - REVIEW, 8132
- PANCREAS
  - PSEUDOCYSTS, 8269
  - REVIEW, 8132
- PANCREATIC DISEASES
  - DIAGNOSIS, 8132

UREA
- LIVER
  - ENZYMES, 8009*
  - PROTEINS, 8009*

URINE
- PORPHYRIN
  - EXCRETION, 8025*

UROGENITAL SYSTEM
- ENTEROCOLITIS, NECROTIZING
  - SURGERY, 8246
- HEPATITIS, INFECTIOUS
  - TRANSMISSION, 8360*
- RECTUM
  - COMPLICATIONS, 8250

URTICARIA PIGMENTOSA
- COLON
  - COLITIS, 8242

VAGOTOMY
- ANTRUM
  - NERVOUS CONTROL, 8120
- BILE ACIDS AND SALTS
  - CHOLERESIS, 8108*
  - SECRETIN, 8108*
- GASTRIN
  - ULTRASTRUCTURE, 8181*
- PYLORUS
  - NERVOUS CONTROL, 8120
- STOMACH
  - MOTILITY, 7940*
- ULCER
  - DUODENUM, 8181*

VARICES
- DIAGNOSIS
  - DYES, 8155
- ESOPHAGUS, 8159
  - CHILD, 8157
  - DIAGNOSIS, 8155
  - DYES, 8155
  - HEMORRHAGE, 8156, 8157
  - SPLENORENAL SHUNT, 8158
  - SURGERY, 8158
  - THERAPY, 8156, 8157, 8158

VASOACTIVE INTESTINAL PEPTIDE
- SEE HORMONES, GASTROINTESTINAL

VASODILATOR AGENTS
- INTESTINE, LARGE
  - ELECTROPHYSIOLOGY, 7951
  - MOTILITY, 7949, 7951
- STOMACH
  - MOTILITY, 7949

VASOPRESSIN
- LIVER
  - CIRCULATION, 8006*

VEINS
- BILE DUCTS
  - ANOMALY, 8440
- EMBOLIZATION
  - TECHNIQUES, 8402*
- ESOPHAGUS
  - EMBOLIZATION, 8402*
- HYPERTENSION, PORTAL
  - EMBOLIZATION, 8402*
- LIVER CIRRHOSIS
  - EMBOLIZATION, 8402*
- STOMACH
  - EMBOLIZATION, 8402*

VILLI
- INTESTINE, SMALL
  - ATROPHY, 8099*
- MALABSORPTION SYNDROMES
  - INTESTINE, SMALL, 8226*

VIRUS DISEASES
- DISEASES ASSOCIATED WITH
  - GASTROENTERITIS, 8481
- GASTROENTERITIS
  - CHILD, 8455*
  - INFANT, 8460
  - SEASONAL FACTORS, 8455*

VIRUSES
- GASTROENTERITIS, 8456*
- HEPATITIS, INFECTIOUS
  - ANTIGENS, 8349*
  - IMMUNOLOGY, 8349*

VITAMIN B1
- LIVER INJURY
  - THERAPY, 8295*

VITAMIN B12
- ANEMIA
  - DEFICIENCY, 8482
- CYSTIC FIBROSIS
  - ABSORPTION, 8268*

VITAMIN E
- LIVER
  - DYSTROPHY, 8078

VITAMINS
- LIVER
  - REGENERATION, 8079
- LIVER INJURY
  - COENZYMES, 8295*
  - THERAPY, 8295*

VOLVULUS
- SEE INTESTINAL OBSTRUCTION

- VOMITING
  - ANTIEMETICS
    - REVIEW, 8479
  - DRUG THERAPY
    - REVIEW, 8479
  - ETIOLOGY
    - REVIEW, 8479
- WATER
  - INTESTINE, SMALL
    - SURFACTANTS, 8086*
    - TRANSPORT, 8086*
  - INTESTINES
    - TRANSPORT, 7921*
  - LIVER CIRRHOSIS
    - ABSORPTION, 8044*
  - TRANSPORT
    - DRUG EFFECTS ON, 7921*
    - SALMONELLOSIS, 7921*
- WHIPPLE'S DISEASE
  - SEE LIPODYSTROPHY, INTESTINAL
- WILSON'S DISEASE
  - AMINO ACIDS
    - LIVER FUNCTION TESTS, 8314
    - METABOLISM, 8314
  - HEMOLYSIS
    - GLUTATHIONE, 8304*
  - LIVER CIRRHOSIS
    - REVIEW, 8397*
  - PREGNANCY
    - REVIEW, 8305*
- WOUNDS AND INJURIES
  - COLON
    - HEALING, 8122
  - LIVER
    - PRESSURE STUDY, 7943
- YERSINIA
  - CECUM
    - PSEUDOTUMORS, 8223
  - COMPLICATIONS
    - ARTHRITIS, 8201
  - DIAGNOSIS, 8476
  - DIARRHEA
    - CHILD, 8202
    - COMPLICATIONS, 8201
    - DISEASES ASSOCIATED WITH, 8202
  - DISEASES ASSOCIATED WITH
    - ANEMIA, 8202
    - PSEUDOTUMORS, 8202
  - GASTROENTERITIS
    - ETIOLOGY, 8203
  - GASTROINTESTINAL SYSTEM
    - BACTERIAL INFECTIONS, 8203
  - HEPATITIS
    - ETIOLOGY, 8203
  - HYPERTHERMIA, 8476
  - ILEUM
    - PSEUDOTUMORS, 8223
- ZIEVE'S SYNDROME
  - ERYTHROCYTES
    - MEMBRANES, 8390*
    - METABOLISM, 8390*
- ZINC
  - CLEARANCE STUDY, 8134
  - INTESTINE, SMALL
    - ACRODERMATITIS, 8225*
  - LIVER, 8134
  - LIVER INJURY
    - SALMONELLOSIS, 8040*
  - PANCREAS, 8134

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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ADLAND, E.
7963*
AGENAES, O.
2450*
ARBAKKE, J.
2071
ARON, W.S.
8434*
ASE, S.
3199*, 6262*
BADI, P.
6309*
BADI, S.
4408
BANDOWITZ, H.M.
6680*
BASOV, I.T.
5532
BASTADO, M.
88
ABBA, B.C.
6324*
ABBONDATI, G.
2808, 4083
ABBOTT, G.
2168*
ABBOTT, G.F.
5659
ABBOTT, J.
2371*
ABDEL-HAFEZ, S.K.
5506
ABDEL-RAHMAN, M.S.
6793
ABDI, W.
2872*
ABDULLAEV, A.K.
6422*
ABDUZHABBAROV, A.
6231
ABE, H.
1228, 6147, 7093*
ABE, K.
4246*
ABE, M.
4634*
ABE, P.M.
2648
ABE, T.
329, 3877
ABECASSIS, J.
3381
ABELEDO, G.
8352*
ABERG, C.
4450
ABERNATHY, C.O.
7996*, 8039*
ABESADZE, A.I.
3763*
ABIODUN, P.
7900
ABIOYE, A.A.
2662
ABLAEVA, T.D.
3484, 8414
ABO-RAHMY, E.
4888
ABOLIMOV, E.V.
6004*
ABOUL-ENEIN, A.
841
ABOUNA, G.M.
2051, 4666
ABOURACHID, H.
4475*
ABRAHAM, R.
3024, 6023
ABRAHAM, S.
3785, 5477*, 7458
ABRAHAMSOHN, C.
7821
ABRAHAMSSON, H.
2767, 3635*
ABRAMS, B.
5669
ABRAMS, J.
6088*
ABRAMS, J.S.
3070
ABRAMS, M.A.
2906
ABRAMSKY, O.
7763
ABRAMSON, J.
1736
ABRAMSON, R.
1810
ABRAMZON, M.A.
4250*
ABREU, F.B.
1666
ABREU, W.N.
1709*
ABRUNHOSA, R.
8164*
ABSHAGEN, U.
7752*
ABSOOD, S.
5900
ABSTON, S.
5229
ABUCEWICZ, A.
532
ABUL-KHAIR, M.H.
2402
ACAR, J.F.
3238
ACCARY, J.P.
1146, 4827, 5941*
ACCATINO, L.
2909
ACERO, D.
3436
ACHOUR, H.
3543
ACKERMAN, D.M.
2903
ACKERMAN, L.V.
2632
ACKERMAN, N.B.
1565
ACKERMANN, E.
8310
ACOSTA, J.M.
3344*
ACTIS, G.C.
3410, 7775
ADACHI, J.
6177
ADACHI, Y.
2908
ADAIR, L.
95
ADAM, A.
5041*
ADAMEK, J.
3961
ADAMI-LAMI CONTI, C.
4511
ADAMO, S.
2438
ADAMS, A.
4935*
ADAMS, C.W.M.
2225
ADAMS, E.B.
5240*, 5241*
ADAMS, M.B.
2401
ADAMS, P.X.
1624
ADAMS, T.W.
1585
ADAMSKA-DYNIEWSKA, H.
3154, 3212
ADAMSONS, R.J.
6200*
ADATIA, A.
597
ADDISON, N.V.
3943*, 6575*
ADELSTEIN, E.
878
ADELSTEIN, P.
3146*
ADIBI, S.A.
895, 1089, 2315*, 3828*, 5116, 6008
ADIGAMOV, L.F.
7989
ADJAROV, D.
225
ADJEPON-YAMOAH, K.K.
601, 7084*
ADKINS, B.
5361*
ADKINS, J.C.
1431
ADLER, G.
2420, 2841
ADLER, M.
989, 2836*, 2844
ADLER, R.
7145*
ADLER, R.D.
2677*, 5419*
ADLOFF, M.
520*, 5033*, 8269
ADLUNG, J.
4000
ADMIRAND, W.H.
1006*, 5704*

ADRIAN, T.E.
1927*, 1928*
ADRIANOV, N.V.
6839
ADSON, M.A.
1437
ADU-GYAMFI, Y.
600
AEBERHARD, P.
1148, 2765, 5320*, 5324*
AFANAS'EV, S.S.
8414
AFANAS'EVA, K.A.
3484, 8414
AFANASIEV, S.S.
3484
AFANASIEV, S.V.
3213
AFARI, G.
6034
AFIFI, F.
1070, 3794, 3814, 4647
AFONINA, I.P.
8059
AFTANDILIAN, E.E.
1480
AGAFONOV, A.A.
3723
AGAMOV, A.G.
269
AGARD, D.
5232
AGARWAL, M.K.
139, 2951, 6123
AGARWAL, S.K.
2663, 5934*, 7158
AGBATHA, A.
5775
AGENANT, D.
6312*
AGER, P.J.
5712*
AGGARWAL, K.N.
2649
AGGER, P.
5231
AGGETT, P.J.A.
4218
AGNERAY, J.
1100
AGNESE, G.
582
AGNEW, J.E.
3976, 4212*
AGORASTOS, J.
2586
AGOSTINI, C.
7806*
AGRAWAL, A.
4388*
AGUILA GONZALES, A.
768
AGUILAR GUERRERO, J.
1705
AGUILAR REQUENA, E.
8313
AGUZZI, P.
267
AGZAMOV, M.A.
1404
AHLMAN, H.
7513*
AHLQVIST, J.
7803*
AHLSTEDT, S.
8100*
AHMAD, M.
6514*
AHMED, M.A.
5964
AHMED, N.
1408, 1409
AHMED, S.H.
839
AHN, B.T.
198
AHONEN, J.
3895
AHREN, C.
3318*, 3877
AIAZZI, L.
8317
AIBARA, S.
7342*
AIKAWA, K.
4636
AILHAUD, G.
4680*, 6817*
AIMINO, R.
3969
AINSWORTH, T.E.
7159
AIRALL, A.A.
1783
AISMAN, R.I.
135
AITKAZIN, A.
4051
AITKENHEAD, A.R.
5490
AIUCHI, M.
7469
AIZAWA, I.
3648
AIZAWA, Y.
163
AJDUKIEWICZ, A.
6977*
AKAHANE, Y.
3369*
AKAO, M.
7516
AKASAKA, Y.
280, 2165*, 3115, 5528
AKASHI, M.
7850
AKBAR, A.M.
5372
AKCAL, T.
6203
AKDAMAR, K.
6335*
AKEDO, H.
5179*
AKERLUND, A.S.
8100*
AKESSON, B.
3780
AKHMADZHANOV, U.
4780
AKHMEDOVA, S.N.
3989
AKHMETKALIEV, S.G.
6110
AKHTAR, M.
6944
AKIBA, H.
6370
AKIMOTO, R.
4171, 8235*
AKIMOV, N.P.
4095
AKINHANMI, G.A.
5577
AKISATO, K.
3242
AKIYAMA, H.
1275
AKIYAMA, T.
5587*
AKOVBIANTZ, A.
7556
AKPO, C.
435
AKWARI, O.E.
55
AL-ABADI, H.
4488*
AL-DEWACHI, H.S.
7500*
AL-DUBONI, H.M.
6634
AL'TSHULER, B.A.
6924
ALAAMA, A.
5859*
ALAGILLE, D.
581, 2565, 8286*
ALAKJIJALA, P.
8033*
ALAM, A.N.
3366*, 4345
ALAM, B.S.
6720
ALAM, M.
1400
ALAM, M.N.
511
ALAM, S.Q.
6720
ALARCON-SEGOVIA, D.
2224*
ALARIF, A.
1108
ALAJSA, K.O.
649
ALAVI, A.
6392, 6959
ALAVI, S.M.
7350*
ALAZRAKI, N.
1101, 1475
ALBANO, J.
115, 996, 1868

LBANO, O.
5927*
LBARET, P.
7079*
LBERDI FRIAS, J.M.
4375
LBERS, J.J.
3856
LBERT, J.
6982*
LBERT, M.J.
7871
LBERT, W.
3716
LBERTI, A.
685, 1024, 4309*
LBERTI, E.M.
544*
LBERTI, K.G.M.M.
8335
LBINUS, M.
7375*
LBCT, G.
4255*
ALBCU, J.C.
7075*, 7199*
ALBREY, M.
4392*
ALBREY, M.B.
791
ALBUQUERQUE, F.J.M.
1715
ALDEN, J.F.
5693
ALDER, M.
983*
ALDERSHVILE, J.
3441, 3452*
ALDINI, R.
1607, 2549, 4670
ALDOR, T.
1498
ALDRETE, J.A.
1469
ALDRETE, J.S.
1502, 5678
ALEKSANDRIAN, D.V.
149
ALEKSANDROV, N.N.
3082
ALEKSANDROVSKAYA, T.N.
8406
ALEKSEENKO, I.F.
757
ALEKSEEVA, M.E.
6627
ALEKSIC, N.
3361*
ALEMANY ONTIVEROS, J.R.
7976
ALEVIZAKI, C.C.
2605
ALEXANDER, J.L.
7834
ALEXANDER, M.
5846*
ALEXANDER, M.A.
6636
ALEXANDER-WILLIAMS, J.
1326, 1672, 2275, 2381, 2762, 3171, 4386, 4948, 4970, 5632, 7017, 7226
ALEXANDRE, J.L.
543*, 5056, 8394
ALEXIU, O.
2815
ALFANO, C.
1082
ALFASI, Z.
2719
ALFIDI, R.J.
1473, 2252, 5540, 6854*
ALFORD, B.A.
7024
ALGERI, S.
889
ALHADEFF, J.A.
133
ALHAVA, E.M.
5702*, 6254, 6988
ALI, M.
4401
ALI, M.A.M.
8482
ALI, M.V.
2708*
ALIABADI, P.
4194
ALIMOV, V.A.
1405
ALIMOVA, M.M.
621, 6163
ALLAM, A.A.
2493*
ALLAM, B.F.
5789*
ALLAN, B.J.
985, 2160
ALLAN, J.G.
2591*
ALLAN, R.
1486, 4974
ALLAN, R.N.
5979*
ALLAN, T.N.K.
2235
ALLEN, A.
107, 1752*
ALLEN, A.M.
6472*
ALLEN, B.R.
1662
ALLEN, J.
5809*
ALLEN, J.R.
1984, 2148
ALLEN, L.B.
1176, 5431*
ALLEN, R.E.
525
ALLEN, R.G.
6472*
ALLEN, S.D.
5718*
ALLEN, T.D.
7904*
ALLEN, W.
5745
ALLEN, W.D.
6818*
ALLGEN, L.G.
4874*, 5661
ALLGOWER, M.
6247, 8165*
ALLISON, M.J.
1304
ALMEIDA, J.D.
654, 7795, 7797, 8349*
ALNOR, P.C.
7622
ALONSO, J.R.
1391*, 4934*
ALONZO, A.
4888
ALP, M.H.
3190, 3340*, 5631
ALPATOVA, E.A.
754
ALPEROVICH, B.I.
752
ALPERS, D.H.
2064, 3842, 3855, 4682*
ALPERT, E.
2501, 7088*, 8334
ALPERT, L.I.
5039*
ALPERT, S.
5712*
ALPHIN, R.S.
2793*, 8105*
ALSABTI, E.A.K.
7131
ALSTON, W.C.
6405*
ALTER, H.J.
1521*, 8360*, 8362
ALTMAN, R.P.
807, 7088*
ALTMANN, H.W.
5906*
ALVARADO, F.
8088*
ALVARES, A.P.
586
ALVARES, O.
3596
ALVAREZ, B.
8023*
ALVAREZ CARRAZANA, L.
505
ALVAREZ, L.A.
2085
ALVEAR, D.T.
541
ALVES, P.A.A.
3333
ALVIRA, M.M.
1500
ALWASIAK, Z.
6103
AMACHER, D.E.
1108
AMADOR, M.
394, 395, 396, 397

AMARAL, L.
1740
AMARANTE, M., JR.
5781
AMATO, F.
1479
AMATRUDA, J.M.
6770*, 7637*
AMBERG, J.
2174*
AMBERG, J.R.
7544
AMBRE, J.
5846*
AMBROMOVAGE, A.M.
83
AMBROSIONI, G.
8314
AMBRUS, J.L.
7867
AMDRUP, E.
2802, 3638*, 5646, 6281, 6743
AMEMIYA, H.
5167*
AMENT, M.E.
1867, 1903, 2167*, 2169*, 2223*, 3042*, 3222*, 4122, 4553*, 4795*, 4801, 4866*, 5570, 5716*, 5766, 5786*, 6605, 8193*
AMERY, A.H.
6405*
AMIC, J.
6775*
AMICI, F.
236, 267
AMIDON, G.L.
5303
AMIRAK, I.D.
5719*
AMIRKHAN, A.D.
6209
AMIRKHANIAN, L.T.
149, 165
AMIRKHANIAN, O.M.
149, 165
AMIROV, N.S.
7975
AMLA, I.
706
AMMANN, R.
854, 4820, 4988*, 6887, 7073, 7727
AMMON, H.V.
28, 2087, 7317
AMMON, R.A.
4625*
AMOROS, J.P.
5833
AMOURETTI, M.
3230, 8393
AMOURY, R.A.
7015
AMSTER, R.L.
2923
AMTHOR, L.
3166
AMURE, B.O.
1906
ANABITARTE, M.
6116
ANACKER, H.
286, 3119, 5519*
ANAGNOSTOU, A.
8036*
ANAGNOSTOU, D.
4671
ANANA, A.
7489*
ANAND, B.S.
4917, 4918
ANANYEV, V.G.
6892
ANATOVSKAYA, V.S.
8342
ANBAR, M.
2210
ANCONA, E.
5585, 8161
ANCRI, D.
5547
ANDERSEN, D.
1824*, 3144*, 3214, 3541, 3992, 7581, 7610, 7619
ANDERSEN, F.L.
4457*
ANDERSEN, H.
1214
ANDERSEN, I.
8356*
ANDERSEN, J.R.
5231
ANDERSEN, K.J.
897, 1441*, 3835*, 4509*, 4510*
ANDERSEN, L.
3247
ANDERSEN, P.
707
ANDERSGAARD, H.
1194
ANDERSON, A.
524
ANDERSON, A.J.
4972
ANDERSON, C.M.
2166*, 2463*, 4903*, 6992
ANDERSON, H.M.
1185*
ANDERSON, J.
5775
ANDERSON, J.M.
557
ANDERSON, J.W.
191, 1095
ANDERSON, K.E.
586
ANDERSON, M.F.
52
ANDERSON, M.J., JR.
507
ANDERSON, R.
7899
ANDERSON-VISCNA, K.
4298*
ANDERSSON, A.
2567*, 2585, 7678
ANDERSSON, H.
2311*
ANDERSSON, S.
100, 1836, 5323*, 7364
ANDO, M.
7348*
ANDO, T.
603
ANDORSKY, M.
5191
ANDRADE, N.
6665
ANDRADE, Z.A.
1709*
ANDRE, C.
2531*, 3178, 4321*
ANDRE, F.
4321*
ANDRE, R.
2561
ANDREANA, A.
2041
ANDREASEN, P.B.
3365*, 5673, 5848*
ANDREEV, I.F.
4434
ANDREIMAN, L.A.
8060
ANDREIS, P.G.
3802
ANDREJAK, M.
4182
ANDREJEVIC, M.
3315
ANDRES, J.M.
7088*
ANDRES, R.
7815*
ANDREU KERN, F.
5084*, 5122*, 8318
ANDREUZZI, P.
618
ANDREWS, J.L., JR.
1271
ANDREWS, P.M.
2680*
ANDREWS, R.
6726*
ANDRIUTSA, K.A.
3435
ANEHA, Y.
6249
ANFOSSI, A.
1302
ANFOSSI, G.
7040, 8367
ANGELI, A.
3449, 5879*
ANGELINI, G.
289, 2221, 2438, 2439, 2850
ANGERVALL, L.
4804*, 4805*, 5612
ANGI, E.
6102
ANGORN, I.B.
359, 4033, 7132, 7574*

NIBAL, O.V.
8276
NICHINI, P.
6526*, 7178*
NNAPURNA, E.
8464
NNESE, C.
2121, 7356
NNIS, J.A.D.
7548
NNONI, G.
1053, 3380, 3808
NSALDI, N.
447
NSARI, A.
1329, 1622
NSARI, A.N.
3974
NSARI, M.S.
2703*
NSEL, H.J.
1572*
NSELINE, P.
5637
ANSELL, I.
1882*
ANSELM, K.
1191
ANSELMO, C.R.
4422
ANSFIELD, F.J.
2631
ANSFIELD, J.
2283*
ANSLEY, J.D.
6522*
ANTALIK, J.
3220*
ANTENER, I.
7866, 8314
ANTIMONII, R.G.
3510
ANTIPOV, V.F.
8322
ANTIRAS, J.
2201
ANTOINE, J.E.
1375
ANTONENKO, F.F.
6306, 6648
ANTONIN, K.H.
7848
ANTONIOLI, D.A.
4040*, 7606*
ANTONOV, D.V.
7975
ANTONOV, M.I.
164, 4381
ANTONOV, V.I.
6648
ANTONOVIC, R.
260, 1453*, 4038*
ANTONOVIC, V.M.
3078
ANTOSHKINA, E.P.
6576*
ANTROPOVA, G.V.
5999
ANTTILA, P.
2790*
ANURAS, S.
5176*, 5313*, 6441*
ANWER, M.S.
1007*
ANZINI, F.
4028, 4539
AOE, H.
6104
AONUMA, S.
6732
AOYAMA, Y.
8017*
APARISI-QUEREDA, L.
8401*
APICELLA, P.
5058
APLEY, J.
7881
APPEL, A.
219
APPEL, M.F.
3069
APPELMAN, H.D.
2871*
APPERT, H.E.
4235, 4588*
APPLETON, D.R.
6876*, 7500*
APPLEYARD, A.
7490*
APRAHAMIAN, M.
8269
APROSINA, Z.G.
6462*
APTEKAR, L.S.
4821
ARABI, Y.
4948, 4970
ARABLINSKY, V.M.
3989
ARAKAWA, K.
120*
ARAKAWA, M.
150, 1018*
ARAKI, E.
7097*
ARAKI, H.
7954
ARAKI, K.
7762
ARAMBULO, A.S.
3097
ARANDA TORRES, A.
5127*
ARAO, M.
3118
ARAUJO, F.G.
6790
ARBORELIUS
59
ARBORGH, B.
2888*
ARCALIS, L.
4736
ARCANGELI, A.
683
ARCELUS IMAZ, I.M.
8496
ARCHAMBAULT, A.
3511, 4785, 4786, 6884
ARCHAMPONG, E.Q.
2655
ARCHIMANDRITIS, A.
482, 6284
ARCURI, F.
670
ARCURI, P.
1546
ARDASHEVA, S.V.
8079
AREF, M.K.
2493*
AREIAS, E.
8398*
ARELLANO-BLANCO, J.
7893
ARENA, F.
664
AREND, Y.E.
4610*
ARENDSEN, D.
810
ARENDT, R.
8142
ARFAA, F.
840, 5250
ARHAN, P.
3224
ARIANOFF, A.A.
318, 6185
ARIANOFF, V.
318
ARIAS, B.
253
ARIAS, I.M.
2929
ARIEL, B.M.
1696
ARIMA, T.
5798*, 6525*, 7790*
ARIMIZU, N.
6538*
ARIMURA, K.
7528*
ARION, W.J.
2934
ARIPOV, U.A.
3150
ARISHIMA, T.
5020*
ARIYAMA, J.
6362*
ARMANDO DE AVILA, C.
5966
ARMATO, R.
3802
ARMATO, U.
3802
ARMELLINI, F.
2981, 3836, 8098
ARMITSTEAD, P.R.
6575*
ARMSTRONG-JAMES, M.
7320*

ARMSTRONG, R.N.
958
ARNAUD, J.P.
520*, 5033*, 8269
ARNDORFER, R.C.
5308*, 7335
ARNDT, H.C.
5328
ARNESJO, B.
981*, 1439*, 2423, 4222*,
4268
ARNFRED, T.
1579*
ARNHOLDT, H.
8091*
ARNMAN, R.
6556*
ARNODORFER, R.C.
4794*
ARNOLD, B.M.
1124
ARNOLD, G.
7943
ARNOLD, M.J.
5954
ARNOLD, R.
1338*, 2353, 2733*, 3696,
3719, 4578, 5559*, 7464
ARNOLD, W.
626, 1024, 3371*, 3439
ARNOLDT, K.H.
4823
ARNON, S.
1180*
ARNTHORSSON, G.
1235
ARNTZ, H.R.
1022*, 1160
ARON, E.
1531, 5114*
ARONDEL, J.
3517
ARONSEN, K.F.
8045*
ARONSON, A.R.
5625*
ARORA, K.L.
6654
ARORA, R.R.
5040*
ARROBIO, J.O.
5935*, 8456*, 8481
ARROYO, V.
698*, 715, 1213, 2558,
4809*, 6532*
ARROYO, V.A.
3416*
ARTEMOV, O.T.
6859, 8174
ARTEMYEVA, N.N.
8436
ARUIN, L.I.
367, 3924, 6843, 7599
ARVAN, D.
6047
ARVANITAKIS, C.
1184*, 1230, 4598, 4966*
ARZUL, C.
5653*
ASABA, G.
5566*
ASAFOV, G.B.
3236
ASAISHI, K.
6657
ASAKURA, H.
8264*
ASANO, E.
8235*
ASANO, K.
6792
ASANO, M.
6122, 6789
ASANO, T.
8102*
ASCH, L.
8201
ASCH, M.J.
4866*
ASCHER, N.V.
1823*
ASHCAVAI, M.
3360*
ASHCRAFT, K.W.
7015
ASHIDA, K.
8017*
ASHMORE, J.
2907
ASHNER, M.
8212
ASHRAF, I.M.
4381
ASHRAF, S.A.
1594
ASHWORTH, J.N.
8361
ASKENASI, R.
5184
ASLANOVA, N.R.
3545
ASNAES, S.
3139*, 6457*
ASPELING, R.L.
7030
ASPERGE, A.
3128
ASQUITH, P.
8263*
ASSAD, R.T.
1760, 4689
ASSADOURIAN, R.
3486
ASSAN, R.
3744
ASSOR, D.
7011
ASSOULINE, G.
5362*
AST, E.
2776
ASTE, H.
943
ATANASSOVA, E.
7938*
ATHANASOULIS, C.A.
1255, 6756*, 6874*, 7549
ATHERTON, S.T.
1485
ATKINS, G.L.
5338
ATKINS, H.L.
3974
ATKINSON, M.
3127*, 6198*, 6217, 8478
ATKINSON, P.
6517*
ATRYZEK, V.
6810
ATSAMENA, M.
3238
ATSEROVA, I.S.
1670
ATTA, W.
3212
ATTOCK, B.
7640
ATZPODIEN, W.
5869*
AUBERT, D.
8210
AUBERT, E.
5628
AUBRESPY, P.
5031*, 5032*
AUBRY, E.
5213
AUCLAIR, C.
3794, 3814, 4647
AUCLERC, G.
3388
AUDEBERT, M.
3268
AUDEN, R.R.
328
AUER, I.O.
3384
AUFRERE, J.
7339*
AUFSES, A.H., JR.
6067, 7670
AUKEE, S.
6254, 6263*
AUNE, S.
2447, 6226*
AUNG-THAN-BATU
886
AURES, D.
1877*, 1878*
AURICCHIO, S.
6953
AUROUSSEAU, R.
4103*, 5160*
AUSLANDER, M.O.
6458*
AUST, J.B.
5609, 7207*
AUSTERHOFF, A.
237
AUSTIN, E.
7109*
AUTH, D.C.
5478*
AUZERIE, J.
4366*, 7208*, 8214

AVAGNINA, P.
2446, 2775
AVDEI, L.V.
6557*
AVERY, G.S.
1345
AVGERINOS, A.
4671
AVIGAD, S.
4906*
AVIOLI, L.V.
2081, 5451
AVRAMENKO, V.S.
1696
AVRIL, M.
3080
AWAZU, S.
5500
AXELSSON, C.K.
6045, 7013
AXELSSON, H.
5991*
AXTMAYER, A.
197
AXTON, J.H.M.
1726
AYALA, E.
587
AYMARD, J.P.
3265
AYMES, C.
6320
AYNSLEY-GREEN, A.
6714*, 7108*
AYOOLA, E.A.
1572*
AYROSA-GALVAO, P.A.
5851*
AZAR, H.
5248
AZARNOFF, D.L.
2920, 7454
AZHIGALIEV, N.A.
7564
AZIMI, F.
7845
AZIZ, O.
2869*, 4706*
AZMY, A.
7014
AZNAR LOPEZ, J.
7976
AZOUZ, E.M.
4118
AZUMA, H.
1083
BAARS, H.G.
7617
BAART DE LA FAILLE-KUYPER,
E.H.4327
BABA, K.
2497*
BABA, S.
6744*
BABADZHANOVA, N.O.
8239
BABANDO, G.
3296, 4496
BABB, R.R.
2495*
BABCOCK, T.L.
1368
BABES, V.T.
7787*
BABITSKY, E.L.
6232
BABUT, J.M.
3231, 8198
BACARDI, R.
566, 2506, 3516
BACARINI, L.
7741*
BACCHELLA, T.
1482, 3333
BACH, A.
1066
BACH, H.
7791*
BACH, J.F.
5868*
BACHEV, I.I.
6908
BACHTIN, M.
2644
BACHJR, N.R.
5825*
BACK, A.
7159
BACK, C.
4684*
BACKMAN, L.
444, 4874*, 5661
BACON, B.F.
2701*
BACQUE, P.
5183
BADBURNE, A.F.
4781
BADDELEY, H.
1225
BADER, J.P.
89, 3662*, 5757*, 8488
BADER, O.
364, 741, 6936
BADIAL-ACEVES, F.
1827*, 5307*
BADOR, H.
8350*
BADRINAS, F.
5068*
BAEHNER, R.L.
7770
BAELE, G.
6524*
BAENKLER, H.W.
4069*, 6420*
BAER, G.M.
8349*
BAER, H.
2367
BAER, J.W.
1391*, 3470*, 4934*
BAERT, A.
7083
BAERT, A.L.
4985, 6382
BAETEN, Y.
7737
BAETENS, D.
2684*
BAEZA, O.R.
1491
BAGCHI, D.K.
5934*
BAGDASAROV, G.A.
269
BAGGENSTOSS, A.H.
6536*
BAGGIO, E.
2981, 3836, 8098
BAGGIO, G.
7397*
BAGLEY, D.H.
4151*
BAGNALL, R.D.
7548
BAGNOLI, M.
4355*
BAGSHAW, M.A.
2630
BAHR, R.
3690, 8220
BAIDO, V.P.
6909
BAIER, R.
3245
BAILEY, A.J.
704
BAILEY, E.
1996, 7452
BAILEY, K.V.
7887
BAILEY, M.E.
2579*
BAILEY, R.J.
1261*, 2471, 2535, 3367*,
4037
BAILEY, R.W.
5769
BAINE, R.W.
6559*
BAIRD, I.M.
2588*, 5339
BAJAJ, S.C.
1871*, 2649
BAJTAI, G.
2524*
BAKALEINIK, M.
1590
BAKER, B.A.
4639
BAKER, D.A.
2172*, 4772, 6550*, 7125
BAKER, D.H.
1250
BAKER, H.
1019*
BAKER, J.P.
6139
BAKER, J.W., JR.
293*
BAKER, L.
7876

BAKER, L.H.
1393*
BAKER, L.W.
359
BAKER, P.
6996
BAKER, P.G.
1382, 4744*
BAKER, R.D.
213
BAKER, R.J.
5525, 7844
BAKER, S.
6635
BAKER, S.J.
5301, 6982*, 7871
BAKHDA, R.K.
7666
BAKHTIAR, L.
7657*
BAKKEN, A.F.
3406*, 5065
BAKKER, J.C.
3750*
BAKLANOVA, V.F.
3510
BAKLIEN, K.
852, 1730*, 3267, 8226*
BAKRAN, A.
4925*
BAKRAN, I.
5965
BAKSHI, S.
7667
BAKUEV, M.M.
6469*
BALABAUD, C.
126, 2925
BALAN, M.M.
6825
BALAN, N.N.
2968
BALAS, D.
1092, 2980, 3687
BALASCH, J.
884
BALASHOV, V.I.
7597
BALASSE-KETELBANT, P.
2368
BALAZS, M.
2524*
BALCELLS, A.
5889
BALDE, I.
425
BALCI, F.
3593
BALDWIN, R.C.
2671*
BALDWIN, R.W.
6800
BALDY-MCULINIER, M.
7182*
BALE, G.F.
6477*
BALFOUR, T.W.
7689
BALI, J.P.
2561, 3935*
BALIKIAN, J.P.
3277*, 3557*
BALINT, J.A.
5038*, 7926
BALIS, M.E.
188, 1423
BALISH, E.
2987*, 4193, 5466*
BALISTRERI, W.F.
4910*
BALL, C.
1548
BALL, C.R.
1135
BALL, S.A.
7476
BALLAN, K.
6204
BALLARD, F.J.
2030
BALLARD, J.
6288*
BALLESTA, A.
5889
BALLINGER, W.F., II
6225*
BALMES, J.L.
3935*
BALOGH, J.
410
BALSAMO, V.
669
BALTCH, A.L.
4388*
BALTHAZAR, E.J.
1556*, 1623, 2237*, 6244,
7129, 7690, 7691
BALZER, H.
3081
BALZER, K.
3904
BAMBA, T.
2989*, 6162
BAMBULE-DICK, J.
2969, 3728
BAN, A.
3929
BANDO, A.
2833*
BANDOMER, G.
3716
BANFIELD, W.J.
2020
BANG, F.B.
4672
BANISTER, A.
1684
BANK, S.
2265, 2266, 2429*, 3072,
4437, 4837*, 4987*, 5390*,
5636, 6146*, 7380
BANKOWSKI, E.
1164
BANTI, B.
7203*
BANWELL, J.G.
186
BANZ, H.
1359
BAO, O.
1205
BAPAT, R.D.
3717
BAR, H.P.
4527*
BARABAS, A.Z.
4666
BARABE, P.
3571
BARAJAS, L.
9
BARAK, A.J.
1019*, 2037, 7412*
BARANOVA, M.
1*
BARANOWICZ, B.
5729
BARANSKI, M.C.
3566
BARANY, F.R.
6379*
BARAONA, E.
1385, 7439*
BARATZ, M.
5679
BARBALATT, S.
7999*
BARBARA, L.
1607, 2549, 3059, 4899
BARBARINO, F.
3929
BARBARISI, A.
1128
BARBASON, H.
168, 3804
BARBATO, A.
8337*
BARBE, C.
7102*
BARBER, P.V.
798
BARBER, S.M.
8114
BARBERA, C.
447
BARBEZAT, G.
4437
BARBEZAT, G.O.
2106*, 4987*, 5390*, 7380
BARBI, G.L.
3380
BARBIER, B.
5918*
BARBIER, F.
274, 2186, 3089, 3390, 4436
6524*
BARBIER, J.P.
8197
BARBIER, P.
2368
BARBOLT, T.
6023
BARBOTTE, P.J.
3935*

BARCLAY, A.J.
6051
BARDFELD, P.A.
5537
BARDZIK, I.
8391
BARELL, V.
2377
BARFORD, A.V.
4913
BARGE, J.
4338*, 4955, 4956
BARGIGGIA, A.
334
BARGON, G.
2326
BARGUTINA, T.G.
6235
BARINSKY, I.F.
8380
BARISCH, J.
2332
BARKA, T.
5351
BARKER, A.N.
898
BARKER, D.J.P.
2576*
BARKER, J.D., JR.
6441*
BARKER, L.F.
2488*, 5083*, 5874*, 8362
BARLAAN, I.
441
BARLTROP, D.
1798, 2700*, 5192
BARNA, K.
2524*
BARNA, L.
476
BARNA, M.
792
BARNARDO, D.E.
6227*
BARNEO, L.
4172
BARNES, A.J.
1927*, 1928*
BARNES, F.
7224
BARNES, F.S.
5923*
BARNES, G.L.
3269
BARNES, H.V.
5256*
BARNES, L.D.
94
BARNES, P.J.
4446
BARNES, S.
3362*, 7520
BARNES, W.G.
7553
BARNETT, R.
1567
BARNETT, T.G.
916, 3642, 7320*
BARNETT, W.O.
1294
BARNHART, J.L.
2024, 2204, 2917, 3783
BARON, J.H.
1341*, 2291, 2784*, 2804, 3576*, 4854, 5618, 5633, 7959*
BARON, N.
6135
BARON, S.
420, 2372*
BARONE, J.
8036*
BARONI, L.
7148*
BARR, R.
594, 2248
BARR, R.G.
5556
BARRAGAN, L.M.
2684*
BARRATT, P.J.
1297
BARRAYA, L.
732
BARRERA, R.R.
3565
BARRERAS, R.F.
4794*, 5639
BARRETT, F.F.
7272
BARRETT, P.J.
2399, 6878*
BARROS D'SA, A.A.B.
3886, 3887
BARROS D'SA, A.A.J.
2784*, 2804
BARROWMAN, J.A.
328, 1946, 3017, 3603*
BARRY, R.E.
1358, 2332, 4900, 8192*
BARTEK, R.
3090
BARTEL, J.
6873
BARTELS, H.
7749*, 7959*, 8268*
BARTH, C.
6101
BARTH, H.
3194*
BARTH, M.
538, 1105
BARTIZAL, J.F.
508
BARTLETT COMA, A.
7976
BARTLETT, J.G.
1436, 7662*
BARTLETT, R.F.
307
BARTNIK, W.
7719
BARTOLMAS, H.
3166
BARTOLOMEO, R.S.
5727
BARTON, S.
5345
BARTRUM, R.J., JR.
3046*
BARTSCH, G.G.
121*
BARTSCH, U.
4303
BASAVARJ, S.
706
BASCH, P.F.
5970
BASE, W.
3966
BASHKIROVA, V.B.
6346
BASHKOV, I.A.
4064
BASINSKIKH, V.I.
3213
BASKARAN, G.
6662
BASKIN, W.N.
2269, 2324, 7905*
BASS, E.M.
3111, 3494*, 6410*
BASS, L.
257, 7385*
BASS, P.
876, 1817, 8086*
BASSALYK, L.S.
7972, 8418
BASSE-CATHALINAT, B.
1226, 6183
BASSET, J.Y.
5547
BASSETT, E.
5761*
BASSEWITZ, D.B.
5042*
BASSEY, O.O.
5563*, 5577
BASSI, N.
5584
BASSILY, S.
1674, 6644*
BASSO, N.
953*, 994, 4079
BASTIE, M.J.
3687, 4586*, 4587*
BASTL, C.
1790, 7271
BASTRUP-MADSEN, P.
3144*, 3541, 3992
BASU, T.K.
3790
BATAILLE, D.
5468*, 6820*
BATAILLE, R.
7697
BATCHELOR, J.R.
2535, 3398, 4314
BATEN'KOVA, I.V.
8205
BATES, M.
3223*
BATES, T.
2851

BATESON, M.C.
5921*
BATEY, R.G.
3619, 5459, 7824*
BATILLAS, J.
7864
BATKO, B.
8070
BATSAKIS, J.G.
2629, 7240, 7241, 7259, 8487
BATTEN, J.C.
2413*
BATTESTI, J.P.
589
BATTIFORA, H.
7631
BATTIN, J.
4366*, 7208*, 8214
BATTISTI-ARMATO, M.M.
3802
BATY, J.D.
4446
BAUCH, K.
5897*
BAUDET, B.
4075*, 6937, 6938
BAUDET, P.
7079*, 7089*
BAUDON, J.J.
6319
BAUCUIN, H.
987, 2842, 3734, 3739, 4599, 5389*
BAUER, C.
1505*
BAUER, C.H.
1997
BAUER, H.
390, 7364
BAUER, J.H.
2728
BAUER, J.J.
7023
BAUER, P.
962
BAUER, R.F.
1860, 7332
BAUERLE, H.
3041*
BAULIEUX, J.
5918*, 6188
BAULIN, N.A.
430, 6304
BAUM, S.
1255, 2433*, 6756*, 6959
BAUM, W.F.
5105*
BAUMEISTER, H.G.
5205
BAUMELOU, H.
7697
BAUMGARTEN, R.
5074*, 6184, 8203
BAUMGARTNER, R.
6158
BAUNSGAARD, P.
8297*
BAUR, H.
6007*
BAUST, G.
1163
BAUWENS, E.
732
BAWIN, R.R.
1999
BAWNIK, J.B.
2993*
BAX, N.
437
BAXTER, H.K.
6243
BAYER, P.M.
3038
BAYER, W.L.
8361
BAYEVER, E.
5912*
BAYLAN, M.
1078
BAYLESS, T.M.
439, 440, 1743, 4684*, 5256*, 7645
BAYLIS, S.M.
6246
BAYO, S.
1560
BAZHENOV, D.V.
3656
BAZIGOU, H.
7134
BAZZOCCHI, M.
7741*
BAZZOCCHI, R.
4888
BEACHLEY, M.C.
1627
BEAHRS, O.H.
1356, 1425
BEAL, J.M.
3503*, 7631
BEALL, A.C., JR.
591
BEAMAN, J.
6074*
BEAN, W.J.
7224
BEAN, W.M.
5923*
BEARD, T.C.
6656
BEATTIE, A.D.
633, 5008*
BEATTY, E.C., JR.
3482*
BEAU, A.
794
BEAUBERNARD, C.
6779*
BEAUDOIN, A.R.
7371*
BEAUDOIN, J.G.
592
BEAUDOIN, M.
1069, 2887*, 3495*
BEAUFILS, F.
8229
BEAUGE, F.
2052, 3927
BEAVEN, M.A.
7512*
BEAVER, M.
2876*
BECCARIA, A.
3568, 7072
BECCARIA, E.
7072
BECK, B.D.
1847
BECK, C.
1226, 6183
BECK, E.
7530*
BECK, E.R.
350
BECK, I.T.
30, 2220, 2255, 4132*, 7867
BECK, M.
30, 4132*
BECKER, C.
3166, 6189
BECKER, D.M.
7114*
BECKER, F.F.
2153
BECKER, H.D.
3169, 3719
BECKER, H.W.
3166, 6189
BECKER, K.
707, 2537*
BECKER, M.
6038*, 6985, 7379
BECKER, R.M.
4798
BECKER, S.V.
8115
BECKER, T.
1153
BECKER, V.
3303
BECKERS, J.
2580*
BECKWITH, J.B.
3095
BEDFORD, A.F.
7014, 7660*
BEDI, B.S.
1148, 2765, 5324*
BEDINE, M.S.
5986
BEEGLE, R.C.
4729
BEEHUIS, H.
4343
BEEKEN, W.L.
2673, 6673*
BEELER, G.W.
935
BEELEY, L.
5770
BEER, B.
7836
BEERS, P.C.
7481

BEESLEY, W.H.
2766
BEEVERS, D.G.
5898*
BEFRITZ, R.
2791*
BEGACHEV, V.B.
4381
BEGEKA, S.D.
3647
BEGENT, R.H.J.
7870
BEGON, F.
596
BEGUE, J.Y.
4471*
BEHAR, A.
7181*
BEHAR, J.
4519*, 4871*, 5357*
BEHER, W.T.
7394*, 7448*
BEIN, N.N.
6409*
BEKE, R.
2186, 3089
BEKKER, C.
246
BELAICHE, J.
3077, 3181, 6902, 6941*,
8437
BELAID, S.
3543
BELAIR, E.J.
5331
BELBER, J.P.
3328*, 4217
BELCHER, D.H.
3818
BELCHETZ, P.E.
5817*
BELDA POUJOULET, R.
8496
BELESLIN, D.B.
60, 2741*
BELFRAGE, P.
7805*
BELIN, R.P.
1196, 2613
BELL, C.E., JR.
3855
BELL, D.R.
4428
BELL, F.P.
3787, 6776*
BELL M.J.
5946
BELLAMY, G.
2907
BELLAMY, J.E.C.
2133
BELLAVIA, A.
4632*
BELLEMANN, P.
119*, 7992*
BELLEN, J.C.
5525
BELLIGOLI, A.M.
3836
BELLIN, A.
3512
BELLINI, C.A.
2707*
BELLOBUONO, A.
1053, 3380, 3808
BELLONI, M.
224
BELO, P.S.
2010
BELOHLAVEK, C.
952*, 1573*, 2860, 5386*,
5626*, 6746*
BELOKRINITSKY, C.V.
8406
BELONJE, B.
2599
BELOUSOV, A.S.
7587, 7596
BELOV, G.F.
4306
BELOV, I.N.
4196, 6223
BELOV, V.N.
6307
BELSEY, R.
5576, 6866
BELSITO, A.A.
4013
BELYAEVA, N.Y.
5999
BELYAEVSKAYA, L.A.
4143
BEN-BASSAT, M.
196
BEN BOUALI, A.
7079*, 7089*
BEN, R.A.
4891
BENACERAFF, R.
4956
BENACERRAF, R.
4155*
BENAROUS, J.J.
3547
BENDA, K.
8215
BENDER, A.E.
5499
BENDER-GOTZE, C.
7749*, 8268*
BENDER, M.D.
2392
BENDER, S.
2414*
BENEDETTI, A.
8021*
BENFIELD, J.R.
1358, 2332
BENGMARK, S.
2423, 8400*
BENGTSSON, E.
6669
BENGTSSON, S.
5465*
BENHAMOU, G.
4219*
BENHAMOU, J.P.
134, 1566, 2465*, 2533,
3489, 3920, 4776, 7115*,
7143, 8340*
BENHAMOU, M.
3906
BENICHOU, J.
3906
BENICHOUX, R.
2159, 3715
BENINI, L.
2439
BENJAMIN, D.
3095
BENJAMIN, I.S.
8035*
BENJAMIN, R.S.
5825*
BENNESS, G.T.
2023
BENNETT, A.
781, 5317*
BENNETT, E.J.
1296
BENNETT, J.R.
4036, 5565*, 6865
BENNETT, L.R.
4746*
BENNETT, P.N.
350, 3576*
BENNIKE, S.
2277
BENO, I.
6910
BENOIT, A.
3508*
BENOIT, R.
4142
BENOZIO, M.
6315
BENSEN, W.
8482
BENTATA, M.
4281
BENTLEY, P.G.
2195
BENTLEY, P.J.
5275*
BENTOLILA, A.
5738
BENUA, R.S.
6998*
BENYO, I.
5470*, 8107*
BENYO, Z.
8107*
BENZ, L.
1685, 8086*
BERANBAUM, S.L.
4442
BERANOVA, I.
2490*
BERARD, A.
3622, 3679
BERARD, C.W.
5036*
BERARDI, R.S.
2246

BERAUD, C.
3230, 8393
BERCI, G.
2205
BERCU, G.
8212
BERDNIKOFF, G.
2122
BERDON, W.E.
1250
BERDOV, B.A.
264, 3965
BERENGO, M.
7714
BERENGUER, J.
1723, 4352
BERENGUER LAPUERTA, J.
8439
BERENS, R.L.
1719
BERETI, I.
4084
BERETVAS, G.
6905
BEREZHNOY, V.I.
6298
BEREZOV, T.T.
4821
BERG, B.
7805*
BERG, C.E.
5628
BERG, G.
5513*
BERG, G.R.
6386
BERG, N.O.
6308*
BERG, P.A.
4292*, 4317, 4333*, 5100*,
5894
BERG, T.
8013*
BERGALLI, L.E.
5153*
BERGDAHL, L.
524, 2567*, 7678
BERGE, K.
5138*
BERGEGARDH, S.
956, 1892, 2285*, 3673*,
5369*, 5624*
BERGEN, W.G.
2010
BERGER, G.
4102*
BERGER, M.
4800, 8365
BERGER, O.
7046
BERGER, P.
3571
BERGER, S.
899
BERGER, S.R.
4350
BERGERON, A.
348
BERGERON, M.
1114, 6813*
BERGLINDH, T.
2785*
BERGMAN, D.
4148*
BERGMAN, F.
1052, 7437*, 8051
BERGMAN, G.E.
2254
BERGMAN, L.
843, 1744
BERGMANIS, I.A.
5893
BERGMANN, K.E.
7633*
BERGSETH, M.
8046
BERGSTROM, J.
6610
BERGSTROM, K.
2622
BERK, J.E.
2435, 7550
BERK, P.D.
1218, 1821, 5028*
BERK, R.N.
1785, 2024, 2204, 3911,
4977*, 5686, 7544, 8423*
BERKLEY, S.
1973*
BERKO, G.
7822
BERKOWITZ, J.M.
1970*, 5723*
BERLATZKY, Y.
6558*
BERLIN, L.B.
82
BERLYN, G.M.
2719
BERMAN, D.A.
7511*
BERMAN, D.T.
1110
BERMAN, H.
3083
BERMAN, M.
6828*
BERMUDEZ CAMPOS, R.
1705
BERMUDEZ, F.
6578*
BERNACKI, E.
728, 739, 762, 1618, 6750
BERNARD, A.
3587*, 4189
BERNARD, C.
3875
BERNARD, J.L.
4103*
BERNARDI, M.
2553, 3404, 3518
BERNAT, M.
737
BERNELLI-ZAZZERA, A.
124*
BERNER, J.
3284, 7712
BERNER, W.
887
BERNETT, G.
1668
BERNHARDT, H.
455
BERNIER, J.J.
22, 450, 3077, 3600*, 3948*,
4181, 4500*, 5174*, 5196,
6320, 6351*, 6902, 6941*
BERNOULLI, R.
7591
BERNSTEIN, A.D.
1374
BERNSTEIN, B.H.
6442*
BERNSTEIN, J.
3407*
BERNSTEIN, L.
3505*, 6135, 7281
BERNSTEIN, O.
6255
BERNSTEIN, R.A.
1633
BERNSTEIN, S.E.
3779
BERQUIST, K.R.
6481*
BERRIDGE, F.R.
3579*
BERRILL, W.T.
449, 4914
BERRY, E.M.
6467*, 7763
BERRY, L.J.
2658
BERSTAD, A.
2272, 2287*, 3671*, 5382,
7963*
BERSTAD, T.
7076*
BERTA, L.
3449, 5879*
BERTACCINI, G.
2778, 4534
BERTASH, V.I.
3893
BERTELOOT, A.
4
BERTERMANN, R.E.
1865
BERTHELOT, P.
5845
BERTHEZENE, M.
6901
BERTHEZENE, P.
3977
BERTHOLET, M.M.
452*
BERTHOUD, S.
1716
BERTI RIBOLI, E.
1302
BERTOLA, D.
7820
BERTOLOTTO, E.
77

ERTRAM, H.P.
6974
ERTRAM, P.
6477*
ERTRAND, E.
1347
BERTRAND, J.
3182, 4324*, 7275*
BERTRAND, P.
2313*, 2388
BERVAR, M.
7041
BESBEAS, S.
3628*
BESCAPE, F.
8341*
BESSARD, G.
4862
BESSER, G.M.
66
BESSESEN, A.
8011*
BESSETTE, G.
4786
BESSLER, H.
11
BESSON, J.
5468*
BESSOT, M.
7715, 8289*
BEST, J.C.
822
BESTERMAN, H.S.
1928*
BETTARELLO, A.
263, 770
BETTELHEIM, K.A.
6589*, 8454*
BETTELHEIM, R.
6852*
BETTILI, G.
8098
BETTINI, U.
1131
BETZ, E.H.
168
BETZLER, M.
2717
BEVAN, P.G.
7846
BEVANS, L.C.
1509*
BEVEN, E.G.
6956
BEYER, R.
4513
BEYERMAN, H.C.
7983*
BEYREISS, K.
2725
BEZAHLER, G.
7281
BEZPROZVANNYI, B.K.
6462*
BHAGWANDEEN, S.B.
2666
BHAMARIA, R.P.
777
BHANDARI, B.
838
BHANDARI, J.R.
3414*
BHARGAVA, K.P.
1921
BHARGAVA, S.
5040*
BHAT, P.
6982*, 7871
BHATHAL, P.S.
7779
BHATIA, M.
3397, 4770
BHATIA, M.L.
5040*
BHATNAGAR, O.P.
3008
BHATTACHARYA, S.K.
1528, 4329*
BHATTACHARYYA, S.
7158
BHINDEY, S.K.
779
BHOOLA, K.D.
115, 996, 1868
BHOOLA, R.L.
2602
BHOWN, M.
1909
BHUJWALA, R.A.
8484
BHUTA, V.
1591
BIAGI, F.
821, 835
BIANCA, T.
6932
BIANCANI, P.
4519*
BIANCHI, F.B.
5860*
BIANCHI, L.
5094, 6116, 7150*, 8355*
BIANCHI PORRO, G.
6593
BIANCHI, R.G.
951*, 4563*
BIANCHINI, G.
5905*
BIARESE, V.
3410, 7775
BIASCO, G.
3593
BIBERFELD, G.
5099*
BICK, R.L.
615
BICKNELL, E.J.
2822
BIDALLIER, M.
1048, 2896, 3903, 8046
BIDARD, J.M.
3649
BIDART, J.M.
2747, 3637*
BIDDAU, A.M.
744
BIDDLE, C.M.
5578
BIDDLECOM, W.G.
5328
BIDIKOV, V.
3487
BIEBUYCK, J.
1161
BIEBUYCK, J.F.
2892
BIECK, P.R.
5361*
BIEGER, W.
2835*, 2841, 7987*
BIELAWSKI, J.
2177*, 4982
BIELAWSKI, W.
5885
BIENVENU, J.
4750*
BIERRING, F.
1755*
BIERSACK, H.J.
5118*
BIERY, D.N.
6959
BIGARD, M.A.
2216, 3080, 3081, 4012,
4471*, 8513
BIGELOW, B.
5728
BIGER, Y.
8364
BIGGIO, G.
5381
BIGGS, J.C.
1286*
BIGO, A.
3296
BIGOT, J.M.
284, 1210
BIHRER, R.
854
BIJLEVELD, R.T.
6907
BIKHAZI, A.B.
7919*
BIKLE, D.D.
2079
BILAND, F.
2414*
BILBAO, M.K.
2581*, 3114
BILETSKII, S.V.
692, 8075
BILHEIMER, D.W.
1653
BILL, A.H.
5652*
BILL, K.
3328*
BILL, P.
3256*
BILLESDON, J.
8192*
BILLIAU, A.
2516

BILLING, B.H.
1988, 3362*, 5264*
BILLINGS, R.E.
2907
BILLON, M.C.
1987
BILTON, R.F.
4446
BINA, J.C.
6645*
BINDA, R.
4889, 7894
BINDER, H.J.
1790, 2593*, 3833*, 4645, 6015, 7271, 7837
BINDER, T.
4333*
BINDER, V.
4202*, 5768
BINDEWALD, H.
2717, 4006
BINDRICH, D.
3982
BINGEN, A.
3821, 6786
BINN, L.N.
228, 229
BINNIE, S.
8287*
BINSTADT, D.H.
6945
BINUS, R.
5076*
BIRAGHI, M.
5613
BIRCH, C.J.
8455*
BIRCHER, J.
2478, 2897, 3376*, 4451, 5003*
BIRD, R.G.
3430*
BIRD, T.D.
5215
BIRGER JENSEN, K.
6927
BIRKENMAYER, E.
4630*
BIRKETT, D.H.
37
BIRKMANN, L.
169
BIRNBACH, D.J.
6073*
BIRNBAUM, W.B.
6862*
BIRRELL, R.
6449*
BISCHOFF, F.
7474
BISHAI, F.R.
7785*
BISHOP, R.F.
785
BISMUTH, H.
2453*, 2560, 2563, 2565, 3402, 3483*, 3488, 3800, 3905, 5134, 8430*
BISMUTH, J.
6779*
BISMUTH, V.
4155*
BISORDI, W.
516, 1251, 5726
BISS, K.
7388*
BISSELL, D.M.
3796, 4611*, 6778*
BITAR, J.G.
3557*
BITAR, K.
7307*
BITAR, K.N.
1945
BITENBINDER, E.C.
6489
BITOUN, A.
3948*
BITTMAN, E.
4310*
BJERKESET, T.
5628, 6272
BJERREGAARD, B.
3139*
BJORK, J.T.
5896*
BJORKEN, C.
2888*
BJORN-RASMUSSEN, E.
6691*
BJORNEBOE, M.
3475*
BJORNTORP, P.
8303*
BLACHE, S.
8444
BLACK, B.L.
7288*
BLACK, J.
3126*
BLACK, J.B.
5995
BLACK, J.W.
381, 2293
BLACK, M.
2458*
BLACK, O.
3746
BLACKBURN, B.O.
4448
BLACKBURN, W.W.
774
BLACKETT, P.
3397
BLACKLOW, N.R.
1078, 5173*
BLACKSTONE, M.
6376
BLACKSTONE, M.O.
3050*, 5790*
BLACKWELL, C.F.
3143*
BLACKWELL, R.J.
3504*, 4456*
BLACKWELL, R.Q.
1792
BLAGOSLOVENSKY, G.S.
4307*
BLAGOVIDOV, O.F.
7071, 8443
BLAHOS, J.
950*
BLAIN, F.
3556
BLAIR, E.L.
3197*, 7375*
BLAIR, J.A.
2065
BLAISDELL, F.W.
7028
BLAKE, P.A.
4418, 4419, 4420
BLAKELY, R.W.
4875*
BLAKEY, T.M.
7058
BLANC, A.
546*
BLANC, D.
4956, 5045
BLANCHARD, J.
19
BLANCKAERT, N.
7135
BLANCO, E.
6658
BLANCO RABASSA, E.
438, 446, 451, 1381
BLAND, F.F., III
229
BLANQUET, P.
287, 1226, 6183
BLASCHKE, T.F.
8283*
BLASCHKE, U.
8142
BLASI, A.
2271, 4581, 7971
BLATTNER, W.A.
6617
BLAZHEVICH, N.V.
6839
BLAZOVICH, J.
3526*
BLEICHER, M.
7670
BLENDIS, L.
6323*
BLENDIS, L.M.
29, 1198, 3085, 8508*
BLENKINSOP, B.
1496
BLENKINSOPP, W.K.
5005*, 6399*, 8396*
BLERY, M.
4155*
BLEWITT, R.W.
7140*
BLIDDAL, J.
8476
BLIESENER, J.A.
5915*
BLIKKENDAAL-LIEFTINCK, L.F.
4607*

BLINKOV, I.L.
8406
BLITZER, B.L.
1218, 1821, 7808*
BLIZZARD, R.M.
4146
BLOCH, K.J.
6128*
BLOCH, P.
431, 1048, 4665, 4773, 7721
BLOCH, R.
1133
BLOCK, Y.E.
6436*
BLOEMENDAL, L.
2404
BLOMER, R.J.
288
BLOMHOFF, J.P.
624
BLOMSTRAND, R.
6078*
BLONDEL, P.
3350
BLONSKAYA, L.F.
6487
BLOOM, N.
6540*
BLOOM, S.M.
2171*, 5640
BLOOM, S.R.
66, 72, 201, 203, 398, 713,
1336*, 1927*, 1928*, 2735*,
2784*, 2804, 2860, 2984*,
4693, 4701*, 4858, 5197,
5272, 5273, 5274, 5386*,
6714*, 6746*
BLOOMBERG, T.
8466
BLOOMER, J.R.
1600, 3372*, 5820*
BLOOMFIELD, G.A.
8291*
BLOTMAN, F.
7697
BLOUIN, A.
2678*
BLOUSTEIN, P.A.
5053
BLOXAM, D.L.
157
BLUESTONE, R.
1281*
BLUM, A.L.
81, 2749, 4556*, 6253, 6904,
7340, 7560, 7561
BLUMBERG, A.
8230
BLUMBERG, B.S.
7784*
BLUMBERG, M.L.
2262
BLUMEL, G.
3902, 4764
BLUMENTHAL, S.G.
1638
BLUMGART, L.H.
1242, 2193, 4884, 6333*,
7462, 7475, 8035*
BLUMSOHN, D.
6276
BLYUGER, A.F.
3574, 4336*, 5928
BO, W.J.
2960*
BOBO, R.C.
5681
BOBOIS, J.P.
5562*
BOCCUZZI, G.
2446, 3449, 5879*
BOCHENEK, W.J.
380, 7927
BOCHIS, R.J.
5959
BOCHKOVA, L.M.
7801
BOCINA, B.
656
BOCK, G.
799
BOCK, O.A.A.
4847
BOCKAERT, J.
4177
BOCKEL, R.
3381
BOCKHORN, H.
3911
BOCKMAN, D.E.
3746, 7514*
BOCQUET, L.
6972
BODANSKY, O.
775
BODANSZKY, M.
998, 1945
BODDAERT, A.
5657*
BODE, C.
3910
BODE, J.C.
3122, 3910, 3982, 3999,
5087*
BODEN, G.
982*, 1842, 7372*, 7390*
BODENFORFER, T.
3522*
BODGAN, A.T.
6102
BODILY, K.
1312
BODNAR, G.V.
8176
BODNER, E.
1452
BODROGI, L.
6527*
BODROGI, T.
1365
BOECKL, O.
2748
BOEDEKER, E.C.
2550
BOERGER, H.W.
3719
BOERS, W.
4280
BOESBY, S.
914*, 4550*, 6210, 6863*,
7358, 8146*
BOGACH, P.G.
127
BOGACHIK, N.A.
4444
BOGATYUK, O.R.
6237
BOGDAL, J.
6402*
BOGDANIKOWA, B.
8243
BOGDANOVICH, N.E.
6426
BOGER, A.
2692
BOGIN, Y.N.
2208
BOGNEL, J.C.
3948*
BOGOCH, A.
2356
BOGOLIUBOV, V.M.
324, 678
BOGOMOLETZ, W.V.
1301, 4459*, 6227*
BOHANE, T.D.
8225*
BOHM, N.
171
BOHMANN, T.
5383
BOHMER, R.
177
BOIKO, N.S.
85, 7977
BOILEAU, J.
5987
BOISELLE, J.C.
2805
BOISNARD, M.
134
BOISOT, B.
3239
BOISSEAU, C.
8393
BOISSEAU, M.
4190
BOISSON, J.
4147*
BOISVERT, F.
7157*
BOITNOTT, J.K.
4697, 5069*, 7637*
BOITSOVA, L.F.
243, 3234
BOIVIEUX, J.F.
2955, 5422*
BOIX-OCHOA, J.
4026
BOJANOWICZ, K.
724, 3284, 7586, 7712, 7793
BOJAR, H.
3904
BOJKOV, S.
1998

BOJOVIC, S.
3315
BOKA, V.A.
8275
BOLAND, J.
643*
BOLANOS, O.
4114
BOLARINWA, Y.
1906
BOLE, P.V.
3218*
BOLENDER, R.P.
2678*
BOLEY, S.J.
4935*, 5537
BOLGOV, D.F.
6584
BOLIN, T.D.
5508, 7854*
BOLKENIUS, M.
7611
BOLLAERT, A.
161, 5129*, 6182
BOLME, P.
2641, 7636*
BOLONDI, L.
1231, 3330, 5529
BOLOTOVA, M.A.
5928
BOLSEN, K.
8025*
BOLT, R.J.
1006*
BOLTON, J.E.
1791, 1803, 2078, 7303*
BOLTON, P.M.
8105*
BOLTON, W.K.
6421*
BOLUFER, J.
27
BOLZANO, K.
7623
BOMBECK, C.T.
2619, 2838*, 2853, 7350*,
7521
BOMFORD, A.
1477, 3398, 4037
BONABA, R.
1445*
BONAKDARPOUR, A.
193*, 2990*
BOND, J.H.
1120, 2124, 4743*
BONDAR, G.F.
1156, 5238
BONDAR, Z.A.
4332*, 6195
BONDARENKO, N.M.
4378, 8071
BONDARENKO, P.G.
6892
BONDARENKO, V.V.
6624
BONDEUX, D.
502
BONDI, J.L.
3221*
BONE, G.
3071, 6876*
BONE, J.
3638*, 7322*
BONFIGLIO, S.
6932
BONFIGLIOLI, G.
8314
BONFILIO, A.C.
6739
BONFILS, S.
88, 1911, 2595, 3581, 3583,
3674*, 3705, 3938*, 4967*,
5757*, 5941*, 8495
BONG, A.W.
8196
BONINO, F.
631, 2517, 5104*, 7156*
BONJOUR, J.P.
5347, 5498
BONK, G.M.
8149
BONKOWSKY, H.L.
2481*, 7811*
BONNEAU, H.P.
3736
BONNEFIS, M.J.
4679*
BONNEL, F.
3940*, 6192
BONNET-EYMARD, J.
4226, 4288*, 4862, 5098
BONNET, J.
3239
BONNEVIE, O.
2610, 4761
BONNEY, W.W.
5176*
BONNIN, A.
5011*
BONOLLO, L.
889
BONOMI, U.
6840
BONORRIS, G.
2060*
BONORRIS, G.G.
2074, 2927, 3496*, 3778
BONTEMPS, R.
5537
BONTING, S.L.
990
BONVICINI, F.
3293, 3404, 3518, 4662,
4912, 6111
BOOK, L.S.
1384, 2066, 5564*
BOOKMAN, M.A.
1122, 3016, 5984
BOOKSTEIN, J.J.
3278*, 5579, 7734*
BOON, D.J.
4770
BOONE, D.J.
3460*
BOONYAPISIT, S.T.
1009*
BOOS, G.
5216
BOOTELLO, A.
4315
BOOTH, C.C.
6995
BOOYENS, J.
7345*
BOQUILLON, M.
7916*
BORALDI, F.
5838
BORCK, H.U.
4658
BORDALO, O.
1229, 2441, 4243, 7730
BORDAS, J.M.
1213, 2562
BORDEIANU, A.
4310*
BOREL, B.
4197
BOREL, G.A.
6111
BORELLA, L.E.
1886*
BORENS, M.
745, 766
BORG, R.
546*
BORGEAUD, J.
432
BORGESE, N.
865
BORGESKOV, S.
3061
BORGHI, L.
4335*
BORGSTROM
59
BORGSTROM, A.
7378
BORGSTROM, S.
7223
BORHANMANESH, F.
2395
BORIANI, F.
5260
BORIES-AZEAU, A.
4367*
BORIES, P.
7182*
BORISOVA, N.A.
141
BORJESSON, B.
8400*
BORKAR, B.
7315, 7333, 7334
BORKOWF, H.I.
5896*, 8403*
BORLAZA, G.S.
3933*
BORNER, J.W.
1823*
BOROJEVIC, R.
3561*, 5972, 6646*
BORON-KACZMARSKA, A.
5096

BORON, Z.
8244
BORONOW, R.C.
1354
BOROS, I.
4310*
BOROWSKY, S.A.
7439*
BORREBAEK, B.
146
BORSATTI, A.
2554
BORST-EILERS, E.
645
BORTHISTLE, B.K.
7318, 7902*
BORTOLOTTI, F.
685
BORTOLOTTI, M.
3632*
BORY, R.M.
2531*, 4354*
BOSANAC, P.R.
6916*
BOSC, F.
3094
BOSCH, J.
698*, 715, 2558, 4809*, 6532*
BOSCHAT, M.
4665
BOSE, S.
970
BOSELLO, O.
2981, 3836
BOSIO, G.
631, 5879*, 7148*
BOSL, F.
6285
BOSMAN, G.
5663
BOSS, J.H.
5348, 7518
BOSSAK, C.
2974
BOSSECKERT, H.
4053, 6883, 8172
BOSSUYT, M.
3257*
BOSWELL, C.
2586
BOSWELL, W.
2203
BOTERO, R.D.
828
BOTHA, J.B.C.
6146*
BOTHA, J.L.
6378*
BOTTGER, E.
8324
BOTTI, E.
392
BOTTICELLI, A.R.
4864
BOTTICHER, R.
3578*, 4995
BOUCHER, L.A.
7159
BOUCHEZ, P.
1347
BOUCHIER, I.A.D.
1619, 4484*, 5168*, 5921*, 7391*
BOUCLY, M.
8246
BOUGAS, S.
482
BOUGHTON, C.R.
5867*
BOUGNOUX, P.
6314
BOUHOURS, D.
3875
BOUHOURS, J.F.
7496*
BOUHROUM, A.
3238
BOULDING, E.T.
1644*
BOULETREAU, P.
4295*
BOULEZ, J.
5918*
BOULIS, M.N.
5683
BOULOS, P.B.
2382, 2669
BOUMA, M.E.
1060, 2945, 4654
BOUNOUS, G.
4713*
BOURASSA, D.
2069
BOURDAGES, R.
2255
BOURDEAUX, L.
7708
BOURDON, D.
1932, 4605, 5457
BOUREAU, M.
3231
BOUREL, M.
543*, 3395, 5056
BOURGEAUX, C.
3057
BOURGEON, R.
3922, 4609*
BOURGIE, J.
4786, 7196*
BOURGOIN, A.
4220*
BOURKE, J.B.
4230, 7689
BOURKE, M.A.
3251*
BOURNE, C.A.J.
1915
BOURNE, L.D.
2894
BOURNOVILLE, M.
4722, 6108
BOURRILLON, A.
8229
BOURRY, J.
1942, 2862, 3736, 4221*, 4229, 6752
BOUSQUET, O.
3076, 5123*
BOUTELIER, P.
8151, 8270
BOUTROS, M.I.R.
1917
BOUVY, P.
3314
BOUWMAN, D.
6366*
BOVE, K.
1501
BOVE, K.E.
3779
BOVE, P.
3333
BOVO, P.
289, 2439
BOWDEN, T.A., JR.
5601
BOWEN, B.K.
3699
BOWEN, J.C.
2125, 3006, 4569*
BOWER, R.H.
7961*
BOWERS, J.B.
2384
BOWES, K.L.
1830*, 5267
BOWIE, E.J.W.
2056
BOWIE, J.
3050*
BOWIE, M.D.
1683
BOWLING, M.C.
5036*
BOWRING, N.E.
1808
BOXALL, E.H.
5077*, 5090*
BOYD, N.D.
2051
BOYER, J.
653, 7089*
BOYER, J.L.
570, 1169, 1526, 2008, 5421*, 6091*
BOZYMSKI, E.M.
6703
BOZZETTI, F.
6600
BRACHTEL, D.
5088*, 5418*
BRACHTEL, E.
2047
BRACKEN, A.J.
7385*
BRACQ, H.
3231, 8198
BRADBURNE, A.F.
2516
BRADBURY, K.
7140*
BRADE, W.P.
5826*

BRADFIELD, J.W.B.
6399*
BRADFORD, N.M.
6760*
BRADLEY, D.W.
1538, 6481*, 6482*
BRADLEY, E.L., III
1447*, 7638*
BRADLEY, J.A.
4925*
BRADLEY, R.D.
5799*
BRADSHAW, J.J.
2915
BRADY, P.G.
2308
BRAECKEVELT, L.
423
BRAGANZA, J.M.
79*, 3337*
BRAGG, D.G.
8129
BRAGIN, V.P.
4307*
BRAHME, F.
846
BRAIDE, I.
3877
BRAIDMAN, I.P.
5817*
BRAILSKA, M.
8499
BRAILSKI, C.
6929, 8410
BRAIN, R.H.F.
2225
BRAKE, Z.K.
3574
BRAM, M.
4388*
BRAMIS, J.
2857, 6067
BRAMSTOM, B.
7768
BRAMSTON, B.
7191
BRANCH, R.A.
1468, 4664, 7091*
BRAND, K.
1043
BRAND, S.N.
3505*
BRANDALISE, N.A.
3163
BRANDAU, H.
8077
BRANDAU, R.
317
BRANDBORG, L.L.
5271, 7643, 7644, 7650, 7651, 7652, 7653, 7654, 7655, 7656
BRANDEN, C.I.
7405*
BRANDENBURG, J.H.
2631
BRANDES, J.W.
850
BRANDLI, H.
3086, 7560, 7561
BRANDS, W.
8324
BRANDSBORG, M.
2802, 3541, 3638*
BRANDSBORG, C.
2802, 3541, 3638*
BRANDSTATTER, G.
3113, 3200, 3346, 3947*, 4017, 4807*, 5772*, 6971
BRANDSTETTER, S.
4604
BRANDT, C.D.
5935*, 8456*, 8481
BRANDT, D.E.L.
7146*
BRANDT, G.
8159
BRANDT, I.K.
7855*
BRANDT, K.H.
2577*, 7831
BRANDT, L.
6308*, 7281
BRANDT, L.J.
3505*
BRANDT, R.B.
5201
BRANDTZAEG, P.
852, 1730*, 8226*
BRANGIER, J.
4147*
BRANN, L.
937
BRARD, E.
2729*
BRASH, A.R.
6354
BRASIL, L.
3831*
BRASIL, M. DC R.L.
2979
BRASITUS, T.A.
34, 5298
BRASLAWSKA, J.
528
BRASSEUR, D.
4752*
BRATLIE, A.
3267
BRATT, P.M.
7635*
BRATTIG, N.
4292*
BRATUS, V.D.
620, 749
BRAULT, B.
8315
BRAUN, A.
3381
BRAUN-FALCO, O.
4938
BRAUN, O.H.
7633*
BRAUN, P.
2122, 3231
BRAUNER, R.
8376
BRAUTBAR, N.
7181*
BRAVO, J.F.
7121
BRAY, G.A.
1358, 2332
BRAY, P.F.
5564*
BRAY PINHEIRO, J.
4686*
BRAY, R.S.
5239*, 7471
BRAZHNIKOVA, N.A.
752
BRECHER, G.A.
3878
BRECHT, G.
4473*
BRECKBILL, D.L.
807
BRECKENRIDGE, A.
2873*
BRECKENRIDGE, W.C.
192
BREEDVELD, P.H.
8502
BREEN, K.J.
4932*
BREGMAN, D.
6485*
BREIMAN, R.S.
7531*
BREIMER, D.D.
1172, 5088*, 6411*
BREINER, S.J.
7628
BREIT, A.
285
BREITSAMETER, J.
6138
BREITSOHL-MORK, C.
4317
BREMEN, J.
961, 1885*
BREMER, A.
3680
BREMER, H.J.
5042*, 7252
BREMNER, C.G.
3629*, 5581, 5599, 6867
BREMNER, C.J.
4030
BREMNER, I.
6805
BRENAC, B.
1947, 4587*
BRENNER, R.R.
1167
BRENNER, S.
3505*
BRENNINKMEIJER, F.J.
907
BRENNOM, W.
4797
BRENT, L.
1434

BRESLOW, J.L.
2867*
BRESNIHAN, E.
4925*
BRET, M.
6869
BRET, P.
1201
BRETHOLZ, A.
112, 1942, 7368*
BRETT, M.
2576*
BRETTE, R.
485, 2491*
BRETTEL, H.F.
219
BREUCHA, G.
2755, 3020, 3690
BREUER, H.
1072, 6024
BREWER, L.L.
5689
BREWSTER, D.
4650
BREZINSKI, D.R.
879
BRIANTIAS, M.J.
4290*
BRICHARD, J.M.
8394
BRIDGES, J.W.
119*, 1980
BRIDGES, R.M.
5677
BRIDGES, S.R.
191, 1095
BRIDGMAN, A.H.
2616
BRIEDIS, L.P.
4336*
BRIGANTE, V.
233
BRIGANTI, A.
3355
BRIGATI, D.J.
7891
BRIGGS, J.D.
6449*
BRIGGS, M.
7783*
BRIHAYE, C.
92
BRINKLEY, D.M.
7099*
BRINZEU, P.
4368*
BRISARD, M.
4609*
BRISBANE, J.
2481*
BRISEID, G.
6814*
BRISEID, K.
6814*
BRISOTTO, P.
7710
BRISOU, J.
4147*
BRISSOT, P.
543*, 3395
BRITA, G.
1082
BRITO, E.
6670
BRITSIS, F.A.
379
BRITTON, D.C.
3071, 6376*, 7055
BRITTON, K.E.
8057
BRIVIO-HUAGLAND, R.P.
1058
BRIXOVA, E.
2534
BRIZARD, M.
2757, 9922
BRIZON, J.
3182, 4828
BROADIE, T.
1141
BROBMANN, G.F.
3878, 4712*
BROCCHI, A.
7178*, 7575
BROCK-UTNE, J.G.
5327, 6051
BROCKLEHURST, J.C.
6603
BROCKMOLLER, S.
4238
BRODERSEN, M.
1150
BRODERSEN, R.
6764*
BRODEY, P.A.
2372*
BRODIE, M.J.
3669*, 6358*
BRODOV, L.E.
4447
BRODRIBB, A.J.M.
3279*
BRODRICK, J.W.
1959
BRODSKAYA, A.A.
4380
BRODSKY, R.E.
3558*
BROEKELSCHEN, P.H.
6506*
BROELSCH, C.E.
3904, 3911
BROGDEN, R.N.
1345
BROITMAN, S.A.
173*
BRON, B.A.
2749, 6253
BRONDEL, H.
4186
BRONNER, F.
2974
BROOCK, R.
3850
BROOKS, A.P.
7639
BROOKS, C.M.
6916*
BROOKS, F.
2595
BROOKS, F.P.
95, 1860, 7332
BROOKS, R.
4836*
BROOKS, R.G.
6202
BROOKS, S.
65
BROOME, J.D.
7877, 7891
BROOR, S.L.
2087, 7317
BROQUIST, H.P.
1995
BROSNAN, J.J.
6240
BROTVER, N.
5849
BROUGH, A.J.
3407*
BROUGHTON, A.C.
1849
BROUWER, A.
7418*
BROUWERS, H.P.
323
BROUX, R.
643*
BROWN, A.A.
3072
BROWN, A.L., II
5694
BROWN, A.R.
3855
BROWN, A.S.
5425*
BROWN, B.D.
7317
BROWN, B.E.
8267*
BROWN, B.H.
4129*
BROWN, C.H.
2113
BROWN, D.A.
5208
BROWN, D.R.
2002
BROWN, F.C.
1845, 1847
BROWN, G.A.
2131
BROWN, G.R.
5958
BROWN, J.
3610*, 6367*
BROWN, J.C.
1144, 2353
BROWN, J.N.
5049
BROWN, M.R.
2500
BROWN, M.S.
1653

BROWN, P.
5247
BROWN, R.A.
1902
BROWN, R.C.
4458*
BROWN, R.E.
1245
BROWN, R.S.
7853*
BROWN, T.
1501
BROWN, W.R.
1776*, 7318, 7902*
BROWNE, R.
4730
BROZIN, I.H.
6276
BRU, C.
1213, 2562
BRUCE, J.I.
5970
BRUCE, L.A.
922
BRUCE, R.G.
3870*, 4464
BRUCH, H.P.
2739*, 8510
BRUCKNER-KARDOSS, E.
2876*
BRUCKNER, W.
5319*
BRUEL, J.M.
725, 1209, 3940*, 3957,
3967, 4010, 6187, 6192
BRUERE-DAWSON, C.A.
4184
BRUETON, M.J.
2166*, 2463*
BRUGUERA, M.
1213, 3436
BRUHN, M.S.
2113, 6727*
BRUN, B.
7759
BRUN, R.
1719
BRUNA, J.
3090
BRUNELLE, R.L.
4535
BRUNELLO, F.
8367
BRUNETAUD, J.M.
1219
BRUNING, K.W.
3272*
BRUNNER, C.M.
6421*
BRUNNER, G.
276, 5131, 5132
BRUNNER, H.
248, 1076, 2321, 2468,
3272*, 4474*, 5070*, 7217*,
8145, 8511
BRUNNER, P.
6827
BRUNNER, S.
6165
BRUNO, R.
4546
BRUNOVA, E.
3090
BRUNS, M.E.H.
2081, 5451
BRUNSER, O.
7262
BRUNSWIG, D.
712
BRUNT, P.W.
8287*
BRUSCHI, G.
4336*
BRUSH, B.E.
3116
BRUUSGAARD, A.
607, 1652, 4878*, 5922*,
8425*
BRYAN, J.A.
1524, 1525, 3420*, 6485*
BRYAN, P.J.
5801*, 6267*, 7845
BRYANT, J.
2499*
BRYANT, M.G.
72, 201, 1927*
BRYER, J.V.
4033, 7132, 7345*
BRYK, D.
6292*
BRYLA, J.
6804
BRYSON, G.
7474
BUBEL, M.
7490*
BUBLYI, V.P.
3244
BUBRICK, M.P.
4115
BUCCI, T.J.
2079
BUCH ANDREASEN, P.
7144
BUCHAN, A.M.J.
203, 5272, 5273
BUCHANAN, G.R.
7133*
BUCHANAN, K.D.
2598, 2754, 3886, 3887,
4140, 5945
BUCHELER, E.
8490
BUCHENAU, D.
1172
BUCHER, N.L.R.
2883*
BUCHHOLZ, H.
5886
BUCHWALD, H.
2455*, 3219*, 5692
BUCKHOLTZ, T.W.
4698, 4708*
BUCKI, J.
3207
BUDAGOVSKAYA, V.N.
3174
BUDANOV, V.A.
4370*
BUDANTSEVA, S.I.
7979
BUDD, D.C.
5753, 7035
BUDILLON, G.
587, 1914, 2529
BUDINGER, T.F.
8134
BUEDING, E.
5496, 5970
BUERK, C.A.
6398*
BUERLET, J.
4102*
BUESS, H.
3527
BUFFE, D.
5012*
BUFFET, C.
677*, 3226, 3466, 4290*,
5891, 5925*, 8392
BUFFLE, P.
1716
BUFFONI, F.
7814*
BUFKOVA, D.
4313
BUGAJSKI, J.
6729*
BUGAT, R.
1877*
BUGNON, B.
355, 485, 2491*
BUHAC, I.
4388*, 7228
BUILDER, J.
6042*
BUINOV, B.B.
3213
BUIST, T.A.S.
6224*
BUIYNINA, L.M.
8442
BUKI, B.
2496*, 5081*
BUKKAVESA, S.
702
BULANOVA, G.K.
3542
BULASH, V.A.
7593
BULATKINA, F.G.
3422*, 4284*
BULGAKOV, S.A.
7598
BULIGESCO, L.
7090*
BULL, D.M.
1122, 3016, 4350, 5984
BULLEN, A.W.
4922
BULLEN, B.R.
5713*
BULLEN, J.J.
2646

BULLOCK, G.
3395, 6413*
BULLOCK, M.B.
5970
BULLON, A.
8173
BULCVSKAYA, L.N.
6623
BULTINCK, J.
245
BUMANOWSKI, W.
3035
BUNCE, H., III
5795*
BUNCOVA, M.
4659
BUNCSCHUH, V.
5319*
BUNDY, B.M.
1569
BUNGE, H.J.
1163
BUNIVA, G.
889
BUONANNC, G.
6497*
BUONO, G.
8308
BURANASIRI, S.
2433*
BURBIGE, E.J.
1743, 4217, 5604, 5986
BURCHARTH, F.
3047*, 5155*, 8425*
BURCHINSKII, G.I.
4087, 6269
BURCZYK, P.
4840
BURDICK, G.E.
519, 3066
BURDMAN, D.
4880*
BURDON, D.W.
1672, 4386, 4970, 7017
BURELLE, H.
4358*
BURES, Z.
3302
BURGER, J.
8135
BURGESS, L.W.
6019, 6020, 7922
BURGESS, M.A.
8452*
BURGESS, T.E.
4302
BURGIN-WOLFF, A.
2343*
BURGOS, G.
6316
BURHENNE, H.J.
523, 4873*, 6569*, 7544
BURICCHI, L.
6526*, 7575
BURK, R.F.
2053
BURKE, E.L.
313
BURKE, G.
5372
BURKE, G.T.
5351
BURKE, J.A.
2613, 6664
BURKE, M.
4276*
BURKE, M.D.
1980
BURKE, V.
6074*, 7911*
BURKHARDT, K.
4980
BURKITT, D.P.
456, 2636, 2637
BURKS, M.
1864, 4536
BURKS, T.F.
924, 1854, 1934, 5307*,
5312*, 5450
BURLEIGH, D.E.
5311*
BURLEV, V.A.
6500*
BURLINA, A.
4778
BURMISTROV, M.I.
4377
BURNAZYAN, R.A.
763
BURNETT, D.A.
2931, 4648
BURNETT, H.F.
4791*
BURNETT, W.
1608, 1617, 5919*, 6737,
7836
BURNS, T.W.
1850, 1851, 1855
BUROBIN, V.A.
5057
BUROKER, T.
7876
BUROMSKAYA, G.A.
6625
BURR, R.
1774*, 4613*, 6007*
BURRELL, M.
2346*, 4793*
BURRIDGE, M.J.
5243*, 8500*
BURRINGTON, J.D.
5372
BURROW, H.
7140*
BURROWES, C.
4717*
BURROWS, C.F.
1860
BURROWS, W.
223
BURSHTEIN, C.I.
6422*
BURSTON, D.
5281*, 7912*
BURTIN, P.
5006*
BURTON, W.C.
2015
BURWOOD, R.J.
7538
BURY, J.
643*
BURY, K.D.
3614, 5902*
BUS, J.S.
1986
BUSCHER, H.P.
1112
BUSCHMANN, C.
3384
BUSHKIN, F.L.
5572
BUSHKOVA, R.K.
6321
BUSING, M.
2831, 3721
BUSING, V.
3137
BUSSE, M.
5319*
BUSSER, L.
3246
BUSSIERE, C.
126
BUSSINK, G.P.
7464
BUSSOLATI, G.
10
BUSUTTIL, A.
4696
BUSUTTIL, R.W.
6287*, 7009
BUTCHER, F.R.
2940
BUTEL, J.
1219
BUTKE, H.
4980, 4996, 5551
BUTLER, C.
4724
BUTLER, D.G.
2962*
BUTLER, G.J.
2489*
BUTLER, M.L.
2180, 3336*
BUTLER, W.H.
6293*
BUTS, J.P.
8228
BUTT, J.
878, 2728, 4244, 6389
BUTT, K.
6200*
BUTTERFIELD, W.C.
1313
BUTTERWCRTH, C.E.
443
BUTTNER, W.
3307, 5897*
BUTUSSOVA, I.A.
44
BUTVIN, G.K.
3986

BUTZOW, G.H.
2537*
BUURMAN, R.
8490
BUXTON, A.E.
7272
BUYNAK, E.B.
6117
BUYNITZKY, S.J.
7477
BUYSSCHAERT, M.
4776, 5225
BUZERNESCU, G.
7787*
BUZY, P.
8202
BYBEE, D.E.
1845
BYCK, W.
1454*
BYERS, R.
8452*
BYNUM, T.E.
3325*
BYRNE, W.J.
1867, 1903, 4122, 4553*, 4866*, 5716*
BYRNES, D.J.
356*, 4834*
C. DELLA TORRE, M.C.
1720
CABRE FIOL, V.
4769
CABREJAS, M.
3605*
CACCIARELLI, A.A.
3158
CACHIN, M.
1246, 5181, 5395*
CADALBERT, M.
6903
CADRANEL, S.
4287*, 4755, 7789*
CADY, B.
5591*
CAENEN, P.
4263
CAETANO DA SILVA, L.
137
CAFIERO, F.
337
CAFIERO, M.
8308
CAGEN, S.Z.
1986
CAGNONI, M.
7575
CAHILL, P.T.
7997*
CAHLIN, E.
8425*
CAILLA, H.L.
2852
CAIN, J.R.
4114
CAJAL, N.
2815
CAJONE, F.
124*
CALABRESE, P.R.
5727
CALABRO, A.
2352
CALAME, A.
6437
CALANDRA, S.
1063, 4652
CALCAMUGGI, G.
8367
CALCATERRA, V.
3393
CALDER, J.F.
5913*
CALDERA, R.
4116
CALDEROLI, H.
6206
CALDERON, P.
3737
CALDWELL, J.H.
1872*, 1876*, 4590*, 5619, 6025, 8147*
CALDWELL, J.L.
629
CALENOFF, L.
301
CALETTI, G.C.
2218, 3330, 5529
CALHOUN, T.R.
6225*
CALI, R.
3134, 6935
CALISE, F.
5052
CALKINS, W.G.
2672*, 7553
CALLAHAN, M.F.
1797
CALLARD, P.
4023*
CALLISON, D.A.
1865, 4563*
CALNE, R.Y.
3391, 3909, 7117*, 8306*, 8307*
CALVO ZAPATA, M.
8245
CAMAIONI, D.
6126
CAMARRI, E.
4355*
CAMBIASO, C.L.
4183
CAMELOT, G.
5654*
CAMENISCH, R.
7085*
CAMERON, A.J.
1262*
CAMERON, D.J.S.
785
CAMERON, H.M.
6407*
CAMERON, J.L.
526*, 3502*, 4125, 4596*
CAMILLERI, J.P.
3727*, 7115*
CAMOUS, J.P.
3075
CAMPA, P.P.
2825, 2826
CAMPANELLI A.
5710*
CAMPBELL, C.B.
608, 635, 1533, 6445*
CAMPBELL, D.P.
1495
CAMPBELL, D.R.
4435
CAMPBELL, G.S.
4791*
CAMPBELL, I.W.
6224*
CAMPBELL, J.
2884*
CAMPBELL, J.B.
1182*
CAMPBELL, J.R.
4154*, 5464*, 7086*
CAMPBELL, N.
5431*
CAMPBELL, P.E.
6460*, 6486*
CAMPBELL, R.
2128, 4690
CAMPBELL, R.L.
7778
CAMPBELL, S.
2985*
CAMPBELL, T.C.
1271
CAMPELLI, A.
582
CAMPION, J.P.
4071*
CAMPIONE, O.
7589, 7613
CAMPO, C.
8173
CAMPOMANES GALLEGO, E.
4375
CAMPORA, J.L.
3513
CAMPOS, J.V.M.
8312
CAMPOS, R.
1720
CAMPRODON, R.
4736, 7692
CAMUS, D.
6645*
CAMUS, J.C.
4600
CANALI, M.
4335*
CANALS, J.
4026
CANARELLI, J.P.
1596
CANARY, J.J.
3101
CANDEL MONSERRATE, I.
5063*, 5064*, 5089*
CANDELARESI, M.T.
2587

CANESE, M.G.
5104*
CANGIANO, C.
3393
CANGOLLI, S.D.
2918
CANIVET, J.
332
CANLAS, N.
7155*
CANNER, P.
5138*
CANNING, E.
1946
CANNON, H.G.
6472*
CANO, J.F.
5889
CANO, J.M.
4747*
CANO, R.
357*, 1336*
CANOSA, C.A.
8352*
CANTALUPPI, G.
1493
CANTARELLI, I.
406, 6280
CANTERBURY, W.J.
8040*
CANTONI, L.
618
CANTOR, D.
1383
CANTOR, D.S.
1094
CANTY, T.G.
4426
CANZLER, H.
4258*
CAPEL, I.D.
8113
CAPELLE, M.
3241
CAPELLI, A.
3293
CAPERS, T.H.
7673
CAPIZZI, F.D.
4888
CAPOBINCO, A.G.
5774*
CAPOCACCIA, L.
3393
CAPONNETTO, A.
3121
CAPOTE ARMAS, L.F.
5091
CAPPEL, R.
4781, 7789*
CAPPELLI, G.
7575
CAPPELLINI, M.D.
3392, 8383*, 8433*
CAPRINI, J.A.
7840
CAPRIOLI, G.
8317
CAPRON, A.
5866*
CAPRON, C.W.
2200
CAPRON, J.P.
314*, 4027, 4475*, 7414*, 7908
CAPRON, M.
6645*
CAPURSO, L.
3514
CAPUSSOTI, R.
7049
CAQUET, R.
4062
CARABALLO GUIJARRO, R.
5084*
CARACHI, R.
4696
CARACTA, P.F.
6969
CARAMIA, F.
2680*
CARAWAY, C.T.
674
CARAYON, P.
5654*
CARAZZA, F.R.
8453*
CARBALLAL LUGRIS, M.
8195
CARBILLET, J.P.
5654*
CARBONE, P.P.
6360*
CARBONELL, F.
8379
CARCASSONNE, M.
5031*, 5032*
CARCHIETTI, E.
6930
CARDAMONE, A.O.
3840
CARDOEN, G.
423
CARDONA, G.
1131, 4898
CARDOSO, J.B.
747
CARDOSO, J.M.
6642*
CARDUS, J.C.
1258*
CARELLI, E.
5058
CARESANO, A.
4101*
CAREVIC, O.
6089*
CAREY, M.
1069
CAREY, M.C.
3772
CAREY, R.M.
2095
CAREY, W.D.
6136
CARGILL, J.M.
6915*
CARIDIS, D.T.
5454
CARL, W.R.
3748
CARLBERGER, G.
2791*
CARLI, C.
4208
CARLIER, Y.
6645*
CARLING, L.
2253
CARLISLE, V.F.
1976*
CARLSON, E.
2884*
CARLSON, G.M.
514, 1850, 1851, 1855, 3281*
CARLSON, G.P.
2038
CARLSON, G.R.
5331
CARLSON, H.C.
6289*
CARLSOO, B.
7256
CARLSSON, L.C.T.
217
CARLSTEDT-DUKE, B.
7389*
CARMICHAEL, H.A.
1485, 2141, 4564*
CARMINA, M.
664
CARNASCIALI, E.
8344
CARNEIRO CHAVES, F.J.Z.
5781
CARNES, W.
2246
CARNOT, F.
8197
CARNOVALE, R.L.
5558*
CAROLI, J.
1516*
CARPANETO, E.
7878
CARPENTER, M.
878
CARPENTIER, Y.
3680, 3688, 6040*
CARPENTIERI, U.
5795*
CARPIO, N.M.
2911, 3776
CARR, J.B.
1376
CARR, M.E.
4430
CARR, P.
2902
CARRASCO, D.
1723, 4352
CARRASQUER, G.
949*, 5375

CARRASQUER, J.
1723
CARRATU, A.
744
CARREA, G.
214
CARRELLA, M.
587
CARRERA, G.F.
2341
CARRIER, J.
7012
CARRIL, J.N.
5120*
CARRILHC, F.
6532*
CARRILHO, F.J.
4769
CARROLL, K.K.
3777
CARROLL, R.M.
5436
CARSEN, G.M.
1200
CARSKY, S.
3232
CARSON, E.R.
8399*
CARSON, J.L.
2538*, 3032
CARTER, D.C.
929, 974, 1882*, 2799, 3625*
CARTER, E.
305
CARTER, E.A.
5430*, 5907*
CARTER, J.
4797
CARTER, T.
2307
CARTEZZO, J.M.
1445*
CARTIER, F.
4071*
CARTONI, U.
1063
CARUBELLI, R.
4624*
CARULLI, N.
5838
CARUTHERS, S.B., JR.
4991*
CARVAJAL, C.
1534
CARY, B.A.
4161
CARYLE, D.R.
1460*
CASANOVA, A.
5621
CASARELLA, W.
1250
CASCINO, A.
3393
CASE, R.M.
7375*
CASELLATC, M.M.
214
CASHORE, W.J.
6435*
CASINI, A.F.
8021*
CASPARY, W.F.
2715, 5558*, 5703*, 7346*
CASSAN, P.
340, 4265, 7082, 8278
CASSIDY, C.E.
2014
CASTAGNA, J.
1574*
CASTAGNINI, A.
3637*
CASTAING, R.
4829
CASTANEDA, C.
6658
CASTANEDA GUILLOT, C.
438, 446, 451, 1381
CASTANHO, R.P.
1720
CASTELEYN, P.P.
1147
CASTELFRANCHI, P.L.
747
CASTELL, D.C.
928, 1829*, 1845, 1847, 2198, 2261, 2304, 2310, 4090, 4514*, 4521*, 4789*, 6708
CASTELLI, W.P.
7515*
CASTELLION, A.W.
1678
CASTELLO, G.
664
CASTELO, H.B.
7040
CASTLEDEN, W.M.
1592
CASTLES, T.R.
1044
CASTRESANA, M.
945
CASTRO, A.F.
1356
CASTRO-BELLO, F.
2425
CASTRO DEL OLMO, R.
8245
CASTRO, G.
6944
CASTRO, G.A.
1712, 1827*, 2829, 5246, 5251, 5307*, 5486
CASTRO, I.O.
5851*
CASTRO, J.E.
5633, 7465
CASTRO, M.
1097
CASTRUP, H.J.
2801, 4495, 8323
CATALANO, S.
947, 969, 1872*, 1876*, 4836*, 7885
CATALANO, F.
2271, 4581, 7971
CATALDI, L.
5843*
CATANIA, V.C.
6600
CATCHPOLE, B.N.
3145*
CATHCART, P.MCD.
5230
CATHCART, R.S.
5230
CATHELINEAU, L.
4905*
CATHLIN, C.
3538
CATITA, A.C.
239
CATTAN, D.
3077, 3181, 6902
CATTANI, F.
333
CATTERALL, R.D.
7783*
CAULET, T.
4255*, 7704
CAULIN, C.
4774
CAUSEY, J.Q.
483
CAUVET, G.
2561
CAVALIERE, F.
4888
CAVALLERO, M.
3356, 3532
CAVALLINI, G.
289, 2221, 2438, 2439, 2850
CAVANNA, A.
2446, 2775
CAVARZAN, A.
1017*
CAVELL, B.
6356
CAVETT, C.M.
1390*
CAVICCHI, A.
2257
CAWDERY, H.M.
7056
CAYEN, M.N.
6808
CEBECI, H.
6203
CECCHETTI, J.
1094
CECIO, A.
3923
CECUTTA, G.
3153
CEDERBAUM, A.I.
1036
CEDERMARK, B.J.
7667
CELANO, P.
5444*
CELENER, D.
7367*

CELESTIN, L.R.
1339*, 4405
CELINSKA, W.
6533*
CENDRON, J.
4153*
CENEVIVA, R.
747
CERALLI, F.
2407*, 5758*
CERDA, J.J.
788, 2335, 7923
CEREDIG, R.
2102*, 5881*
CERF, M.
3848, 4139, 4219*, 6940*,
6972, 8231
CERILLI, G.J.
5619
CERLETTI, C.
889
CERNAT, M.J.
2815
CERNY, E.
7800
CERSONSKY, J.
2909, 4655
CERVANTES, L.F.
6642*
CERVEN, J.
6910
CERVENKA, J.
1523*
CESARI, C.
3571
CESNIK, H.
4362*
CESTONARO, G.
8367
CEUPPENS, H.
5607
CH'IEN, L.T.
1328
CHA, C.J.
2333
CHA, Y.N.
2958, 4674
CHABAL, J.
5918*, 8253
CHABANON, R.
3285
CHABROLLE, J.P.
3229
CHACKO, A.K.
6406*
CHACKO, C.M.
7855*
CHADEYRON, P.A.
7215*
CHADHA, S.K.
7243
CHADWICK, V.S.
5276*, 5277*, 6070*, 7483*
CHAHINIAN, H.
2845
CHAIBI, A.
122*
CHAIMOFF, C.
5477*
CHAJEK, T.
5429*, 7763
CHAKRABORTY, J.
1980
CHAKRAVARTI, R.N.
4133*
CHALGANOV, A.I.
4264, 6423, 8441
CHALLA, V.R.
4815*
CHALLACOMBE, D.N.
6979*, 6956
CHALLIS, D.
4431
CHALUT, J.
4766, 7590, 8242
CHAMBAUT-GUERIN, A.M.
2999
CHAMBERS, R.A.
4141
CHAMONE, D.A.F.
1527
CHAMOUN, S.
8445
CHAMPAULT, G.
717, 4254*, 5181, 6697*,
8224, 8417
CHAMPION, H.R.
5237
CHAN, C.K.
7767
CHANCE, R.E.
4592*
CHANDERKAR, N.G.
777
CHANDLER, J.G.
3911
CHANDRA, R.K.
8484
CHANDRA, V.
2141, 4564*
CHANDRASOMA, P.T.
6668
CHANG, C.H.
3407*
CHANG, D.
1836, 5323*
CHANG, H.
1768*
CHANG, I.W.
4582
CHANG, L.
2876*
CHANG, L.K.
3666*, 4558*
CHANG, M.L.W.
2001
CHANG, N.
968, 3865*
CHANG, S.
5622
CHANG, T.H.
5605
CHANG, W.C.
6794
CHANG, W.W.L.
5346
CHANOCK, R.M.
5935*, 7863
CHANZY, M.
3906
CHAPLYGINA, G.V.
5092
CHAPMAN, D.
33, 3607*
CHAPMAN, L.
2507
CHAPMAN, R.S.
3319*
CHAPOY, P.
1499
CHAPUIS, Y.
5181, 8224
CHAPUT, J.C.
3226, 3466, 4290*, 5925*
CHARBONNIER, A.
1246, 5395*
CHARD, C.R.
1656
CHARI, V.R.
4329*
CHARIOT, J.
1957, 3727*, 3742, 5391*,
6095, 7940*
CHARLESWORTH, J.A.
5867*
CHARNEY, A.N.
1091
CHARNOCK, F.M.L.
5737
CHAROUSEK, J.
1181*
CHARTERS, A.C.
3911
CHARTIER, P.
427
CHARTRAND, L.
1483, 7750*
CHARUZI, I.
391, 463, 6558*
CHASE, H.S., JR.
5787*
CHASE, R.A.
575, 676, 2552, 5027*,
5816*
CHATAL, J.F.
5557*, 5588*
CHATELIN, C.L.
3513
CHATTERJEE, A.
5934*
CHATTERJEE, D.K.
6127
CHATTOPADHYAY, C.K.
4537, 4538
CHATTRAND, L.
2583
CHAUDHRY, A.
7296
CHAUDHURI, T.K.
63
CHAUDHURY, S.C.
2127
CHAUDHURY, T.K.
386

CHAUN, H.
2356, 7119
CHAVARRIA, A.P.
5252
CHAVEZ, G.
92
CHAWLA, K.
564
CHAWLA, S.K.
564
CHAYVIALLE, J.A.
3744, 4240, 4489*, 4863,
6759*
CHAYVIALLE, J.A.P.
3679, 3875
CHEAH, S.S.
7771*
CHEARSKUL, S.
702
CHEDID, A.
3463*, 5106*
CHEESEMAN, C.I.
7913*
CHEGUILLAUME, J.
7089*
CHEJFEC, G.
6256
CHEKANOVA, S.K.
6620
CHELI, R.
4861, 8166, 8191*
CHELIBONOVA-LORER, H.
1998
CHELLY, C.
4774
CHEMERINSKY, V.D.
4082
CHEMIN, P.
3626*
CHEML, J.
751
CHEMODUROV, N.T.
4056, 8170
CHEN, C.
7192
CHEN, C.F.
2771
CHEN, D.S.
6404*, 6491, 6493
CHEN, F.W.K.
2284*
CHEN, K.M.
1458*
CHEN, K.Y.
3005
CHEN, L.C.
4503*
CHEN, L.J.
1006*
CHEN, N.C.
8016*
CHEN, N.S.C.
8016*
CHEN, S.T.
1754*
CHEN, T.
3051*
CHEN, V.
547*
CHEN, Y.R.
1458*
CHENAIS, F.
5108
CHENDEROVITCH, J.
160
CHENEY, M.
6020
CHENG, F.C.Y.
488, 7185*
CHENG, K.K.
1171
CHENG, Y.S.
5908*
CHENOUDA, M.
8419*
CHEPURNOY, G.I.
8153
CHEREDNICHENKO, A.M.
8206
CHERENKO, M.P.
749
CHERET, A.M.
1911
CHERIAN, S.
777
CHERIF-ZAHAR, K.
4367*
CHERKAOUI, M.
6754
CHERNISH, S.M.
4535
CHERNOBAYEVA, I.D.
8169
CHERNUKH, A.M.
3921
CHERNYAVSKY, A.A.
6267
CHERRICK, H.M.
1664
CHERRUAUD, D.
7079*
CHERTOK, R.J.
1797
CHERUBIN, C.E.
6484*, 7764, 8474
CHESTERMAN, H.
7476
CHEUNG, L.Y.
968, 1317, 1635, 2267,
3865*
CHEVALLIER, F.
3756*, 7413*
CHEVREL, J.P.
5657*
CHEW, C.S.
6738
CHEW, W.C.
5842*
CHEY, W.Y.
67, 945, 2371*, 2458*,
4522*, 7638*
CHI, E.Y.
2199
CHIAO, F.F.
7473
CHIARAMONTE, M.
1595, 3382, 3426*, 3446
CHIARANTINI, E.
683, 690
CHIARINI, A.
7151*
CHIBA, I.
571
CHIBA, M.
3713
CHIBA, S.
7161
CHIBISOV, I.V.
580
CHICHE, B.
4237
CHICHESTER, C.O.
5449
CHIEN, K.R.
6088*
CHIENPRADIT, K.
2190
CHIFFLET, J.
5153*
CHIGOT, J.P.
585
CHILD, D.L.
6528*
CHILD, J.A.
8333
CHILD, P.T.
4987*, 6378*
CHIMBRU, V.I.
8406
CHIN, J.
5204
CHIOTELLIS, E.
5522
CHIPRUT, R.O.
3949*
CHIR, B.
4685*, 5543
CHIRKIN, Y.D.
3484
CHISARI, F.V.
5085*
CHISHOLM, G.D.
5633
CHISTIAKOVA, O.V.
4054, 6229
CHISTIAKOVA, V.I.
1670
CHISTOVA, L.V.
691, 708
CHISTYAKOV, S.S.
6299
CHITKARA, Y.K.
5217
CHITRA, D.R.
3550
CHITRANUKROH, A.
7520
CHIU, C.J.
7857
CHKHEIDZE, R.D.
3590
CHLEQ, C.
3295

CHMELIZEK, F.
2748
CHO, C.H.
105, 978, 7517
CHO, K.J.
1455*, 7734*
CHOATE, R.
3396
CHOE, D.
8023*
CHOI, H.
198
CHOJNACKI, J.
3154, 3212
CHOL, J.J.
5299
CHOLETTE, A.
8375
CHOLLIER, A.
4103*
CHOME, J.
3587*, 4189
CHOPARD, M.
6043
CHOPPIN, J.
6781*
CHORVATHOVA, V.
6910
CHOU, C.C.
2972, 3767, 4700*
CHOU, L.Y.N.
2076
CHOUSTERMAN, M.
5925*
CHOW, A.W.
1472, 8192*
CHOW, L.H.
3777
CHOWDHURY, A.R.
1282*, 2458*, 4927*
CHOWDHURY, J.R.
1970*, 2929
CHRETIEN, P.
1218
CHRISTENSEN, J.
302, 926, 1859, 4515*, 5295, 5313*, 6701, 6704
CHRISTENSEN, K.C.
4074*
CHRISTENSON, T.
6564*
CHRISTIAN, W.
5904*
CHRISTIANSEN, E.D.
4185
CHRISTIANSEN, J.
374
CHRISTIANSEN, L.
5155*
CHRISTIANSEN, L.A.
2936, 8425*
CHRISTIANSEN, L.V.
6045
CHRISTIANSEN, P.M.
3247
CHRISTIANSEN, R.Z.
7444*
CHRISTIE, A.B.
2493*
CHRISTIE, D.
3095
CHRISTIE, D.L.
1867, 2167*
CHRISTIE, J.P.
7679
CHRISTIE, M.
6656
CHRISTOFFERSEN, P.
2504, 3475*, 8281*, 8386*
CHRISTOFIDES, N.D.
4858
CHRISTOFOROV, B.
3567, 3811, 4649
CHRISTOPHE, J.
116, 1002, 1758, 1941, 2834*, 2849, 2944, 3737, 3788, 7986*
CHRISTOPHER, J.
1494
CHRISTOPHER, J.P.
7425*
CHROSTOWSKA, H.
6466*
CHU, T.M.
2412*
CHUANG, J.
78*
CHUANG, V.P.
1640, 6322*, 7734*, 7841
CHUBAROVA, Z.V.
8261
CHUDACEK, Z.
279
CHUDAPONGSE, P.
142
CHUMAKOV, V.N.
3732
CHUMAKOVA, A.V.
6893
CHUNG, A.
2060*, 2074, 2927, 3496*, 3778
CHUNG, B.H.
6125
CHUNG, C.M.
637
CHUNG, E.B.
5258*, 7058
CHUNG, H.
2002
CHUNG, P.R.
1711
CHUNG, R.S.K.
7301*
CHUNG, W.B.
7119
CHUNG, Y.
5305
CHUPRYNA, V.V.
7601
CHURCHILL, R.
6642*
CHUTTANI, H.K.
826, 2649
CHVAPIL, M.
2884*
CHYLE, M.
1555*
CHYLE, P.
1555*
CIAMMAICHELLA, A.
1546
CIAMPOLINI, M.
4511
CIANCIARA, J.
8359*
CICHY, W.
249
CIESLIK, R.
3216
CIHALIK, C.
1181*
CIHULA, J.
3959
CILLO, C.
1155
CIMERMAN, B.
1720
CIMO, P.L.
4875*
CINOTTI, G.A.
2606
CINQJALBRE, J.
538, 540, 4150*
CINTI, D.L.
1026, 1028
CIOCCA, M.
7124
CIOK, J.
8482
CIONTEA, M.
7090*
CIPOLLINI, F.
2257
CISEK, T.
3347
CITRIN, C.M.
2384
CITRIN, Y.
1487
CIVETTA, J.M.
1446*
CLAHASSEY, E.B.
5731
CLAHSEN, H.
7943
CLAIN, D.J.
347, 4134*, 4135*, 7191, 7768
CLAIN, J.
4437, 7380
CLAIN, J.E.
5367*, 6070*
CLANCY, R.
5705*
CLARET, Y.
4128
CLARK, C.G.
381, 1612, 2292, 7663*
CLARK, D.G.
7470
CLARK, E.E.
7658*
CLARK, J.
1266*, 6030

CLARK, K.L.
4921
CLARK, M.L.
24, 4479, 7912*
CLARK, R.
2180
CLARK, S.B.
1096, 1795, 2089, 2976,
3827*, 3857, 7493*, 7924
CLARKE, A.M.
3053
CLARKE, B.F.
6224*
CLARKE, J.R.
7064*
CLARKE, J.S.
7662*
CLARKE, M.B.
4771
CLARKE, N.A.
7146*
CLARKE, P.D.
2650
CLARKE, R.M.
1759, 3585*, 5455
CLARKE, S.D.
2010, 5412*, 7441*
CLASSEN, J.N.
5550
CLASSEN, M.
3041*, 7535
CLAUDE, J.R.
6787
CLAUSEN, B.
7013
CLAUSEN, P.P.
246
CLAUSS, B.
5835
CLAUSS, D.
4823, 4839
CLAVER, M.
3074, 4711*
CLAYMAN, C.B.
7357
CLEM, T.
7863
CLEMENCON, G.
4019*
CLEMENS, J.D.
5193
CLEMENS, M.
4042*, 4043*
CLEMENT-CHAMPOUGNY, J.
122*
CLEMENT, J.P.
4358*
CLEMENT, M.
3927
CLEMENT, P.B.
7001*
CLEMENTE, C.
4809*
CLEMENTE, F.
3726*
CLEMENTI, F.
1763
CLEMENTS, J.L., JR.
1447*, 4379
CLEMETT, A.R.
7544
CLERMONT, R.J.
3459*
CLEVEN, D.
5466*
CLIFFORD, S.
3219*
CLINE, B.L.
5969
CLINE, C.T.
1876*
CLINE, W.S.
1685, 8086*
CLOUP, M.
502
CLOUSE, M.E.
6361*, 7725*
CLOWES, A.W.
2867*
CLOWES, G.H.A., JR.
2333
COADY, A.
1563
COATES, M.E.
4719
COBO DE LA CRUZ, J.
4375
COBO-FRENKEL, A.
2024, 2204
COCCIA, P.F.
7024
COCHETON, J.J.
413
COCHRAN, K.M.
2141
COCHRAN, R.C.
7035
COCHRANE, A.M.G.
1659, 3461*, 7099*
COCHRANE, J.P.S.
72
COCKEL, R.
6913*
COCKERILL, E.M.
1352
CODE, C.F.
55, 1863, 6056
COEL, M.N.
5579
COELHO, P.M.Z.
6790
COEN, G.
2606
COENEN, Y.
4985, 6382
COFFEY, J.W.
130
COFFIN, J.C.
4023*
COGHILL, G.
4484*
COGHILL, N.F.
3576*
COGHILL, S.B.
4485*
COGOLO, L.
409
COHAN, S.
2452*
COHEN, A.L.
4408
COHEN, A.M.
1288*
COHEN, B.E.
5041*
COHEN, B.I.
2952, 3359*, 3762*
COHEN, B.J.
3421*
COHEN, M.
7281, 7330
COHEN, M.H.
1374
COHEN, M.I.
6606
COHEN, M.L.
5970
COHEN, M.M.
1318, 7270
COHEN, R.J.
7126
COHEN, S.
514, 927, 930, 1828*, 1839,
2236, 2340, 2750, 3281*,
4516*, 6047, 6290*
COHEN, S.R.
2489*
COHEN, W.N.
6367*
COHEN, Z.
199, 3885
COHN, I., JR.
5234
COIA, A
8311
COLAS, A.E.
1651
COLBERT, D.A.
6810
COLCHER, H.
2596
COLE, H.D.
187
COLEMAN, R.
2675*, 7392*
COLES, G.C.
5958
COLIN-JONES, D.G.
449, 3138*
COLIN, R.
3537, 4423, 5940*, 8209,
8515
COLLARES, E.F.
2979, 3831*
COLLE, E.
7853
COLLER, J.A.
4892
COLLETAS, J.
5791*
COLLETTE, M.
3759*
COLLEY, D.G.
8112

COLLINS, D.C.
2551
COLLINS, J.P.
5691
COLLINS, P.
3050*
COLLINS, P.A.
2233
COLLINS, P.W.
951*, 2113, 6727*
COLLIS, J.L.
297, 3126*
COLLOMBEL, C.
8066
COLN, D.
2734*
COLOBERT, L.
8350*
COLODNY, A.H.
4466*, 6529*
COLOIGNER, M.
2896, 3903
COLOMB, E.
1964
COLOMBO, J.P.
5003*
COLOMBO, M.
3442, 4334*
COLON, A.R.
1699
COLTORTI, M.
681
COLUMBANO, A.
1165
COLVILLE, D.S.
5176*
COMBE, E.
3834*, 6713*
COMBES, B.
2917, 3783
COMBETTES, P.S.
5940*
COMODO, H.
3163
COMPERNOLLE, F.
7135
COMPORTI, M.
8021*
COMPSTON, J.E.
3479*, 7609*, 7641
CONARD, F.U.
5580
CONCALVES, D.
2441
CONDAT, M.
3931*
CONDE, R.D.
5406*
CONDON, R.E.
1287*, 2161, 2401, 7662*,
8274*
CONDON, V.R.
5564*
CONDORELLI, M.
1155
CONFORTI, A.
4632*
CONGIU, L.
641, 1165
CONKLIN, J.L.
5295
CONLAY, L.A.
5932*
CONLEY, D.R.
2074
CONLON, S.
7032
CONLON, T.P.
116, 1002, 1941, 7983*
CONN, H.O.
5119*, 7808*
CONNELL, A.M.
1415, 1548, 2376, 5106*
CONNELL, R.S.
5464*
CONNELLY, L.J.D.
3419*
CONNEY, A.H.
2912
CONNOLLY, C.E.
7112*
CONNON, J.J.
5071*
CONNOR, T.
5900
CONNORS, T.A.
5824*
CONOLLY, M.E.
5361*, 6354
CONRAD, C.
4159
CONRAD, M.E.
2514, 3434*, 5067*
CONROY, R.M.
5910*
CONSO, F.
8345
CONSROE, P.
6450*
CONSTANT-DESPORTES, M.
3445
CONSTANTIN, M.
2601
CONTE, L.
7319
CONTE, M.
500
CONTE, P.J., JR.
5533
CONTE, V.P.
263
CONTI, U.
1614
CONTIERI, E.
8080
CONTINI, S.
392
CONTRERAS, F.
3074
CONVERT, M.J.P.
5055
CONWAY, E.S.
940
COOK, A.
5215
COOK, A.W.
7877, 7891
COOK, B.H.
863, 1773*, 3584*
COOK, E.H.
6482*
COOK, G.C.
2366, 4413
COOK, L.
4426
COOK, S.A.
3990
COOKE, A.R.
941, 2744*, 3155, 3630*,
3631*, 5313*
COOKE, C.R.
1549
COOKE, E.M.
6589*
COOKE, L.
5432*
COOKE, S.A.R.
5939*
COOKE, T.C.G.
1928*
COOKE, W.J.
5432*
COOKE, W.T.
1379, 1672, 2362, 4131*,
4974, 5979*, 7635*, 8263*
COOKSLEY, W.G.E.
545*, 6446*
COOLEY, G.R.
4523*
COOMBES, R.C.
8291*
COOMBS, E.
6215
COON, M.J.
1025
COONEY, D.A.
1044
COONEY, D.R.
5484
COOPER, A.D.
2086, 2975, 5415*
COOPER, B.
2065
COOPER, B.T.
2362, 4903*
COOPER, C.W.
3001
COOPER, E.H.
4169, 4930*, 5713*, 8333
COOPER, H.S.
773, 4201*
COOPER, K.A.
7968*
COOPER, R.G.
470
COOPER, R.J.
8477
COOPERBERG, P.L.
7270
COOPERMAN, A.M.
1473, 2247, 3590, 6259,
7874
COOPERMAN, L.R.
2459*

COPELAND, E.M.
1712, 1940, 2829, 4528*, 4551*, 5246
COPELAND, M.M.
4174
COPELAND, W.
299
COPPOLA, E.D.
5745
COPPULA, W.
7012
COQUIN, Y.
4394*
CORAN, A.G.
8133
CORAZZA, G.R.
3404, 3518, 4899, 4912
CORAZZIARI, E.
4028, 4539
CORBETT, C.L.
5284*, 5456
CORCIA, A.
7308*
CORDERO, J.
2462*
CORDOVA VARGAS, L.
505
CORDS, B.R.
804
CORE, S.K.
1395*
CORFA, A.
3094
CORKERY, J.J.
1429
CORLETTE, M.B.
8430*
CORMAN, J.
2887*
CORMAN, M.L.
4892
CORNEE, J.
3977
CORNET, A.
6926, 8197
CORNETT, J.W.D.
7030
CORNILLOT, P.
7812*
CORNWELL, E.E.
7058
CORONADO QUESADA, E.F.
5253*
CORRADINO, R.A.
2075
CORRALES BUENO, J.I.
7565
CORRALL, R.J.
2906
CORREA, J.
7876
CORREA, P.
469, 6334*
CORREIA, J.P.
8398*
CORREIA, M.A.
1012*
CORRER, S.
2680*
CORRIGAN, J.J.
3526*
CORRING, T.
1932, 4605, 5457, 7933
CORRODI, P.
3222*
CORRY, R.J.
5176*
CORSINI, P.
4826
CORTELAZZO, S.
3412, 3520, 7773*
CORTESINI, C.
7814*
CORTEZ PIMENTEL, J.
2480*
CORTOT, A.
3600*
CORVI, G.
6593
COSSART, Y.E.
3421*
COSTA, A.
7575
COSTA, F.
6176
COSTA, J.
5889, 6604
COSTA, J.A.
1094
COSTA, J.B.
4418, 4419
COSTA, M.
1084*, 2742*
COSTA, P.L.
2848
COSTANTINI, R.
3507*
COSTANTINO, C.
1493
COSTANZA, M.E.
473
COSTE, T.
4270
COSTELLO, C.
5603
COSTELLO, L.C.
7450
COTTER, R.
1125, 2062*, 2419
COTTON, P.B.
2445, 3978, 4983, 4999, 7539
COTUTIU, C.
3929
COUGARD, A.
3931*
COUGHLIN, G.F.
5631
COULAUD, J.P.
3445
COULBOIS, J.
340, 341, 4265
COULIC, V.
3863*
COULOMB, H.
3967
COUMAROS, D.
767, 3381
COUNTEE, R.W.
7942
COUPAR, I.M.
2961*
COUPLAND, G.A.E.
6880
COURCY, J.
6043
COURI, D.
6793
COURILLON, A.
4461
COUROUCE-PAUTY, A.M.
4286*
COURPOTIN, C.
3241
COURT, H.
7926
COURTECUISSE, V.
4259*
COURTEMANCHE, A.C.
1318
COUSINS, L.M.
4553*
COUSSEMENT, A.
3996
COUTSOFTIDES, T.
6261*, 6274
COUTURE, M.M.
7230
COUTURIER, D.
3135, 3233, 4020*, 7940*
COUZIGOU, P.
3705, 8393
COVE, H.
3496*
COVE-SMITH, J.R.
7004
COWAN, R.E.
4735
COWAN, R.J.
5680
COWARD, W.A.
3860*, 6802, 7245, 7524
COWEN, A.
6737
COWEN, A.E.
5426*
COWIE, A.G.A.
1612
COX, J.N.
1301
COX, P.H.
5549
COX, R.R.
4757
COY, D.H.
66, 7375*
COY, P.
6613
COYNE, M.J.
2060*, 2074, 2927, 3496*, 3778, 7829
COZETTE, P.
3715

COZZOLINO, A.
7584
CRABIE, P.
8345
CRADDOCK, V.M.
6799
CRAGO, S.
4575
CRAIG, J.P.
4420
CRAIG, R.M.
801
CRAIG, R.P.
5635
CRAMER, G.G.
4013
CRANE, L.J.
2879*
CRANER, G.E.
519, 3066
CRAPP, A.R.
4386
CRAST, F.W.
4427
CRAUN, G.F.
789, 4420
CRAVARIO, A.
3555
CRAVEN, P.
2937
CRAVETTO, C.A.
3555
CRAWLEY, J.C.W.
5817*
CRAXI, A.
7151*
CREAGAN, E.T.
7051
CREAGHE, S.B.
3722, 4044*
CREAK, D.R.
4405
CREAMER, B.
877, 7609*
CREAN, G.P.
4493
CREEL, R.
3625*
CREES, M.
3426*
CREMER, H.
2234
CREMER, M.
984, 2434, 2834*, 4016,
4359*, 4755, 8280
CREMIN, B.J.
466, 3494*
CREPEAU, R.
4501*
CRESPO, C.
7692
CRESPO DIEZ, A.
5122*
CRESPON, B.
3083, 8437
CRET, L.
4750*
CREUTZFELDT, C.
1338*, 3719
CREUTZFELDT, W.
992, 1338*, 1757, 1951,
2353, 2437, 2733*, 3696,
3719, 4578, 7364
CREWS, Q.E., JR.
3970
CRICK, W.F.
7923
CRISMER, R.
8514
CRISSEY, M.H.
2874*
CRISTINA, M.L.
3591
CRISTO, C.
4099*
CRITCHLOW, T.
407
CRIVELL CHARNECO, C.
5084*
CRIVELLI, O.
4496, 5104*
CROCKER, A.D.
936
CROFT, D.N.
4849, 4859
CROFT, R.J.
6675*
CROITORESCU, L.
2009, 8015*
CROIZAT, B.
8254
CROKER, M.
1868
CROMARTIE, R.S., III
6597
CROME, P.
2482*
CROMER, J.K.
1417
CROMWELL, C.L.
4715*
CROMWELL, L.G.
3282*
CRONIN, T.G., JR.
7044
CRONSTEDT, J.
2253
CROOM, R.D., III
2258
CROS, R.C.
2440, 3486
CROSIER, J.
3912
CROSS, J.H.
1711, 2661
CROSS, S.A.M.
7964*
CROSSLEY, I.R.
1206
CROTTE, C.
38, 2926, 4618*, 5424*
CROVARI, P.
648, 7786*
CROVETTI, F.
4652
CROW, H.C.
3046*
CROWELL, E.B., JR.
8346
CRUICKSHANK, J.G.
5200
CRUMP, E.P.
7868
CRUZ, I.
7453
CRYER, P.E.
2898
CSAKY, T.Z.
7305*
CSENDES, A.
331
CSICSKO, J.F.
5484
CUADRADO, F.
3345
CUARTERO, A.R.
5120*, 5152*
CUBILLA, A.
4215
CUCCURULLO, L.
681
CUCHE, C.
1201
CUENI, B.
5016*
CUENI-HEER, E.
5016*
CUESTA CASELLES, G.
7565
CUILLERET, G.
2561
CULANK, L.S.
4913
CULIC, D.D.
801, 4440
CULLEN, J.
3362*
CULLEN, J.B.
199
CULLENS, H.
1518*, 2520, 3437, 4285*
CULLIS, S.N.P.
7234
CULLITY, G.J.
7873
CUMMACK, D.H.
3056
CUMMINGS, J.H.
917, 1389*, 3624, 5188
CUMMINS, A.G.
5508
CUMMINS, G.E.
5695
CUNNINGHAM, H.M.
7934
CUNNINGHAM, J.J.
7227
CUNNINGHAM, T.
1469
CUOMO, V.
7948
CUPARENCU, B.
5374
CUPELLO, J.L.
4424

CURCIO, M.
889
CURLETTO, R.
291
CURLEY, A.D.
2014
CURRAN, P.F.
32, 1086*, 6009
CURRARINO, G.
6954, 7766
CURRI, S.B.
618
CURSTEDT, T.
8004*
CURT, G.A.
5824*
CURTI, M.T.
7806*
CURTIS, C.G.
5403*
CURTIS, L.E.
1285*
CURTIS, P.J.
2082
CURTO, M.
4546
CURZON, G.
575, 676
CUSARO, G.
1814, 8089*
CUSCHIERI, A.
8084*
CUSHNER, S.
6716*
CUSICK, G.
3504*, 4456*
CUSSLER, E.L.
1609, 2031
CUSUMANO, A.
3553, 8161
CUTHBERT, D.
7119
CUTHBERTSON, A.M.
5691
CUTLER, L.S.
7296
CUTZ, E.
3373*, 8225*
CYWES, S.
494
CZAJA, A.J.
415, 818, 3142*
CZAJKOWSKI, J.
6103
CZARNECKI, L.
1512*
CZARNETZKI, H.D.
8081
CZARNOWSKA-MISZTAL, E.
6696
CZEMBIREK, H.
3966, 4749*
CZEREDA, T.
6890
CZOK, G.
4658
CZUCZY, P.
792
CZYGAN, P.
2776
D'AGNOLO, B.
271
D'AGNOSTINO, N.
238
D'AGOSTINO, L.
1914
D'ALECY, L.G.
4703*
D'AMATO, T.
5796*
D'AMICO, A.
8374
D'AMICO, D.F.
5584
D'AMICO, S.
1479
D'ANCHINO, M.
3293
D'ESHOUGUES, J.R.
3271
D'HAVELOOSE, J.
5607
D'IGNAZIC, D.
2825, 2826
D'ISA, L.
5052
D'IZARN, J.S.
3567
D'SILVA, V.
5698
D'SOUZA, D.W.
963
DA COSTA, L.R.
2189, 2255, 4132*
DA CUNHA, A.C.F.
1527
DA CUNHA, J.E.M.
3333
DA SILVA, A.F.
3566
DA SILVA, L.C.
1527
DA SILVEIRA, G.M.
3274*
DABELS, J.
7074
DABNEY, J.M.
4700*
DABROWSKA-CHROMINSKA, T.
419
DABROWSKI, A.
739
DADAN, H.
762, 1618
DAEMS, W.T.
4490*, 7455, 7903*
DAGEVOS, J.
5709*
DAGGETT, W.M.
1446*
DAGNELIE, J.
5129*, 6182
DAGNINI, G.
7821
DAGORN, J.C.
997, 1936, 2837*, 5442*, 6775*, 7373*
DAGORNE, D.
8067
DAHL, E.P.
4268, 4660
DAHLEM, R.
5118*
DAHLGREN, S.
5322*, 5465*, 5647
DAHLQVIST, A.
7647
DAHLSTROM, B.E.
1985
DAHM, K.
2240, 2819, 4811*, 8438
DAI, S.
105, 978
DAIKOKU, S.
2*
DAIL, D.H.
4984
DAJANI, E.Z.
951*, 1865, 2113, 4563*, 6727*
DAL BRUN, G.
3412, 3520, 7773*
DALAL, N.J.
831, 6663
DALE, G.
8486
DALGAARD, J.B.
8281*
DALICHO, W.
4767
DALINKA, M.K.
6392
DALL'OLIO, D.
447
DALLA PALMA, L.
7741*
DALLEMAND, S.
6380*
DALLING, R.
2397
DALMAS, H.
5189
DALMAU, J.
8352*
DALOZE, P.
2887*
DALY, J.M.
6944
DAMGAARD, S.E.
7429*
DAMIAN, R.T.
1729
DAMJANOV, I.
4065
DAMLE, S.R.
8292*
DAMM, K.H.
156
DAMMANN, H.G.
1966*, 3754*, 7420*
DAMMERMANN, H.
5894
DAMMERMANN, R.
5100*

DAN, E.M.
7090*
DANCE, D.R.
5749
DANCEA, S.
1746*
DAND, A.
3651, 3654
DANE, D.S.
7783*
DANEK, L.
6729*
DANES, B.S.
5172*
DANGOUMAU, J.
126
DANHOF, I.E.
922
DANI, S.
4539
DANIEL, E.E.
1830*, 1833*, 4541, 6706
DANIEL, G.G.
5677
DANIELE, S.
4581
DANIELOVA, E.M.
3763*
DANIELSSON, H.
2924
DANIK, L.M.
3928
DANILA, F.
660
DANILOV, M.V.
3334, 6582, 7071
DANKS, D.M.
6460*, 6486*
DANLEY, R.B.
2570*
DANN, R.W.
6959
DANNEY, M.M.
5180*
DANO, P.
5673
DANOFF, D.M.
5731
DANON, A.
5362*
DANOWSKI, R.
7626
DANSETTE, P.
2912
DANSWAN, G.W.
3027, 3028
DANTAS, R.
6520*
DANZINGER, R.G.
3217*
DAO, M.
7089*
DAPSON, R.W.
7944
DARCEL, J.P.
653
DARDENNE, A.
4985
DARDENNE, A.N.
6180, 6382
DARENSKY, D.I.
7621
DARIOTIS, A.
560
DARMOSTUK, V.Y.
6631
DARNBOROUGH, A.
1188, 2998
DARNIS, F.
599, 4369*, 5903*
DART, G.C.
6464*
DARUP, K.
6848
DARYABEIGI, J.
6279
DAS, K.M.
856, 5723*, 8237*
DAS, P.B.
4792*
DASGUPTA, G.
4792*
DASH, A.C.
215
DASHER, C.A.
6521*
DASHKINA, Z.I.
8074
DASZNSKI, J.
901
DATARDINA, S.
5334
DATSUN, T.A.
3322
DAUCHEL, J.
767, 933, 1826*, 1835, 2751,
3657, 3883, 5190
DAUGHADAY, W.H.
2942
DAUM, R.
5674, 7611
DAUSSET, J.
2063
DAUTREBANDE, J.
7083
DAVCEV, P.
3487
DAVENPORT, H.W.
955
DAVID, D.
4256*
DAVID, S.
2815
DAVIDSON, A.R.
5072*
DAVIDSON, G.P.
785
DAVIDSON, H.A.
5635
DAVIDSON, J.F.
8273*
DAVIDSON, M.
5191, 7281
DAVIDSON, R.E.
4508*
DAVIES, D.R.
3276*, 4931*
DAVIES, H.
5923*, 7224
DAVIES, J.D.
6977*
DAVIES, M.
5816*
DAVIES, M.G.
6761*
DAVIES, M.I.
2112
DAVIES, P.S.
2588*
DAVIES, R.L.
6731, 6829*, 8118
DAVIES, W.A.
3196*
DAVIGNON, J.
8046
DAVIS, A.E.
5508, 7854*
DAVIS, C.P.
211, 5466*
DAVIS, G.
3702
DAVIS, G.B.
5579
DAVIS, H.L., JR.
2631
DAVIS, J.B.
7011
DAVIS, J.N.
7336*, 7337*
DAVIS, J.V.
1793, 2720, 2721
DAVIS, L.
7645
DAVIS, L.M.
2198
DAVIS, M.
2105*, 3374*, 4024*, 4351,
5027*, 6068*, 7141*, 7190,
7777*, 7802*, 7807*, 8295*
DAVIS, P.W.
3164
DAVIS, R.A.
2049, 7399*
DAVIS, T.J.
5686
DAVIS, W.M.
1858, 4724
DAVISON, J.S.
2731*
DAVISON, L.
6227*
DAVY, A.
4192, 4197, 8252
DAVYDOV, A.A.
6236
DAVYDOVA, R.Z.
6422*
DAWKINS, H.G., JR.
4157*
DAWKINS, P.D.
6996
DAWSON, A.M.
24, 6311*, 7276*, 7287

DAWSON, J.
4037, 6201, 7282
DAYAN, L.
4367*
DAYRAS, M.
4353*
DBALA, D.
2490*
DE ALANIZ, M.J.T.
1167
DE ANDRADE, M.A.
3176
DE ANGELIS, R.
175
DE ARANA, J.M.S.
330
DE BELLE, R.C.
1078, 1890
DE BENEDETTI, F.
4208
DE BERNARDINIS, P.
2825, 2826
DE BERNARDIS, F.
4889, 7701, 7710, 7894
DE BLONAY, J.
5161*
DE BOER, W.G.R.M.
1915
DE BOTH, N.J.
4699
DE BRITTO-COSTA, R.
8190*
DE BRUYERE, M.
7896*
DE BUYSSCHER, E.V.
1110
DE C. CORTEZ, C.
3176
DE CAMILLI, P.
73
DE CAMPOS, E.P.
1715
DE CARLE, D.J.
4515*, 6441*, 6704
DE CARVALHO, C.A.F.
7901*
DE CASTRO, C.
441
DE CASTRO DEL POZO, S.
2530*
DE CIUTIIS, D.
6930
DE COCK, G.
4236
DE CONCA, V.
4851
DE CORRAL SALETA, J.M.
106
DE CUYPER, F.
7789*
DE DA PORTE, P.L.
7367*
DE DIOS, J.F.
4747*
DE DOMBAL, F.T.
1188, 2998, 3171, 6212
DE DONATO, A.
7584
DE FAIRE, U.
4086
DE FARLA, J.L.
3163
DE FLORA, S.
648, 7786*
DE FLORIO, L.
5260
DE FRANCHIS, R.
3392
DE FRANCISCI, G.
6126
DE FRANCISCIS, S.
1914
DE GAETANI, C.F.
4052
DE GAST, G.C.
3440
DE GEUS, A.
8502
DE GIACOMO, M.
6126
DE GODOY, R.A.
8162*
DE GRAAF, P.
2544*
DE GRAEF, J.
961, 1885*, 3060, 3206, 3594, 3680, 3688, 3720, 6040*
DE GROAT, W.C.
1856
DE GROOTE, G.
7279
DE GROOTE, J.
680, 2516, 2580*
DE HEER, K.
2746, 3765*, 8438
DE JESUS, D.
5705*
DE JONG-STOELINGA, M.H.F.M.
8502
DE JUAN BURGUENO, M.
4091
DE KALBERMATTEN, N.
2969, 3728
DE LA FUENTE CHAOS, A.
7565
DE LA FUENTE PERUCHO, A.
7565
DE LA PAZ, J.A.R.
768
DE LA PENA, M.
8173
DE LA PIERRE, M.
3263
DE LA RASILLA, G.
5122*
DE LA RIVIERE, A.B.
4468*
DE LA SANTA, J.
8318
DE LA SANTA LOPEZ, J.
3290, 8258
DE LA TORRE FERNANDEZ, J.M.
5091
DE LA TOUR, J.
2856, 3742, 5391*, 6095
DE LACEY, G.
8466
DE LAMO, R.
7995*
DE LESTANG-LABROUSSE, M.
7203*
DE LUCA, B.
233, 238
DE MAGISTRIS, K.
4539
DE MAJO, A.
7081
DE MARCO, A.
1001
DE MATTEIS, F.
2904
DE MEDEIROS TORRES, P.
137
DE MEDICIS, E.
4713*
DE MELLO, J.B.
370, 6934
DE MELLO, J.D.
8120
DE MELLO, M.C.F.
7512*
DE MENIBUS, C.H.
4907*
DE MOL, J.
5607
DE MONTALIER, H.
7082, 8278
DE MONTIS, G.
3229
DE MORAES NOVAES, H.
6176
DE NADAI FRANK, A.
7821
DE NEEF, P.
2849
DE NIE, I.
4280
DE OLIVEIRA E SILVA, A.
1527
DE OLIVEIRA, J.A.M.
747
DE OLIVEIRA, J.P.M.
7368*
DE OLIVEIRA VALENSA, A.
7571, 7602
DE PADUA VILELA, M.
2487*
DE PESQUERA, F.G.
5122*
DE RITIS, F.
2529
DE ROCCO, R.
3548, 3973
DE ROMANA, G.L.
3604*
DE ROOIJ, D.G.
2682*
DE ROOSE, J.
5607
DE RUITER, H.
3868*
DE SIMONE, G.
5710*

DE SMUL, A.
1935
DE SOTO, F.
573
DE SOUSA, A.L.
2656
DE SOUZA, L.J.
4120
DE TOEUF, J.
2434, 4016
DE TURRIS, P.
5843*
DE VILCHEZ, I.S.
2039
DE VILLIERS, D.
1542*
DE VOGELAER, J.P.
7896*
DE VRIES-VAN ROSSEN, A.
3750*
DE WAELE, B.
1935
DE WARDENER, H.E.
666
DE WEERDT, G.A.
2186, 3089
DE WEVER, I.
6699, 7937*
DE WITTE, C.
3287
DEAK, J.
1632
DEAN, A.C.B.
7677
DEAN, S.
2676*
DEAN, T.M.
5743
DEANE, W.M.
1375
DEBAS, H.T.
2780, 3682, 3694, 3729,
3741, 5378
DEBAT, J.
3135
DEBENKO, M.V.
4082
DEBESSE, B.
8197
DEBEJGNY, P.
5037*
DEBONGNIE, J.C.
5302, 7483*
DEBOUVRY, J.
7211*
DEBOWSKA-WOJCIK, D.
419
DEBRAS, E.
3834*
DEBRAY, C.
1665, 1957, 2856, 3054,
3083, 3135, 3233, 3512,
3742, 3848, 4020*, 4139,
4219*, 5391*, 6095, 6181,
6940*, 6972, 7070, 7940*,
8437
DEBRAY, D.
6181, 7070
DECAENS, C.
3662*
DECARLI, L.M.
3806
DECARO, L.
3902
DECASTRO, F.J.
6448*
DECHAKAISAYA, S.
7111*
DECKER, I.
410
DECKER, K.
1014*, 1016*
DECKER, R.
5237, 7155*
DECLUSIN, R.J.
213
DECOSSE, J.J.
2401, 8274*
DECOUFLE, P.
6375
DECROIX, G.
292*
DEDENKO, I.K.
553
DEDERER, Y.M.
5834
DEDIEU, P.R.
5557*, 5588*
DEDLOVSKAIA, V.I.
8206
DEDRICK, D.F.
1161
DEEGAN, M.J.
5953
DEERING, T.B.
4833*, 6536*
DEFFRENNE, P.
4001
DEFILIPPI, C.
3740, 7329
DEFORD, J.W.
7769
DEFORE, W.J., JR.
591
DEFRANCE, D.
3271
DEFRANCE, J.
2616
DEFTOS, L.J.
4233
DEGANI, C.
6636
DEGENSHEIN, G.A.
6540*
DEGLI ESPOSTI, A.
8314
DEGOS, F.
2533, 3489, 5117
DEGOS, J.D.
8415
DEGOTT, C.
4281, 4776, 5868*
DEHAENE, J.
423
DEHAENE, J.L.
584, 1707, 3109
DEHEER, K.
2240
DEHERTOG, P.
1722
DEHORATIUS, R.J.
1517*, 4211
DEITEL, M.
6636
DEITRICK, J.E.
1582
DEKKER, W.
4463
DEL CARMINE, R.
2036
DEL FAVA, R.L.
7044
DEL FAVERO, C.
4101*
DEL LLANO DE DIAZ, A.
7467
DEL MAZO, J.
4548, 7638*
DEL RIO, G.
568
DEL VALLE, A.
6894
DEL VALLE BODEGA FRIAS, B.M.
8249
DEL VALLE, E.A.
768
DEL VECCHIO-BLANCO, C.
681
DELABY, F.
431
DELAFOLIE, A.
8150
DELAFOSSE, B.
4295*
DELAGE, Y.
1508, 2865*, 2866*, 4155*
DELAITRE, B.
3238, 8224
DELAMARRE, J.
314*, 4475*
DELANEY, J.H., JR.
5784
DELANEY, J.P.
1141
DELANEY, P.
461, 4481
DELANEY, P.V.
5977*
DELANY, H.M.
6135
DELAS, N.
332
DELAVIERRE, P.
3297
DELCAMBRE, B.
3271
DELCLOS, L.
2633
DELCOURT, A.
2858, 8271*
DELCROIX, C.
2842
DELECOURT, R.
2747

DELEU, H.W.O.
1412
DELEZE, G.
5007*, 7105*
DELFORGE, M.
8514
DELINCE, P.
3594, 3720
DELL'OSSO, A.
406
DELLA CELLA, G.
3259, 6317
DELLAGRAMMATIKAS, H.
5202
DELLE FAVE, G.F.
4539
DELMONT, J.
3075, 3485, 3650, 3996,
5978*, 6179
DELORME, G.
740, 3239
DELORME, M.L.
4665
DELORT, P.
6043
DELTENRE, M.
984, 2434, 4016, 4359*
DELTZ, E.
857
DELUCA, H.F.
881, 882, 1115, 5458
DELUCA, R.F.
6204
DELUMEAU, G.
4137*
DELVIGNE, J.
3939*
DELVIN, E.E.
802
DEMASON, L.R.
1764
DEMATTEIS, R.
8026*
DEMBINSKI, A.
114, 7347*
DEMBROW, V.D.
7059
DEMEESTER, T.R.
294*, 1263*, 1270
DEMENTIEVA, N.I.
7564
DEMERS, L.
5198
DEMERS, L.M.
2983*, 4751*
DEMEULENAERE, L.
2472, 5607
DEMIDOVA, A.I.
8097
DEMIGNE, C.
7339*
DEMLING, L.
114, 459, 986, 1333*, 1950,
2288*, 2732*, 2735*, 2759,
2761, 2792*, 2860, 2984*,
3041*, 3195*, 4070*, 4593*,
4849, 4859, 5000, 5626*
DEMOL, P.
1954, 2809, 2852, 2855,
3745
DEMOS, T.C.
3043*
DEMPSEY, E.C.
2418*
DEMPSEY, M.E.
4616*
DEMPSTER, G.
7785*
DEN OTTER, W.
4607*
DENBESTEN, L.
1620, 3773, 4651, 7301*
DENBURG, J.
8482
DENCE, D.
2211
DENCK, H.
4025*
DENES, A.E.
6481*
DENIES, J.L.
584
DENIS, J.
4188
DENIS, M.C.
4226
DENIS, P.
3537, 4423
DENISENKO, Y.V.
3289
DENK, H.
1028, 2880*, 5025*
DENNIS, C.R.
6200*, 8419*
DENNIS, M.
2281*, 5478*
DENNIS, M.B.
6733
DENT, D.M.
4837*, 7234
DENT, J.
5930*
DENYER, M.E.
3978, 4999
DEODHAR, K.P.
5024*
DEODHAR, Y.
1656
DEORIO, A.J.
1117
DEPAUT, G.
4722, 6108
DEPEW, W.
5115
DEPORTE, A.
2563, 3483*, 3488
DERGILOVA, M.P.
6620
DERIBAS, V.I.
108
DERO, M.
274
DERCIDE, J.P.
342, 7082, 8278
DEROM, F.
5607
DERUBERTIS, F.R.
2937
DESAI, N.
7127
DESAULTY, A.
292*
DESBAILLETS, L.
4799
DESCAMPS, B.
5868*
DESCAMPS, C.
5763*
DESCATOIRE, V.
3489
DESCHNER, E.
2134
DESCHNER, E.E.
4929*, 7890, 8111
DESCHODT-LANCKMAN, M.
1758, 2849, 4600
DESCHREYER, M.
3287
DESCHRYVER-KECSKEMETI, K.
1891
DESCOS, F.
2531*
DESCOS, L.
2416*, 2531*, 4234, 4240,
6905
DESFEMMES, F.
4023*
DESGREZ, P.
5123*
DESHAYES, P.
4476*
DESHPANDE, A.H.
297
DESHPANDE, P.J.
4187
DESHPANDE, Y.G.
1597
DESJEUX, J.F.
32, 1086*, 6009
DESLIGNIERES, S.
4136*
DESMET, V.J.
1514*, 1520*, 2516
DESMOND, A.M.
1292
DESMOND, P.V.
4932*
DESMYTER, J.
2516, 4781, 6471*, 7279
DESOUZA, D.
6483*
DESPAS, P.
4798
DESPLACES, A.
6781*
DESROCHERS-GAUTHIER, S.
3459*
DESSAINT, J.P.
5866*
DESSI, S.
5206
DESVIGNES, G.
4955
DETMER, D.E.
7767

DETOURNAY, G.
2580*
DETTE, G.A.
3041*
DEUTSCH, E.
1654
DEUTSCH, J.A.
873
DEVADAS, M.
153
DEVAIAH, K.A.
2246
DEVAL, V.
3239
DEVAUL, R.A.
5760*
DEVAUX, M.A.
2745*, 3637*, 3649
DEVEDAS, M.
1141
DEVENEY, C.W.
5571
DEVENEY, K.
4591*
DEVI, C.S.
3550
DEVI, M.S.
3550
DEVI, P.U.
6833*
DEVI, S.
706
DEVIC, G.
7211*
DEVILLE-CHABROLLE, A.
6319
DEVIN, R.
4358*
DEVINE, B.J.
3522*
DEVISHEV, M.I.
3964
DEVROEDE, G.
4501*
DEWBURY, K.C.
4745*
DEWITTY, R.L.
7058
DEWULF, E.
318
DEYDEN, W.E.
1401
DEYHLE, P.
854, 4817, 4820, 4846, 4940,
6173, 6253, 6887, 7073,
7727, 8256
DEYSINE, M.
1151, 5502
DGEBUADZE, R.G.
3763*
DHAR, G.J.
1809
DHAR, J.K.
7142*
DHATT, P.S.
4344
DHITAVAT, V.
2175*
DHONDT, J.L.
2617
DHUMEAUX, D.
596, 1508, 3517, 4364*
DI BELLA, J.
1534
DI COSTANZO, G.
3848
DI COSTANZO, J.
3486, 3736
DI CUONZO, G.
1479
DI FEBO, G.
3593, 5529
DI MAMBRO, M.
7081
DI MARCO, G.
7798*
DI MARIO, F.
3173
DI MEZZA, F.
1082
DI NOLA, F.
7148*
DI PADOVA, C.
224
DI SEGNI, M.
2606
DI SIMONE, A.
3448
DI TOMMASO, G.
1128
DIACONIS, J.N.
1322, 5762*, 7823*
DIAKONOV, V.T.
6346
DIAKOVA, R.M.
6583
DIAMANT, N.E.
53, 1838, 6028
DIAMANTOPOULOS, G.
1628
DIANA, S.
2517
DIARD, F.
740
DIAZ, A.
2453*, 3402, 3920
DIAZ FLORES, L.
6894
DIAZ, G.
3740
DIAZ-GIL, J.
2547
DIAZ, M.
7149*
DIAZ-RUBIO GARCIA, E.
8382*
DIAZ-RUBIO GARCIA, M.
5063*, 5064*, 5089*, 8382*
DIBAR, E.
7124
DIBBINS, A.W.
1427
DIBIASE, A.
4935*
DIBIROV, A.D.
6230
DIBONA, G.F.
5286*
DICK, A.P.
3579*, 4971
DICK, D.A.T.
864
DICK, J.
991
DICK, R.
539, 3048*, 4212*, 4989*
DICK, W.
4205
DICKENSON, C.J.
8055
DICKER, E.
1036
DICKERSON, J.W.T.
3790
DICKEY, J.W.
1367
DICKINSON, F.M.
8055
DICKINSON, P.B.
4013
DICKMEYER, J.P.
5792*
DICKSON, A.J.
136
DICKSON, E.R.
2545*, 6536*
DIDOLKAR, M.S.
5714*
DIDONATO, L.R.
4168
DIEBOLD, N.
454*
DIEDERICHSEN, H.
8356*
DIEFENBACH, W.C.L.
1710
DIEMER, N.H.
8110
DIENSTAG, J.L.
1521*, 2104*, 2485*, 2486*,
2882*, 3432*, 5859*, 5872*,
5875*, 6456*, 6484*
DIETEL, J.
6186, 7818
DIETHELM, A.G.
1328
DIETMAIER, A.
909
DIETRICH, F.E.
2055
DIETRICHSON, O.
2504, 2557, 3371*, 3441,
3452*, 8386*
DIETSCHY, J.M.
1661, 1785, 1816, 1819,
2710, 2712, 5278*
DIETZE, G.
6079*
DIEZ CASCON, A.
6933
DIEZ-CASCON MENENDEZ, E.
6933
DILAWARI, J.
6323*

DILAWARI, J.B.
5598*
DILAWARI, R.A.
1371
DILLIHUNT, R.C.
2200
DILLY, P.N.
296
DIMAGNO, E.P.
1636, 3601*, 4978*, 5773*, 8125
DIMICK, M.K.
1137
DIMITROV, B.
6929
DIMOCK, F.
4970
DIMOPOULOS, G.
7574*
DIMOPOULOS, G.E.
5327
DIMOV, D.M.
270, 278
DIMPIER, F.L.
330
DINDA, P.K.
30, 4132*
DINEEN, P.
6588*
DINELLI, C.A.
3179
DINH, D.M.
7396*
DINI, L.
236, 267
DINIZ, C.R.
2758
DINN, W.M.
5801*
DINNER, M.
7007
DINNO, F.H.
7348*
DINNO, M.A.
949*, 1812, 5446, 7348*
DINOSO, V.P.
4927*
DINOSO, V.P., JR.
78*, 1282*
DINTSMAN, M.
5955, 6552*, 6554*, 7828
DIOGUARDI, F.
2548
DIOGUARDI, N.
2548, 3380, 3808
DION, R.
7737, 7739
DIOP, A.
425
DIOT, J.
424, 1219, 7704
DIOUF, A.B.
435
DIPPEL, C.
4623*
DIRSCHMID, K.
5021*
DISERENS, H.
6939*
DISSANAIKE, A.S.
6662
DITTRICH, H.
3079, 8412
DIVE, C.
254, 4041*, 4183, 5763*, 7737
DIVIZIA, G.
258
DIVRY, P.
8150
DJALDETTI, M.
11, 8282*
DJERBI, A.
3543
DJIAN, A.
3508*
DJORDJEVIC, D.
3315
DLATON, J.W., JR.
7175
DLUGOSZ, J.
527, 3358
DMITRIEV, A.E.
4376
DO CANTO, A.L.
4257*
DO PRADO QUINTINO, L.
4419
DO ROSARIO, M.
3831*
DO, U.H.
132
DOANE, W.A.
7833
DOBBEN, G.D.
3097
DOBBINS, J.W.
2593*, 4645, 4871*
DOBBS, R.E.
2684*
DOBBS, R.J.
5339
DOBERNECK, R.C.
1375
DOBRE, D.
2312*
DOBRE, V.
2312*
DOBRESCU, G.
2312*
DOBRILLA, G.
289, 2221, 3349
DOBRONTE, Z.
4251*
DOCKRAY, G.J.
372, 5187
DODD, G.D.
5558*
DODDS, A.J.
1286*
DODDS, W.J.
499, 2477, 4195, 4794*, 5308*, 5538, 6701, 7335, 7544
DODDS, W.L.
2184
DODGE, J.A.
2620
DODGE, P.
810
DODI, G.
2859, 4604, 7714
DODION, J.
7135
DODSON, C.
2777
DODSON, P.
6651
DOERTENBACH, J.G.
2831
DOFFOEL, M.
767
DOGLIA, M.
1493
DOGNALEK, J.
6395*
DOHI, I.
6567*
DOI, S.
3118
DOKLEN, A.
8326
DOLBAEVA, G.M.
7596
DOLBY, J.M.
418, 4931*
DOLETSKII, S.I.
6924
DOLIN, R.
420
DOLLINGER, H.C.
4067*
DOMELLOF, L.
1344*, 4808*
DOMINGO, N.
1017*, 6775*
DOMINGUES, S.H.S.
2487*
DOMINGUES, W.S.
5781
DOMINGUEZ CARMONA, A.
5091
DOMINGUEZ SAYANS, J.
5244*
DOMMERGUES, J.P.
581, 4259*, 5017*
DOMRES, B.
8219
DOMSCHKE, S.
114, 952*, 986, 1950, 2735*, 2792*, 2860, 2984*, 3195*, 4069*, 4070*, 4593*, 4849, 4859, 5386*, 5388*, 5626*, 6746*, 6837, 7325
DOMSCHKE, W.
114, 952*, 986, 1333*, 1950, 2288*, 2735*, 2759, 2761, 2792*, 2860, 2984*, 3195*, 4069*, 4070*, 4593*, 4849, 4859, 4997, 5000, 5343, 5386*, 5388*, 5626*, 6746*, 6837, 7325
DONAHUE, P.E.
2853, 7521

DONALD, D.E.
6762*
DONALD, J.W.
7220*
DONALDSON, J.D.
375
DONALDSON, L.A.
3492*, 3981, 6358*, 6381
DONALDSON, R.M.
3711
DONALDSON, S.S.
6599
DONATH, K.
5235
DONATI, A.
6932
DONATI, C.
3380
DONCEV, I.
270, 278
DONCKERWOLCKE, R.A.
6452*
DONCE, U.M.
597
DONDELINGER, R.
725, 3940*, 3957, 3967,
6192
DONHUIJSEN, K.
4488*
DONIACH, D.
4314
DONNELLY, B.J.
4481, 5977*
DONOVAN, I.A.
2275, 2762
DONTSOVA, N.D.
753
DONY, A.
3287, 4359*
DOOLITTLE, P.D.
6602
DOORENBOS, H.
578
DOPPELT, S.H.
3001
DOPPMAN, J.L.
4151*
DORFMAN, S.H.
4401
DORMANDY, T.L.
3375*
DORME, N.
2810
DORNER, A.
4818
DORNFELD, L.
5792*
DOROFEICHUK, V.G.
6426
DOROFEYEV, G.I.
2796
DORONIN, A.V.
8504
DORPH, S.
2740*
DORRA, M.
4265
DORRICOTT, N.
5632
DORRINGTON, L.
5560*
DORSCH, E.R.
2279
DORSI, J.P.
2142
DOS SANTOS, J.L.
3176
DOS SANTOS RODRIGUES, F.
2487*
DOSCHERHOLMEN, A.
5622
DOSHI, J.C.
6652
DOTEVALL, G.
1772*, 2309
DOTSON, M.M.
2538*
DOTTER, C.T.
4038*
DOUBLE, J.A.
1135, 4930*
DOUBRAVSKY, J.
6191
DOUGLAS, A.P.
445, 1241, 1658, 5163,
8339*
DOUGLAS, H.C., JR.
6360*
DOUGLAS, M.
7665
DOUGLAS, S.D.
3321*
DOUGLASS, H.C.
2412*
DOUGLASS, H.C., JR.
7825*
DOUNIAU, R.
3314
DOURDOUREKAS, D.
3394
DOURNOVO, P.
4461
DOUSA, T.P.
94, 1925, 4567*
DOUSTE-BLAZY, L.
4679*
DOUTRE, L.P.
3626*, 5562*
DOUWES, F.R.
4902*
DOW, J.
6077*
DOWLA, M.U.
7313
DOWLING, B.L.
4796
DOWLING, H.
6012
DOWLING, R.H.
2851, 3457*, 5293*, 6061,
8429*
DOWNING, J.W.
5327
DOWNING, R.
7017, 7226
DOYLE, J.T.
7515*
DOYON, D.
1210
DOYON, M.
4118
DOZOIS, R.R.
967, 1925, 3718, 4567*,
4573*
DRAGHI, E.
3802
DRAGOMER, A.S.
3044*
DRAGOMIR, N.
3204
DRAGSTEDT, L.R.
972
DRASAR, B.S.
1198, 2588*, 4113, 4924,
5188
DRAXLER, G.
3706
DREESMAN, F.R.
2018
DREESMAN, G.R.
6471*, 7160
DREILING, D.
1229, 7730
DREILING, D.A.
983*, 989, 2427, 2441,
2836*, 2857, 3327*, 4343,
5963, 6067, 7736*
DREN, A.
810
DRENICK, E.J.
3222*, 8193*
DREOSTI, I.E.
158
DREVON, C.A.
4653, 5461, 8013*
DREW, J.
1267
DREW, J.S.
8353*
DREW, R.
2003
DREW, S.I.
5912*
DREWS, M.
1087
DREYFURST, R.
3904
DREYFUS, B.
3476*
DREYFUSS, J.R.
3102
DRISKILL, D.R.
951*, 4563*, 6727*
DRITZ, S.K.
7159
DROBINSKY, I.R.
3435
DROCHMANS, P.
161, 5400*
DROETTO, G.
1416, 5715*
DRONFIELD, M.W.
3317*, 6198*

DRONIUK, R.I.
4082
DROPPLEMAN, D.A.
2793*
DROPSY, G.
3562, 6640*
DROUILLARD, J.
740
DROZD, J.
8243
DRUGOVA, T.A.
4822
DRUMMOND, A.
4688
DRUMMOND, G.B.
7583
DRUMMOND, S.
2415*
DRUSCHKY, F.
6420*
DRUTZ, D.J.
8054
DRYBURGH, J.R.
1144
DU PONT, J.J.H.H.M.
990
DUANE, W.
2943
DUARTE, M.I.S.
3353
DUBARRY, B.
4383
DUBARRY, J.J.
287
DUBE, B.
1528
DUBE, R.
1528
DUBERMAN, L.B.
8435
DUBERNARD, J.M.
5393
DUBIN, A.
3394
DUBINI, F.
1701
DUBOIS, A.
2304, 2310, 4010, 4090,
5175*, 6187
DUBOIS, J.B.
3294
DUBOIS, M.P.
814, 3744
DUBOIS, P.M.
814, 3744, 4489*
DUBOIS, R.S.
5102*
DUBOVA, A.V.
3244
DUBOVIK, N.T.
6307
DUBRASQUET, M.
1146, 3701, 3705
DUBREUIL, A.
4354*
DUBUC J.
6808
DUCA, C.
1174, 6102
DUCA, S.
1174, 6102
DUCASSOU, D.
1226, 6183
DUCASTELLE, T.
3295
DUCLIEU, J.
2416*
DUCLOS, J.P.
697*
DUCLUZEAU, R.
1671
DUDA, M.
5151*
DUDARENKO, B.I.
734
DUDRICK, S.J.
1712, 1827*, 2829, 4551*,
5246, 5307*, 5765, 6944
DUFF, J.H.
1420
DUFFY, J.
2018
DUFFY, K.
1844
DUFFY, T.E.
1568
DUFLO, B.
3567, 4136*
DUJOVNE, C.A.
120*, 4641
DUJOVNEY, F.
5169*
DUKE, G.E.
920, 1857
DUMAN, A.
336
DUMBLE, L.J.
8381*
DUMITRASCU, D.
5931*
DUMKE, K.
4488*
DUMMER, P.M.H.
6946
DUMOLARD, P.
7557
DUMONDE, D.C.
2864*
DUMONT, A.E.
5492
DUMONT, M.
40, 41, 2866*, 4615*, 4661,
5420*, 7414*
DUNBAR, G.A.
5496
DUNCAN, A.M.
7657*
DUNCAN, J.R.
158, 5292*
DUNCAN, M.A.
4448
DUNCOMBE, V.M.
3270, 5508, 7854*
DUNKLEY, L.C.
4738
DUNLOP, D.
2342
DUNLOP, E.H.
6068*
DUNN, D.C.
2296
DUNN, E.J.
5234
DUNN, G.D.
5718*
DUNN, M.A.
3823
DUNNE, W.T.
5979*
DUNNIGAN, D.
810
DUNPHY, J.E.
525
DUPAS, J.L.
4027, 4475*, 7908
DUPEYRON, J.P.
4150*
DUPONT, C.
3862*, 5468*
DUPONT, H.L.
2590*, 5226, 8458
DUPONT, J.R.
407
DUPRE, J.
1144
DUPREZ, A.
7715, 8289*
DUPUIS, Y.
2702*, 3829*
DUPUY, M.
339, 340, 341, 342
DUPUY, P.
339, 341, 4265
DUQUE, E.
4114
DURANCEAU, A.
4790*
DURAND, G.
1100
DURAND, P.
3259
DURAND, S.
3726*
DURANDY, Y.
2563, 3483*, 3488
DURANTE, E.
6175
DURBEC, J.P.
38, 2440, 3977, 5424*
DURBIN, R.P.
6039*
DUREK, W.
3347
DURENG, G.
6043, 6044
DURET, R.L.
6182
DURKIN, M.G.
358*
DURON, J.J.
3226
DUROVICOVA, J.
7365
DURR, H.K.
3122, 3982, 3999, 5087*

DURST, J. 1193, 4050
DUSPIVA, W. 4764
DUTHIE, H.L. 3636*, 7328
DUTTA, J.K. 7243
DUTTA, N.K. 780
DUTTA, S.N. 970
DUTTON, G.J. 6807
DUTTON, J.W. 474
DUVAL, C. 4192
DUVAL, J. 5014*
DUVAL, M. 40, 41, 3920, 4661
DUVALDESTIN, P. 5148*, 5845
DUVERNOY, W.F.C. 1400
DUZHII, E.D. 3162
DVORACEK, C. 8215
DVORNIK, D. 6808
DVUZHILNAYA, E.D. 7592
DWORAK, Z. 1088
DWORKIN, L.D. 1119
DWYER, J.M. 6474*
DWYER, R.C. 1191
DYAKONOV, V.T. 4162
DYBDAHL, J.H. 1194
DYBICKI, J. 6533*, 8247
DYBICKI, M. 528
DYBING, E. 2103*, 7136*, 8029*
DYCKNER, T. 4086
DYER, I.A. 8016*
DYER, R.L. 2110
DYKTYNSKI, P. 765
DYMOCK, I.W. 614, 616, 652, 658, 661, 709, 1183*, 2245
DYNNIK, V.I. 8342
DYSON, N.A. 3972
DYUBENKO, K.A. 5998
DZAMBAS, D. 3361*
DZAU, V.J. 97, 2828
DZHUMASHEV, E.Z. 4760
DZIECIUCHOWICZ, S. 3478*
DZIENISZEWSKI, J. 1017*
DZIEWALTOWSKA, D. 6103
DZINK, J.L. 1436
DZIURA, B.R. 4065
DZOGA-LITWINCWICZ, M. 3151
DZUGAEV, S.G. 1237
DZYUBICH, L.I. 6426
EADE, M.N. 5503
EADE, O.E. 449
EARAMPAMOORTHY, S. 5111*
EARNEST, D. 2046
EARNEST, D.L. 5704*
EASTWOOD, G.L. 1760, 4689
EASTWOOD, M.A. 299, 1392*, 4402, 7060, 8136
EATON, S.B., JR. 1222
EAVES, G. 4169
EBADI, A. 6209
EBBESEN, F. 5062*
EBEID, A.M. 1564, 2305, 7956*
EBELS, I.G. 1545, 5893, 6303
EBERLEIN, W. 6928
EBERSOLE, J.L. 4702*
EBERT, H. 3546
EBERT, R. 992, 2353, 3696, 4578
ECARLAT, B. 1187
ECCHER, S. 2777
ECHEVERRIA, P. 3525*
ECHINARD, C. 3637*, 3649
ECKARDT, V. 1831*
ECKEL, J. 6024
ECKER, M.D. 5708*
ECKERSTORFER, R. 2880*
ECKERT, P. 1321
ECKHERT, C.D. 5292*
ECKNAUER, R. 1759, 3585*, 5440*, 6138
ECKSTEIN, H.B. 5725
EDDLESTON, A.L.W.F. 590, 627, 666, 1477, 1518*, 1659, 2520, 2535, 3391, 3398, 3437, 3461*, 4314, 4347, 5108, 5428*, 8354*
EDELING, C.J. 2209
EDELMANN, G. 3512
EDEN, K.V. 6619
EDEN, T. 4222*
EDENHARDER, R. 5512*
EDERLE, A. 2439, 4981
EDERY, H. 5477*
EDGE, W.E.B. 6364*
EDGINGTON, T.S. 5085*
EDHAG, O. 7886
EDMAN, D.C. 1674
EDMONDS, C.J. 29, 7918*
EDMONDSON, J.W. 6758*
EDWARDS, C.R.W. 7287
EDWARDS, J.D. 798
EDWARDS, L.A. 5071*
EDWARDS, P.A. 2953
EDWARDS, R. 2958, 4674
EDWARDS, W.D. 8148*
EDY, V.G. 2516
EECKHOUT, C. 6699
EFENDIC, S. 3660*
EFIMENKO, G.P. 3450
EFREMOV, A.V. 3215

EFRON, G.
5644, 5712*
EFSEN, F.
5155*
EFTER, T.
4906*
EFUNI, S.N.
6265
EGBERTS, E.H.
6026*
EGEDORF, J.
3061
EGERE, J.U.
2666
EGGER, M.
6506*
EGGINK, W.F.
7120
EGGLESTON, J.C.
773
EGOROV, A.P.
6265
EGOROV, D.S.
5999
EGOROVA, G.I.
8189
EGOZI, I.
7059
EHARA, M.
5179*
EHLERT, C.P.
7216*
EHNHOLM, C.
3897
EHRET, I.
6098
EHRKE, D.
5158*
EHRLICH, F.E.
7233
EHRLICH, R.
7222
EICHEN, R.
2746, 4818
EICHFUSS, H.P.
2819, 4811*, 4818
EIDE, J.
7680
EIDELMAN, S.
4410
EIDT, H.
4813*
EIGENMANN, J.E.
7379
EIGUER, T.
1353
EILBER, F.R.
6615
EINARSSON, K.
1067, 6564*
EINHORN, R.
2237*
EISELE, G.R.
2705*
EISEMAN, B.
2404, 5228, 6076*
EISENBERG, H.
315*, 5521*
EISENBURG, J.
4320*
EISENSCHER, A.
1212, 4220*
EISENSTAT, T.E.
6336*
EISENSTEIN, B.
2656
EISSELT, M.
6395*
EJSMONT, L.
793
EK, J.
3267
EKBERG, O.
6337*
EKBLAD, M.
1907
EKELUND, G.
3291
EKELUND, K.
87, 2763, 6745*
EKENVED, G.
1772*
EKIMOVSKY, A.P.
3917
EKISENINA, N.I.
3236
EKRA, A.
1347
EKSTRAND, T.
7256
EL ALAMY, M.A.
5869
EL BADRAWY, N.
6646*
EL HASSAN, A.M.
5964
EL LOZY, M.
1106
EL MUNTASSER, I.H.
2493*
EL-NAGEH, M.
2493*
EL SHAFIE, M.
5671
EL-SHARKAWY, T.Y.
53, 6028
EL SHEIKH, N.
1518*
ELASHOFF, J.
2303, 4810*, 5366*
ELASHOFF, J.D.
6914*
ELBADAWI, A.
2464*
ELDER, G.H.
2949, 7754*
ELDER, J.B.
1236, 2713, 3892, 4549
ELEFTHERIOU, N.
625
ELETSKY, I.K.
2686, 2688
ELEY, K.G.
5317*
ELHARRAR, M.
6721
ELIAKIM, M.
3431*
ELIAN, E.
2479*
ELIAS, E.
539, 713, 3976, 4212*, 4782,
4989*, 5293*, 5520*
ELIAS, E.A.
1727
ELIAS, E.G.
5714*
ELIAS, L.L.
5714*
ELIAV, B.B.
3762*
ELIOT, N.
5035*
ELIZONDO, L.
6642*
ELL, P.J.
7530*
ELLEGAARD, J.
3992
ELLEKJOER, E.F.
598
ELLENBOGEN, G.
6205
ELLERT-ZYGADLOWSKA, J.
1543*
ELLESTAD-SAYED, J.J.
1437, 5706*
ELLINGER, S.
7143
ELLIOTT, D.W.
2183
ELLIOTT, J.G.
6773*, 6774*
ELLIOTT, K.R.
7383*
ELLIOTT, R.
5303
ELLIS, C.J.
3343*, 3937*
ELLIS, G.
3467*
ELLIS, H.
1291, 1293
ELLISON, M.
8291*
ELMAHDY, A.
4583*
ELMAN, A.
5045, 6898
ELMASRI, S.H.
2382, 2669
ELMORE, M.F.
4775
ELONEN, E.
6687*
ELOY, M.R.
5190
ELOY, R.
1822*, 1835, 2752, 3639,
3844, 7489*
ELPIDIO, M.
6740
ELSBORG, L.
2361, 3144*, 3541, 3992

ELSLAGER, E.F.
5970
ELSON, C.O.
3871*
ELSTER, K.
4813*
ELVEBACK, L.R.
4296*
ELVY, B.L.
1386
EMANUEL, B.
1697
EMANUELLI, G.
1220, 3975, 8367
EMAS, S.
957, 3675*
EMERIT, J.
5123*
EMMELOT, P.
1478
EMPSON, R.N., JR.
2079
EMURA, T.
329
ENCKE, A.
422
ENDE, A.V.D.
567
ENDER, L.A.
6534*
ENDERLIN, F.
8135
ENDERLIN, F.E.
6071*
ENDERT, G.
3352
ENDO, O.
6530*
ENDO, Y.
8355*
ENGEL, R.R.
3937*
ENGELBRECHT, C.
7447*
ENGELBRECHT, G.H.C.
3907
ENGELBRECHT, H.E.
4014
ENGELGARDT, N.V.
3751*
ENGELHARDT, D.L.
8117
ENGELHOLM, L.
2434, 7738
ENGELMANN, C.
565
ENGERT, J.
721
ENGERT, R.F.
4695, 5699*
ENGLERT, E., JR.
2294
ENGLISH, D.C.
5745
ENGQUIST, S.
7047
ENGSTER, M.
3024
ENKER, W.E.
5734
ENOCH, B.A.
798
ENOCHS, M.R.
5353
ENRIQUEZ, L.
8382*
ENTNER, M.
8447
ENZAN, H.
1040
ENZMANN, D.R.
298, 4517*
EPISHIN, A.V.
711
EPPIG, J.J.
2417*, 2418*
EPSTEIN, S.S.
1108
ERASMUS, D.A.
6661
ERB, W.
3500*
ERBER, W.F.
8237*
ERBLER, H.C.
3498*
ERDMAN, J.W., JR.
6773*, 6774*
ERHARDT, W.
3902
ERICHSEN, J.
4838
ERICKSON, J.C.
4098*
ERICKSON, S.K.
5415*
ERIKSEN, P.O.
7322*
ERIKSSON, C.J.P.
6831*
ERIKSSON, H.
8004*
ERIKSSON, M.
2641, 7636*
ERIKSSON, S.
1344*, 4224*, 4808*
ERKELENS, D.W.
578
ERKES, E.L.
4378
ERLANDSEN, S.L.
216
ERLINGER, S.
40, 41, 2665*, 2866*, 2955,
4615*, 4661, 5133, 5420*,
5422*, 7414*
ERNI, W.
3634*, 5330
EROKHIN, P.G.
269, 3997
ERSHOV, I.A.
716
ERTTMANN, R.R.
156
ERVE, P.R.
3784
ESATO, K.
5818*
ESCARTIN, P.
2547, 4315, 7189*
ESCHLER, A.
3498*
ESCOFFIER, J.M.
3736
ESCOURROU, J.
8204
ESCOURROUS, J.
6754
ESCRIVA ESCRIVA, C.
4091
ESCRIVA ESCRIVA, J.
4091
ESKOLA, P.
5959
ESPERER, H.D.
7415*
ESPINOSA, E.
4357*
ESPINOZA, J.
1096, 2089
ESPINOZA, L.R.
5650*
ESPOSITO, G.
7305*
ESSA-KOUMAR, N.
982*, 7372*
ESSA, N.
193*
ESSELSTYN, C.B., JR.
1643
ESSEN, J.
1966*
ESSEVELD, M.R.
5663
ESSIOUX, H.
8512
ESSY, A.J.
7944
ESTEBAN, R.
3438
ESTEFAN, A.
5153*
ESTEL, G.
6023
ESTEP, D.A.
4448
ESTEP, J.A.
1796
ESTEVEZ, A.
7804*
ESTIMA-MARTINS, A.M.
239
ESTIVAL, A.
5394
ESTRADA RODRIGUEZ, M.
505
ETIENNE, J.P.
677*, 3226, 3811, 4290*,
5891, 5925*, 8392
ETO, K.
1207
ETTMAN, I.K.
5662
EUBANKS, E.R.
2658

EUGENE, C.
436*
EULER, A.R.
1903, 2223*, 4122, 4553*, 4795*, 4801
EUSEBIO, E.B.
7010
EVANDER, A.
7722*
EVANS, D.C.
4592*
EVANS, D.F.
1609, 2031
EVANS, D.G.
5226
EVANS, D.J.
5226
EVANS, H.E.
1698
EVANS, J.O.
2949
EVANS, J.S.
8007*
EVANS, J.T.
7667
EVANS, K.T.
4385, 6731, 6829*
EVANS, L.S.
433
EVANS, N.
2131
EVANS, O.T.
7018
EVANSON, O.A.
920
EVDCKIMOV, V.V.
2687
EVELAND, L.K.
2667
EVENSHTEIN, Z.M.
6626
EVERED, D.F.
7931
EVERS, G.
6873
EVERSON, R.B.
1492
EVERTS, V.
7960*
EVILL, C.A.
2023
EVTUSHENKO, V.P.
755
EWEN, S.W.B.
6352*
EWERS, H.R.
323
EWERWAHN, W.J.
4959*
EWING, D.J.
6224*
EXARCHAKOS, G.
1291, 1293
EXARHOS, N.
2201
EYAL, F.G.
2192
EYAL, Z.
391, 463, 6558*
EYO, E.E.
5577
EYSSEN, H.
2577*
EZAKI, H.
2823
FABER, R.G.
1928*, 5627*
FABIA, F.
7812*
FABIANI, V.L.R.
6055
FABIANOVA, B.
6109
FABRE, F.
717, 8417
FABRE, J.
5136
FACCIOLI, G.
2981, 3836, 8098
FACER, P.
4701*
FADEEV, N.P.
3084
FADIKA, G.
7450
FADYUKOVA, A.I.
3174
FAGGIONI, L.G.
3621, 4512
FAGNIEZ, P.L.
3889
FAGUNDES, D.J.
3170
FAHR, K.
5674, 5911*
FAHRENKRUG, J.
6819*, 7374*
FAIN, J.N.
2940
FAIN, S.I.
3150
FAIN, S.N.
464
FAINARU, M.
8014*
FAINTUCH, J.
3333
FAIRBANKS, V.F.
1186*
FAIRCLOUGH, P.D.
24, 7912*
FAIRMAN, M.J.
6133, 6978*
FAITEL'BERG, R.C.
2968, 6825
FAIVRE, J.
4166, 4190, 6901
FAJARDO, L.F.
5689
FALASCA, C.A.
3140*
FALCHI, S.
7178*
FALCHUK, K.R.
1731*
FALCK, J.
6186
FALEK, A.
7742*
FALK, G.
801
FALK, R.E.
199, 3885
FALKO, J.M.
1771*, 4590*
FALLIS, J.C.
1418
FALLSTROM, S.P.
3248*
FALOON, W.W.
2331, 6942*
FALSER, N.
4803*
FAMAEY, J.P.
7939*, 7952
FAMILIARI, G.
2407*, 5758*
FANAROFF, A.A.
1692
FANCOURT, M.
3256*
FANELLI, F.R.
3393
FANG, H.S.
2771
FANG, W.F.
2125
FAOAGALI, J.L.
7792
FARA, J.W.
1970*, 2128, 4690
FARAH, F.
6080*
FARAHMANDIAN, I.
5250
FARBER, E.
558, 6801
FARBER, J.L.
6088*
FARBER, N.A.
3423*
FARCASIU, M.
2009, 8015*
FARGE, B.
4461
FARGIER, M.C.
3178
FARGION, S.
3392
FARGION, S.R.
8383*, 8433*
FARID, Z.
1674, 6644*, 6660
FARINELLA, M.
8422*
FARINI, R.
1595, 3173, 3382
FARIVAR, M.
2883*
FARKAS, I.
1632
FARKHUTDINOV, R.R.
4225

FARLEY, A.
3511, 4785, 6884
FARMAN, J.
6380*
FARMER, J.M.
5375
FARMER, R.G.
844, 847
FARNIK, J.
2490*
FARRELL, G.C.
7779
FARRER-BROWN, G.
1278
FARRIAUX, J.P.
2617
FARRIS, J.M.
723*
FARRUGIA, F.
5260
FARTHMANN, E.
1152
FASS, D.N.
2056
FASSATI, M.
1555*, 3098
FASSATI, P.
1555*, 3098
FAST, D
4585*
FASTH, S.
3318*
FASTLICH, E.
1290
FATCURECHI, V.
1424
FATYKHOVA, R.M.
3542
FAUERHOLDT, L.
6457*
FAULCONER, H.T.
490
FAURE, C.
4008
FAURE, X.
5978*, 6179
FAUSA, O.
606, 812, 1456*, 2450*,
6672*, 7393*, 8226*
FAUST, H.
3941*, 8081
FAUSTO, N.
6810
FAUVERT, R.
1566
FAUVY, A.
426
FAVAREL-GARRIGUES, J.C.
4829
FAVIA, G.
5584
FAVIER, C.
4945
FAVRETTI, F.
4604
FAVUS, M.J.
5954
FAWCETT, A.N.
7982*
FAYS, J.
1708, 7715, 8289*
FAZIO, V.
8509*
FAZIO, V.W.
7898
FEATHERS, R.S.
5719*
FEDDLESTCN, A.L.W.
4285*
FEDELI, G.
1079
FEDERSPIL, G.
3412
FEDOR, E.
1365
FEDOROVA, O.D.
764
FEDOROVSKAYA, E.O.
6489
FEDOROWSKI, T.
4640
FEDOTOV, V.V.
668
FEDOTOVA, O.I.
1363
FEDRICK, J.
3146*
FEDYANIN, Y.P.
6502
FEELEY, J.C.
6619
FEGELER, K.
6974
FEGER, J.
1100
FEHER, J.J.
2080, 4642
FEHER, T.
6527*
FEHLMANN, M.
5261*
FEIFEL, G.
6286, 7355
FEIGENBERG, Z.
6552*, 6554*
FEIL, C.
5050
FEINBERG, S.B.
3219*, 6151*
FEINSTEIN, A.R.
5193
FEINSTONE, S.M.
2494*, 5874*
FEISS, J.S.
1367
FEIST, D.
3112
FEKETY, F.R.
4730
FEKETY, R.F., JR.
3522*, 5769
FELBER, J.P.
991, 2969, 3728
FELDMAN, D.S.
888, 4497*
FELDMAN, E.B.
888, 4497*
FELDMAN, J.M.
4100*
FELDMAN, M.
960, 2779, 7968*
FELDMAN, P.
3283
FELDMAN, S.E.
1137
FELDMANN, G.
43, 134, 4338*, 7115*,
7414*
FELITSYN, L.A.
6455
FELIX, E.L.
1374, 4151*
FELIX, M.
4358*
FELKER, T.E.
8014*
FELLER, E.R.
5907*
FELNER, S.
4276*
FELSENFELD, C.
5505
FELSHER, B.
3776
FELSHER, B.F.
2911, 7755*
FELTKAMP-VROCM, T.M.
4468*
FENDEL, H.
3536
FENGER, C.
5746
FENGLER, J.D.
6184, 8203
FENIKSOVA, R.V.
4143
FENNELL, R.H., JR.
1461*
FENNER, A.
7999*
FENWICK, D.E.
7479
FENYO, G.
2098*, 3888, 7290*, 8194*
FERANDO, R.
2212
FERARD, G.
1777*, 5452
FERARU, F.
3185
FERDINANDUS, L.D.
5448
FERGUSON, A.
1645*, 8099*
FERGUSON, D.J.P.
3026
FERGUSON, D.L.
6149
FERGUSON, J.A.
7781*
FERGUSON, J.C.
3341*
FERGUSON, J.H.
4623*

FERGUSON, R.
2362, 4131*, 6198*
FERLAND, S.
4
FERLATTE, M.I.
5289*
FERLAZZC, B.
5884
FERMANIAN, J.
5123*
FERMAUD, H.
348
FERN, M.
906
FERNANDA TORGAL GARCIA, M.
4686*
FERNANDES, J.L.
1721
FERNANDEZ ANDRADE, C.
5122*
FERNANDEZ-CRUZ, E.
4315
FERNANDEZ-HERLIHY, L.
1741, 7629
FERNANDEZ-LOPEZ, V.
4680*, 6817*
FERNANDEZ, R.
394, 395, 396, 397
FERNET, M.
427
FERNHOLZ, H.J.
6171
FERRALI, M.
8021*
FERRAND, B.
8198
FERRARA, A.
2808, 3714
FERRARI, A.
512, 1416, 3288, 3356, 3532,
4496, 5715*, 7527*
FERRARI, G.
2706*
FERRARO, C.
3605*
FERRAU, O.
345
FERRAZZI, M.
1464
FERREIRA, P.S.
4418
FERRIE, M.M.
2824, 3876
FERRIS, A.A.
3433*, 8351*
FERRIS, E.
1295
FERRONI, P.
8358*
FERRUCCI, J.T., JR.
1222, 3102, 5517*, 6199*
FERWERDA, J.
4463
FESCE, A.
6841
FESSEL, J.M.
7808*
FESTI, A.
2549
FESTI, D.
1607, 4670
FEVERY, J.
6515, 7135
FEVRE, D.I.
1297, 6378*
FEYDY, P.
3224
FEYERABEND, G.
1759, 3585*
FIALA, J.M.
8257
FIALA, M.
5085*
FIASSE, R.
4183, 5225, 7896*, 7897*
FICHELLE, J.M.
4773
FICI, F.
4355*
FICO, P.
8378
FIODIAN-GREEN, R.G.
2265, 2266, 2300, 3693
FIEDLER, H.
8362
FIEDLER, L.
6154
FIEDLER-NAGY, C.
130
FIELD, M.
34, 1803, 2078
FIELDING, J.F.
7043
FIELDS, H.A.
6471*, 6482*
FIESSE-VANDALE, P.Y.
3938*
FIESSINGER, J.N.
7115*
FIGARELLA, C.
1936, 1964, 3329, 3736,
3999
FIGENSCHAU, K.J.
790
FIGUEIREDO, A.
6520*
FIGUEIREDO, J.F.M.
6645*
FIGUEROA, J.
3396
FIL'SHTINSKII, A.I.
4059, 4825
FILHO, J.A.
6055
FILICE, H.
7149*
FILIMONOV, M.I.
4387
FILIMONOV, R.M.
6265
FILIMONOW, G.P.
7187*
FILIPE, M.I.
5746
FILIPOVIC, D.
5883, 6499*
FILIPPAZZO, G.
1479
FILIPPICH, C.
822
FILIPPINI, L.
4933*, 7085*, 7563
FILIPPINI, M.
289
FILIPPINI, P.
8378
FILIPPKIN, M.A.
1195
FILIPY, R.E.
2067
FILKOVA, E.M.
4409
FILL, W.
1654
FILLIT, H.
7281
FILLY, R.A.
7684
FILSTON, H.C.
774, 3159
FINBERG, L.
1691
FINBY, N.
1200
FINCH, J.
6394*
FINCH, M.
8355*
FINE, A.
3669*
FINEGOLD, S.M.
3222*, 8193*
FINIKOVA, L.
3863*
FINK, M.L.
998
FINK, R.L.W.
5454
FINKELSTEIN, J.D.
5086*
FINKELSTEIN, R.
1661
FINKINSHTEIN, Y.C.
135
FINLAYSON, M.H.
3792
FINLAYSON, N.D.C.
601, 2589*, 7084*
FINLEY, A.
5191
FINNIS, D.
8424*
FIODOROV, N.E.
730
FIORELLI, G.
2548, 3392, 8383*, 8433*
FIORI, G.P.
4294*
FIRNAU, G.
5554
FIRSOV, E.S.
6238
FISCHBACH, H.
6985

FISCHBERG, E.
2929
FISCHER, A.
5857*
FISCHER, F.
2420
FISCHER, H.
1757
FISCHER, J.
5764
FISCHER, J.E.
189, 796, 1161, 1564, 2305,
2473, 4443, 5207
FISCHER, J.F.
7956*
FISCHER, K.C.
7113*
FISCHER, M.
113, 351, 3774, 3916, 4756,
6113, 6736, 7110*
FISCHER, P.W.F.
7435*
FISCHER, R.P.
1312
FISCHMANN, B.
6606
FISER, M.E.
3082
FISER, R.
3396
FISHCHENKO, A.I.
734
FISHER, A.A.
366
FISHER, J.
2672*
FISHER, J.R.
7460
FISHER, K.A.
3833*
FISHER, L.S.
1472
FISHER, M.A.
3995
FISHER, M.M.
1065, 4617*
FISHER, R.L.
7837
FISHER, R.S.
51, 927, 1260*, 1276, 1840,
1842, 2229
FISHER, S.R.
4790*
FISHMAN, P.
11
FISHMAN, W.H.
7486*, 7487*
FISSORE, O.
3513
FITCH, L.L.
5692
FITTERER, J.D.
3282*
FITTS, W.T., JR.
4201*
FITZER, P.M.
593, 1215
FITZGERALD, J.
7770
FITZGERALD, J.F.
5448, 7311, 7879
FITZGERALD, C.
993, 1548, 1955, 1962
FITZGERALD, P.
993, 1962
FITZPATRICK, J.M.
993, 1962
FITZPATRICK, P.
3138*
FITZPATRICK, P.F.
449
FIXA, B.
1327
FLABEAU, F.
413, 7595
FLACH, A.
8219, 8220
FLAKS, B.
2158, 2689
FLAMANT, Y.
6898
FLAMINI, G.
6126
FLANIGAN, D.P.
6561*
FLASCH, H.
3599*
FLASHNER, Y.
7341
FLATAU, E.
6674*
FLATMARK, A.
624, 6408*, 7098*
FLAX, F.
2640
FLECKENSTEIN, P.
2737*, 2740*, 5314*, 6676*
FLECKER, K.
2871*
FLEGEL, U.
3038, 3225
FLEISCH, H.
5347, 5498
FLEISHER, D.
5766
FLEISHER, E.B.
5451
FLEMING, C.R.
2545*, 6536*
FLEMSTROM, G.
7360
FLESHLER, B.
2290
FLETCHER, G.H.
2633
FLETCHER, J.W.
6514*
FLEURY, A.
5632
FLEXNER, C.
965, 2140
FLIEGEL, C.P.
6529*, 8128
FLIESHER, E.B.
2081
FLINN, W.R.
3503*
FLINT, G.
5257*
FLOCH, M.H.
2349, 4401
FLOOD, M.S.
6942*
FLOREN, C.H.
3758*
FLORENCIA, J.
4419
FLORES, A.
7149*
FLORES, F.N.
4424
FLORET, D.
4105*
FLORY, J.
1573*
FLOYRAC, G.
5050
FLUTEAU, D.
1246
FLUTEAU, G.
5395*
FLUTHAS, P.
2201
FLYE, M.W.
4790*
FODOR, O.
5887, 5931*
FOEMMEL, R.
7155*
FOERSTER, C.F.
6702
FOGEL, M.R.
2315*
FOGELMAN, A.M.
2953
FOGLER, R.
7019
FOGLIA, R.P.
5766, 7009
FOKINA, A.A.
322, 7977
FOKINA, T.V.
691
FOLIOT, A.
3811, 4649
FOLK, R.M.
1044
FOLKE, M.
2016, 2042, 5408*
FOLKERS, K.
1836, 5323*
FOLLETT, E.A.C.
2668
FOLLETT, G.F.
1369
FOLLOWS, O.J.
3943*, 6575*
FOLLY, G.
2738*
FOLSCH, U.R.
992, 1757, 1951, 2437,
6069*
FOLSCROFT, J.
4598

FOMENKO, L.I.
749
FOMICHEV, V.I.
678, 746, 756
FOMIN, A.N.
6300
FOMIN, N.N.
6300
FOMON, S.J.
7883
FONDACARO, J.D.
892
FONKALSRUD, E.W.
797, 4866*, 5570, 5766
FONSECA, L.C.
4393*
FONSECA, P.C.
6055
FONTAINE, J.
5316*, 7939*, 7946, 7952
FONTANA, G.
1231, 2848, 3330, 4899,
5529
FONTANGES, R.
6842
FOOTE, G.A.
2206
FOOTE, S.R.
3046*
FORD, J.R.
6562*
FORDHAM, S.D.
2242
FORDTRAN, J.S.
1661, 4391*, 7968*
FORELL, M.M.
110, 288, 1348, 2846
FOREST, G.
4075*
FORGACS, A.
7585
FORK, F.T.
846
FORKER, E.L.
5176*
FORMAL, S.B.
1091, 1660, 7921*
FORMAN, S.
5138*
FORMAN, S.P.
3321*
FORMENTO, E.
7072
FORNASIRI, R.
7705
FORNES, M.F.
2261
FORREST, A.P.M.
71*, 2799
FORREST, J.A.H.
601, 1882*, 7084*
FORRESTER, J.M.
2966*
FORSSMANN, W.G.
2679*, 3749*, 5992
FORSTED, D.H.
6392
FORSTER, E.
538, 540
FORSTER, H.
4513
FORSYTH, A.
3319*
FORTE, F.
7764
FORTEZA VILLA, J.
8163*
FORTIER-BEAULIEU, M.
4366*, 7208*
FORTMAN, D.L.
7381
FORTNER, J.G.
2982*, 4215
FOSCOLO, P.P.
1614
FOSS, D.C.
6152*
FOSSDAL, J.E.
7680
FOSSIECK, B.E., JR.
2449*
FOSTER, B.
1548
FOSTER, D.N.
2185
FOSTER, G.
5907*
FOSTER, K.J.
4758
FOSTER, L.D.
1154
FOSTER, P.C.
1996, 7452
FOSTER, S.C.
7543
FOTOPOULOS, J.P.
7840
FOTTRELL, P.F.
448, 2354, 3251*
FOURNET, J.
4226, 4862, 5098
FOURNIER, A.
2702*, 3829*
FOURNIER, P.
2702*, 3829*
FOURQUE, B.
4862
FOURTANIER, G.
2887*, 4566*
FOUTY, W.J., JR.
5753
FOWLER, E.F.
6782*
FOWLER, W.C., JR.
1354
FOWLIE, F.E.
5481*
FOX, A.W.
1876*
FOX, B.
6726*
FOX, K.R.
1814
FOX, W.P.
6970
FOXLEY, E.G., JR.
1585
FRACASSO, M.E.
8076
FRADKIN, V.A.
4312
FRAGER, S.H.
5774*
FRAGET, P.
4824
FRAGOSO ARBELO, T.
438, 446, 451, 1381
FRAGOSO, T.
6658
FRAJRIA, R.
5879*
FRAME, C.M.
6132
FRAME, M.H.
7363
FRANCAVILLA, A.
5927*
FRANCESCATTI, D.S.
1117
FRANCHI, M.
3549
FRANCHI-MICHELI, S.
2091
FRANCILLON, J.
4075*, 6937, 6938
FRANCIS, D.E.M.
5936*
FRANCIS, G.M.
871*
FRANCK, P.
4150*
FRANCO, D.
2453*, 2560, 2565, 2653,
3402, 3483*, 3488, 3800,
3905
FRANCO, E.
1536
FRANGI, S.M.
3861*
FRANK, D.M.
4737
FRANK, O.
1019*
FRANK, P.
745, 766, 6227*
FRANKEL, L.A.
1303
FRANKEL, M.
6547*
FRANKEL, N.B.
8262
FRANKEN, F.H.
1410, 6186, 7818
FRANKL, H.D.
6914*
FRANKLIN, C.
5207
FRANKLIN, E.C.
6461*
FRANKLIN, R.A.
5335
FRANKLIN, R.H.
5586
FRANSDEN, E.K.
1941

FRANSSILA, K.
6831*
FRANZ, W.D.
4841
FRANZKE, W.
6420*
FRAPPART, L.
4102*
FRASE, S.
5439*, 6083*
FRASER, D.B.
4435
FRASER, G.M.
3056
FRASER, H.S.
2873*
FRASER, J.
5243*
FRASSON, F.
4101*
FRASSON, P.
3553, 8161
FRATTON, A.
2221
FRAUMENI, J.F., JR.
6617, 7188*
FREDDARA, U.
3514
FREDERIKSEN, P.
4976*
FREDJ, G.
4774, 5395*
FREDLUND, P.
4268
FREDLUND, P.E.
4660
FREEARK, R.J.
433, 508, 1626, 7029
FREED, D.L.J.
8477
FREEDLAND, R.A.
8009*
FREEDMAN, A.R.
2118
FREEDMAN, B.J.
7889
FREEDMAN, R.A.
5287*
FREELAND, G.R.
928, 1829*, 4521*
FREEMAN, H.
5305
FREEMAN, J.B.
5180*, 6581*
FREEMAN, L.M.
4753
FREEMAN, M.
7173*
FREENY, P.C.
260, 1453*, 2581*
FREGNAN, G.B.
1008*, 4627*
FREI, J.V.
6632
FREI, P.C.
4299*
FREIBERG, J.M.
2642
FREIBURGHAUS, A.
2360
FREIDIN, N.
8282*
FREIMAN, I.
7875
FREISE, J.
6443*
FREITAG, H.
6885
FREITAG, N.
5205
FREMLAND, A.
5643
FRENCH, G.L.
7522
FRENI, M.A.
628, 688, 1542*
FRENI, S.C.
4330*
FRENK, S.
6316
FRENKEL, E.P.
2015
FRENNING, B.
2730*
FRESTON, J.W.
2294
FRETHEIM, B.
1599, 6406*, 7098*
FREUDENBERG, J.
1024
FREUND, H.
391, 463, 6558*, 7042
FREW, R.
4527*
FREXINOS, J.
639*, 2980, 3547, 3687, 4206, 5385*, 5880*, 6754, 8204
FREY, P.
3240
FREY-WETTSTEIN, M.
5082*, 8362
FREZZA, M.
3411, 7930
FRIC, P.
3843, 3950, 4004, 5511*
FRIDHANDLER, L.
2435, 7550
FRIDMAN-MANCUZIC, A.
168
FRIDRICH, R.
3936*
FRIED, W.
8036*
FRIEDLAND, G.W.
7544
FRIEDLANDER, D.M.
5561*
FRIEDMAN, G.
5429*, 7763
FRIEDMAN, I.H.
8131
FRIEDMAN, N.B.
6614
FRIEDRICH, E.
3183
FRIEDRICH-FREKSA, A.
2910
FRIEDRICH, G.
4631*
FRIEDRICH, M.
5030*
FRIER, B.M.
5168*, 6444*
FRIGERIO, G.
7671
FRIK, W.
3052, 6171, 7197*
FRIMBERGER, E.
3676
FRIMEL, K.
4232
FRINTZILAS, M.
6510*
FRISON, J.C.
566, 3516, 5797*
FRITH, L.O.
151
FRITSCH, W.P.
237, 4560*, 6038*, 7603
FRIZZELL, R.A.
4505*, 5441*
FROESCH, E.R.
6948, 7379
FROHLICH, H.
4470*
FROHLICH, J.
6795
FROHLING, W.
2776
FROHMAN, L.A.
5954
FROL'KIS, A.V.
1363
FROLAND, S.S.
8226*
FROLICH, J.
7119
FROLICH, R.
6736
FROLIK, C.A.
1115
FROLKIS, A.V.
4250*, 6321
FROMAGECT, P.
3674*
FROMENT, T.
1707
FROMKES, J.
8147*
FROMM, D.
36, 2818, 3710, 4570*, 5285*, 7928
FROMM, H.
1609, 3498*, 4258*, 6586*
FROMMER, D.J.
6072*
FROMMHOLD, H.
3039*, 5156*
FROSLIE, A.
7434*
FROSNER, G.G.
5871*

FROST, F.
5595*, 6917*
FROTZ, H.
4472*
FRUHMORGEN, P.
459, 842, 1179*, 2219, 3041*, 4943, 7535
FRUIN, R.C.
5625*
FRY, J.R.
119*
FRY, R.J.M.
7425*
FRYDECKA, I.
380
FUCCELLA, L.M.
6593
FUCHIGAMI, T.
3161
FUCHS, C.G.
7200*
FUCHS, H.
3119
FUCHS, H.F.
6172, 7065
FUCHS, K.
8323
FUCHS, W.A.
1248, 4612*
FUCHSJAGER, N.
2861
FUCINI, C.
1131
FUDENBERG, H.H.
5108
FUELLEMAN, R.W.
5910*
FUGAZZOLA, C.
4101*
FUGIMURA, I.
7901*
FUHRO, R.
5285*, 7928
FUJII, K.
1283*
FUJII, T.
1983
FUJII, Y.
377
FUJIMORI, H.
7914*
FUJIMOTO, Y.
3713
FUJIOKA, Y.
414
FUJISAWA, Y.
6777*
FUJITA, M.
4634*
FUJITA, R.
6549*
FUJITA, S.
1102*
FUJITA, T.
200, 679, 4331*, 5453
FUJIWARA, K.
1166, 3033, 7469
FUJIWARA, M.
1083, 7342*
FUJIWARA, S.
414
FUJIWARA, T.
2156, 7161
FUJIWARA, Y.
3597, 5777
FUJIYAMA, S.
1207
FUKAI, Y.
3913
FUKASE, M.
3798
FUKAZAWA, T.
603
FUKUCHI, K.
1754*
FUKUCHI, M.
1228
FUKUDA, E.
4619*
FUKUDA, M.
3014, 7480
FUKUHARA, J.
689
FUKUHARA, M.
1013*, 8296*
FUKUI, O.
5587*
FUKUMOTO, K.
3115
FUKUSHIMA, K.
6530*
FUKUSHIMA, T.
5670, 8095
FUKUTA, S.
7292
FUKUTOMI, H.
7669
FUKUYAMA, Y.
1484
FULFORD, K.W.M.
7783*
FULLEN, W.D.
6416*
FULLER, G.C.
2038
FULLER, J.
3124*
FULLER, J.W.
7037
FULLER, R.K.
3481*
FULLER, T.J.
2335
FUNDING, L.
6764*
FUNG, W.P.
338, 2244, 3187, 3993
FUNOVICS, J.
2861
FUNOVICS, J.M.
189, 1161
FUNSTON, M.R.
6410*, 7234
FURFARO, M.
4293*
FURMAN, W.
5836
FURMANENKO, N.F.
8277
FURNELLE, J.
3737
FURNEMONT, E.
6889
FURNESS, J.B.
1084*, 2742*
FURNIVAL, C.
7836
FURUGARD, K.
848
FURUGOURI, K.
6018
FURUNO, K.
150, 1018*
FURUTA, F.
1137
FURUTA, S.
686, 3369*
FUSSI, F.
1079
FUTAGAWA, S.
312
FUTTERMAN, S.
5054
FUZAILOV, Y.M.
4414
GABARETS, E.P.
3435
GABBE, E.E.
7749*, 8268*
GABBERT, H.
3824*
GABBIANI, G.
862
GABELLA, G.
7488*
GABRIEL, L.
8397*
GABRIELSSON, N.
5527
GABRIELYAN, N.D.
5438
GABRYELEWICZ, A.
527, 533, 710, 1451, 2995
GABRYS-POMYKALA, B.F.
2838*, 7350*
GABUNIIA, R.I.
324, 3914, 3965, 3983
GACKE, D.
1637
GACS, G.
2700*
GACYK, W.
743, 3400, 6533*, 8247
GADACZ, T.R.
3611*, 4865*
GADE, M.F.
1556*
GADOMSKA, H.
3292
GAETA, G.B.
8378
GAFFEY, T.A.
5985
GAFTER, J.
8282*

GAGGIOTTI, G.
4546
GAGINELLA, T.S.
1750*, 2643, 3611*, 7436*,
7483*, 7484*
GAGNON, R.F.
7064*
GAIA, E.
3356
GAIDANO, G.P.
2446, 2775, 3449, 5879*
GAILLARD, F.
5588*
GAILLARD, J.
7557
GAINES, R.D.
7232
GAIRDNET, D.M.J.
418
GAISFORD, W.D.
2317, 3055, 3951
GAITONDE, B.B.
777, 2083
GALAEVA, S.S.
760
GALAMBOS, J.T.
612, 720, 7742*
GALANTE, D.
2041
GALANTI, B.
2522, 8384*
GALARDY, R.E.
7366*
GALASINSKI, W.
1164
GALBRAITH, R.M.
590, 666, 3427*, 4314, 5108
GALDAMES, M.
253, 3569
GALEAZZI, R.
4072, 4850, 7430*, 7508*
GALIAN, A.
450, 4104*, 4181, 5174*,
6351*, 6941*
GALINDO, E.
5226
GALJAARD, H.
3868*
GALKIN, V.A.
727, 750
GALL, D.G.
33, 2962*, 3373*, 3607*,
7261, 8225*
GALL, F.
4994
GALLAGHER, D.M.
5730
GALLAGHER, K.
870*
GALLAGHER, N.
3610*
GALLAGHER, N.D.
1650, 5459
GALLEGO CARRACEDC, E.
8155
GALLEGO HERNANDEZ, A.
7565
GALLENKAMP, H.
2047, 3813, 5088*, 5418*
GALLERINI, L.
3509
GALLI, E.
409
GALLITANO, A.L.
1295
GALLO, D.
1009*
GALLO, V.
7049
GALLOT, D.
1048, 2896, 3903
GALLOWAY, R.W.
7548
GALLUSER, M.
1777*
GALLUZZI, F.
4355*
GALMARINI, D.
1493
GALMICHE, J.P.
3583
GALPERIN, E.I.
8322
GALZIGNA, L.
4778
GAMACHE, A.
507
GAMBIN, G.T.
2310
GAMMELTOFT, M.
1874*
GAMMON, A.
5301
GAMSTATTER, G.
3136, 4474*
GANAPATHY, V.
5301
GANATRA, R.D.
7386*
GANCEDO, H.
1668
GANCHENKO, L.I.
4076
GANDHI, V.
3043*
GANESHAPPA, K.P.
4794*
GANG, H.
1036
GANGAROSA, E.J.
789, 4418, 4419, 5170*,
7264
GANGL, A.
25, 2727, 6655, 8096
GANGOLLI, S.D.
1032
GANGULI, P.C.
1236, 3669*
GANGULY, A.K.
3008
GANGULY, J.
7398*
GANSER, V.
4630*
GAPPAROV, M.M.
2798
GARAS, J.
3628*
GARBIN, L.
5479*
GARBUTT, J.T.
3147*
GARCIA, A.C.
6998*
GARCIA-CALVO OLIVERA, M.
7565
GARCIA-DIAZ, J.F.
7308*
GARCIA, E.
1721
GARCIA, E.P.A.
8312
GARCIA GIL, A.
3747
GARCIA, H.
4891
GARCIA, M.E.
3283
GARCIA, M.M.
5152*
GARCIA PEREZ, H.
8401*
GARCIA-PONT, P.
5086*
GARCIA, R.
4145
GARCIA ROMERO, E.
8496
GARCIA-SEGURA, L.M.
3683
GARDA, E.
4256*
GARDANI, G.
8259
GARDE, J.
7211*
GARDEUR, D.
284
GARDIKAS, C.
4671
GARDINER, I.G.
449
GARDIOL, D.
2893, 4662, 6111
GARDNER, B.
8419*
GARDNER, E.J.
7053
GARDNER, J.D.
116, 118, 178, 999, 1002,
1938, 1941, 5175*, 7983*,
7985*
GARDNER, M.J.
7284
GARDNER, M.L.G.
16*, 5338
GARFINKEL, D.
5041*
GARFINKLE, S.E.
4123
GARG, B.D.
1982
GARG, D.K.
3006, 4569*

GARG, L.C.
2335
GARIJO FORCADA, J.M.
8195
GARNER, A.
2786*
GARNETT, P.A.
1726
GARNICA, A.D.
4425
GARNICK, M.B.
6397*
GARNIER, H.
3889
GARNIER, M.
694, 4254*, 8417
GARRARD, W.F.
7159
GARRETT, J.R.
5, 3000
GARRIDO, A.
5305, 8120
GARRIDO, A.B., JR.
370
GARRIDO, A., JR.
6934
GARRIDO, G.
1723, 4352
GARRIDO PERALTA, M.
5049
GARRIDO TORO, A.
7976
GARRIGUES, J.M.
3286, 4184
GARRISON, R.N.
5669
GARSTKA, G.
8343
GARTNER, U.
5926*
GARTON, G.A.
138
GARTSIDE, J.M.
1662
GARTY, B.
8469
GARVEY, G.J.
2369*
GARY-BOBO, J.
3294
GARZA-GARZA, R.
7726*
GASANOV, T.M.
8443
GASBARRINI, G.
3293, 3404, 3518, 4662,
4899, 4912
GASH, D.B.
5247
GASKIN, R.J.
2784*, 2804
GASPAR, G.
1167
GASQUET, C.
3131, 4390*
GASSE, J.
3182, 4828
GASSER, R.
909
GASSMANN, R.
6158
GASSNER, S.
196, 5477*
GASSULL, M.A.
1198, 5598*
GASTAGNINI, A.
2745*
GASTARD, J.
5757*, 8394
GATEAU, P.
1516*
GATEHOUSE, D.
4948
GATENO, N.
5153*
GATES, G.A.
7254
GATES, G.F.
5531, 8290*
GATINEAU-SAILLANT, C.
5232
GATLEWAR, W.N.
779
GATTEGNO, L.
7812*
GATTI, G.L.
2036
GAUB, J.
3797
GAUCHER, P.
2159, 2216, 4012, 4471*,
8513
GAUENS, I.K.
5893
GAULTIER, M.
8345
GAUTHIER, A.
3486, 3736
GAUTHIER, N.
5011*
GAUTIER, A.
4662, 6111
GAUTIER-BENOIT, C.
8246
GAUTIER, M.
581
GAUTVIK, K.M.
5350, 7076*
GAVALER, J.
1890
GAVEND, M.
4862
GAVRILENKO, Y.V.
4765, 8186
GAVRISH, N.I.
3162
GAWRONSKI, M.
1087, 1088
GAY, C.
1809
GAY, E.
1097
GAY, G.P.
1269
GAY, R.J.
2766
GAYLER, B.W.
4125
GAYLOR, J.L.
6791
GAZET, J.C.
6293*
GAZIT, E.
4906*
GAZIZOV, R.M.
389
GAZTAMBIDE CASELLAS, J.
2101*
GAZZANIGA, G.M.
409, 1614
GAZZARD, B.
2454*
GAZZARD, B.G.
6311*
GAZZINELLI, G.
6150
GAZZOLA, G.
1544*
GEALL, M.G.
6536*
GEBBERS, J.O.
4960*, 5655*, 6349*, 7067
GEBESH, V.V.
4444
GEBHARD, R.L.
2086, 2975
GEBHARDT, C.
4239
GEBHARDT, R.
7992*
GEBHART, R.J.
7769
GEBOES, K.
2313*, 2388, 4177
GEBRE-MEDHIN, M.
5245*
GEDDES, A.M.
1700, 2650
GEENEN, J.E.
7335
GEENEN, J.W.
8274*
GEFEL, A.
6674*
GEFFROY, Y.
3537, 4423, 5259, 8209,
8515
GEGENAVA, O.P.
6340
GEIGER, R.
7355
GEINDRE, M.
3967
GEIR, W.
7353*
GEISSE, H.
4050
GEISSINGER, H.D.
6680*
GELB, A.M.
8285*, 8473
GELBARD, A.S.
1568

GELBART, D.R.
5689
GELBART, S.M.
1117
GELERNT, I.M.
7023
GELFAND, D.W.
261
GELFAND, M.C.
2452*
GELLATLY, J.B.
3447
GELLATLY, M.
2043
GELLEI, B.
7106*
GELLER, L.I.
754, 3209, 7570, 7731, 8182, 8497
GELMAN-MALACHI, E.
7835
GELMAN, S.
6552*
GELPI, A.P.
5767
GELPI, F.
2850
GELSTON, A.
6651*
GEMAR ANTUNEZ, E.
6933
GEMBICKI, M.
3478*
GEMENDE, G.
7107*
GEMENDE, I.
7107*
GENDRE, J.P.
3268, 3316
GENELL, S.
1929*, 7378
GENEVA, L.
6836*
GENNARI, C.
2724
GENNARO, A.R.
4111
GENOVA, G.
1479, 7151*
GENOVESE, A.
1155
GENOVESI, M.G.
300
GENRE, G.
3568
GENSSLER, W.
3304
GENTIL, F.
8312
GENTILE, S.
6497*
GENTILINI, P.
683, 690
GENTRY, R.P.
2703*, 2957
GEOFFROY, H.
1219
GEOKAS, M.C.
1959
GEORGE, E.A.
6514*
GEORGE, H.
4762
GEORGE, P.K.
4278
GEORGES, L.P.
1845
GEORGESCU, L.
4368*
GEORGESCU, M.
8503
GEORGIEV, G.
6836*
GEPPE, A.A.
6221
GERA, K.L.
1533
GERARD, A.
3357
GERARD-MARCHANT, R.
5015*
GERASIMENKO, A.A.
6555*
GERBER, G.B.
121*
GERBER, M.A.
5865*
GERBER, N.
5870*
GERDIL, F.
7102*
GERDING, D.N.
6507*
GERETY, R.J.
2492*, 5083*, 5874*
GERHARDT, D.
2230
GERIN, J.L.
8360*
GERKENS, J.F.
965, 2140
GERLACH, F.
4473*
GERLACH, J.
2108*, 2691, 6847
GERMAIN, M.
3805, 4272, 4608*, 4656, 7585
GEROK, W.
682, 1112, 4316, 4341, 6795, 8028*
GEROLAMI, A.
38, 2926, 4618*, 5424*
GEROULANOS, S.
5594*
GERSH, I.
7106*
GERSHBEIN, L.L.
8037*
GERSON, C.D.
853, 4901*
GERSON, D.E.
1306
GERSTENBERGK, L.
2831
GERSZTEN, E.
1304
GERISCH, P.
6939*
GESERICK, G.
6501*
GESHANOVA, E.
1998
GESSA, G.L.
5381
GEUBEL, A.P.
3455
GEURTS, W.J.C.
6275
GEUZE, J.J.
2682*, 7352*
GEYER, G.
2460*
GHAFFARPUR, F.A.
2147
GHAHREMANI, G.G.
1627, 2233, 7841
GHANDUR-MNAYMNEH, L.
2475
GHASSEMI, H.
2400
GHAVAMI, B.
6282
GHAZI, A.
1421, 4886
GHEBREGZABHER, M.
2352
GHENT, C.N.
1600
GHEORGHE, N.
4310*
GHEORGHIU, T.
4576
GHERI, R.
6526*
GHESQUIER, D.
1911
GHETIE, V.
7291*
GHINELLI, F.
4335*
GHIRARDI, P.
6803
GHIRINGHELLO, B.
10
GHISOLFI, J.
5183
GHNASSIA, J.C.
502, 1671
GHOOS, Y.
7323
GHOSH, J.J.
6127
GHOSH, T.K.
3559*
GHOZLAN, R.
5181
GIACOSA, A.
4861, 6896, 8191*
GIANELLA, R.A.
1091
GIANETTA, E.
3121
GIANNELLA, R.A.
7921*

GIANNELLI, C.
3582
GIANNINI, A.
630
GIANNONE, G.
4857
GIANNOPOULOS, G.
125
GIANOTTI, F.
3442
GIARDINA, N.
6935
GIBBS, A.R.
6447*
GIBBS, D.
8479
GIBBS, D.D.
6218, 7532
GIBINSKI, K.
8494
GIBON, M.
5588*
GIBSON, B.
7766
GIBSON, J.E.
1986
GIBSON, R.
1192, 3753*, 4908*
GIBSON, R.G.
1897, 3667*, 6521*
GICHEV, Y.P.
8058
GIDAY, Z.
6981*
GIEFER, E.E.
1633
GIERASIMOWICZ, M.
793
GIERBLINSKI, I.
3262
GIERCKSKY, K.E.
6919*
GIGER, W.
5007*
GIGNOUX, M.
4197, 8252
GIGOU, M.
2453*, 3402, 3800, 3905
GIKALOV, I.
3376*
GIL, J.D.
7189*
GILAT, T.
346, 1498, 1647, 7835
GILBERT, H.S.
1693
GILCHRIST, T.
2051, 4666
GILES, G.R.
5713*
GILHUUS-MOE, C.C.
607
GILKES, J.J.H.
8291*
GILL, G.
6035
GILL, G.J.
5696
GILL, M.K.
5217
GILLAIN, A.
5763*
GILLAM, G.L.
6215
GILLBERG, R.
2357
GILLE, P.
8210
GILLESPIE, G.
2256, 6333*
GILLESPIE, I.E.
2713, 4549
GILLESPIE, P.E.
6878*
GILLET, M.
4220*, 5654*
GILLETTE, J.R.
2103*
GILLIES, P.J.
6776*
GILLILAND, S.E.
3013
GILLJAM, H.
2791*
GILMORE, I.T.
3339*, 5799*
GILMOUR, D.G.
5490
GINESTE, J.
3230
GINKO, T.
3879, 3880
GINSBERG, A.L.
5555
GINSBERG, R.L.
6397*
GINSEL, L.A.
7903*
GINTER, E.
6780*
GINZBURG, S.N.
4175, 8239
GIOANNINI, P.
2864*
GIORCELLI, W.
3410, 7775
GIORDANO, C.
3382
GIORDANO, F.
8389*
GIORDANO, G.
77
GIORGIO, A.
8378
GIOVAGNOLI, P.
1536
GIOVINETTO, A.
6935
GIPS, C.H.
632, 659, 2513, 2518, 2519,
3377, 4343
GIRARD, F.
4259*
GIRARD-GLOBA, A.
7377
GIRARD, M.
767, 6921
GIRARDEAU, M.H.F.
4458*
GIRI, S.
953*
GIRMA, J.P.
1146, 3674*
GIRODET, J.
1911, 3581, 4567*, 5757*
GIRODROUX, C.
5051
GIRONA, G.C.
5098
GIROUD, M.
8350*
GIROUX, E.
3480*
GIROUX, Y.
3511, 4785, 4786, 5987,
6884
GIRVAN, D.P.
4854
GIRYN, I.
6103
GISLON, J.
436*, 1146, 3674*, 3938*,
4338*
GISSELBRECHT, H.
5654*
GISVOLD, J.J.
6289*
GITNICK, G.L.
1538, 2498*, 2525*, 4296*,
6458*, 8362
GITZELMANN, R.
7108*
GIUDICELLI, C.P.
4182
GIUDICELLI, Y.
7433*
GIULI, R.
5791*
GIUSTI, G.
568, 2041, 2509, 2522,
8384*
GJONE, E.
624, 1456*, 8226*
GLABAI, V.P.
7071
GLADEN, H.E.
3004
GLADER, B.E.
7133*
GLADIGAU, V.
6098
GLADKI, A.P.
3656
GLADTKE, E.
5061*
GLANVILLE, J.N.
4742*
GLARBORG JORGENSEN, T.
2263
GLASER, D.
1741
GLASINOVIC, J.C.
41, 2865*, 2955, 5422*

GLASS, G.B.J.
84, 93, 1887, 3172, 3191, 4494, 6725*, 7351*
GLASS, R.
3194*
GLASSMAN, J.A.
1591
GLAUSER, R.
4933*
GLAVIN, G.B.
5501, 6835*
GLAZER, G.
1930*
GLAZIER, R.L.
8346
GLEASON, W.A., JR.
6448*
GLEIBERMAN, A.S.
3751*
GLENDE, E.A., JR.
2155, 5416*
GLENN, F.
1577*, 1582, 1616
GLICKMAN, M.G.
6291*, 7608*
GLICKMAN, R.M.
182, 7496*, 7497*
GLINSKAYA, T.P.
7570, 7731, 8182, 8497
GLINSMANN, W.H.
2939
GLOBER, G.A.
6324*
GLOOR, F.
4019*
GLORIEUX, F.H.
802
GLOUBERMAN, S.
3066
GLOVER, J.L.
7005
GLOVER, J.R.
932
GLOWACKI, A.
765
GLOZAND, I.V.
4307*
GLUCK, E.
4106*
GLUCK, F.W.
2665
GLUKHMAN, S.I.
1670
GLUSHKO, L.F.
6822
GMELIN, K.
4303
GNARINI, R.
3448
GNEKOW, W.
7266
GO-BATENKO, V.P.
6265
GO, M.D.
4832*
GO, V.L.W.
1186*, 1636, 3454*, 3601*, 3718, 4573*, 4978*, 5367*, 5773*, 5844, 7484*, 7862, 8125
GOBEZIE, G.C.
3481*
GOBUNIYA, R.I.
264
GOCH, J.H.
3154
GOCHMAN, N.
3030
GOCHO, K.
6571*
GODING, J.W.
5509
GODULIAN, S.A.
746
GOEBEL, F.D.
8390*
GOEBEL, K.M.
8390*
GOEBELL, H.
995, 7724*
GOEL, K.M.
2668
GOERGEN, T.G.
1475
GOERZ, G.
8025*
GOETSCH, C.A.
4695
GOEVERTS, J.
6167
GOFFINET, D.R.
2630
GOGL, A.
2524*
GOGLER, H.
5186
GOH, E.H.
8000*
GOHEER, M.A.
6807
GOIJMAN, I.
4408
GOLBA, S.
1512*
GOLD, R.E.
4149*
GOLD, R.P.
5536
GOLDANIGA, G.C.
6593
GOLDBERG, D.M.
3467*, 7982*
GOLDBERG, H.I.
2314*, 2477, 3114, 5546, 6950
GOLDBERG, N.
8431*
GOLDBERG, P.K.
3125*, 6540*
GOLDBERG, S.J.
5106*
GOLDBERGER, J.H.
2333
GOLDBERGER, L.E.
3278*
GOLDBLATT, M.S.
4892
GOLDBLATT, P.
4065
GOLDEN, G.T.
478
GOLDEN, M.
5947
GOLDENBERG, M.M.
1145, 1678, 4721
GOLDENBERG, S.
3170
GOLDENHERSH, K.K.
2714
GOLDFAIN, D.
5174*
GOLDING, R.L.
466, 5544
GOLDLUST, D.
427
GOLDMAN, H.
4040*, 7606*
GOLDMAN, L.N.
385, 1192
GOLDMAN, M.
6716*
GOLDMAN, R.D.
5115
GOLDMAN, R.L.
7126
GOLDMAN, S.L.
1349
GOLDMAN, S.M.
7219*
GOLDNER, A.M.
1796
GOLDRING, J.
6391
GOLDRING, O.L.
5507
GOLDSMITH, H.S.
6409*
GOLDSMITH, M.R.
2171*, 5640
GOLDSTEIN, A.L.
1550
GOLDSTEIN, D.A.
1448*
GOLDSTEIN, F.
1736
GOLDSTEIN, H.M.
1178*, 1249, 1460*, 5558*
GOLDSTEIN, J.L.
1653
GOLDSTEIN, L.I.
1625, 6548*
GOLDSTEIN, M.
5708*
GOLDSTEIN, N.P.
5822*
GOLEMATIS, B.
2424
GOLFERINI, A.
7049
GOLIGHER, J.C.
1356, 2391, 2431*, 4048, 4081, 4925*, 4930*, 7664*
GOLIMBU, M.
7688

GOLINDANO, C.E.
4345
GOLINKO, O.N.
3700, 7361
GOLLAN, J.L.
3375*
GOLLIN, F.F.
2631
GOLCFEEVSKY, V.Y.
6685
GOLCGAN, R.
2815
GOLCSOVA, T.V.
6500*
GOLCVANCVA, E.S.
388
GOLUB, E.E.
2974
GOLUB, G.D.
3082
GOLUBENKO, A.M.
6463*
GOMES, A.S.
2251
GOMEZ-BARRETO, J.
2640
GOMEZ-ESTRADA, H.
7893
GOMEZ FAYREN, J.M.
8163*
GOMEZ, J.A.
5483
GOMEZ-PAN, A.
7375*
GOMEZ SAEZ, J.M.
5127*
GOMI, T.
1738
GONAI, T.
3093
GONALONS, E.
1097
GONCALVES, A.L.
3621, 4512
GONCALVES BORGES, M.A.
4257*
GONCETTE, L.
7083
GONCHAROVA, G.I.
1670
GONDRAN, M.
4186
GONNELLA, F.
6497*
GONTAR', A.M.
5097
GONZALES-CRUSSI, F.
7770
GONZALES, L.
6854*
GONZALES, L.R.
330
GONZALEZ, A.C.
1447*
GONZALEZ, B.N.
4748*
GONZALEZ, G.
1184*
GONZALEZ-GARZA, M.T.
7893
GONZALEZ GONZALEZ, M.
3747
GONZALEZ-LICEA, A.
8
GONZALEZ, M.
5122*
GONZALEZ-MOLINA, A.
8379
GOODACRE, R.L.
3275*
GOODALE, R.L.
1823*, 6151*
GOODALL, M.C.
7354
GOODCHILD, M.C.
2463*
GOODE, R.L.
2630
GOODENBERGER, D.M.
4144
GOODGAME, R.W.
440
GOODING, G.A.W.
6372, 7842
GOODMAN, D.B.
2574*
GOODMAN, I.
5989
GOODMAN, J.S.
2375
GOODMAN, M.J.
510*, 2389, 5717*
GOODRICH, B.S.
8119
GOODWIN, C.
2064
GOPALAKRISHNA, G.S.
1467, 3799
GOPINATH, P.G.
2213
GORAL, R.
2365, 4893, 7624
GORBACH, S.L.
7662*, 8454*
GORCE, D.
348
GORDON, A.S.
6073*
GORDON, D.
6200*
GORDON, H.E.
4080, 5575
GORDON, I.
2256, 5864*
GORDON, M.J.
1199
GORDON, P.H.
491
GORDON, R.L.
6547*
GORDON, R.S.
5138*
GORDON, T.
7515*
GORE, I.
1328
GORESKY, C.A.
3792
GOREVIC, P.D.
6461*
GORI, A.
334
GORKIN, V.Z.
147
GORODINSKAYA, V.S.
367
GORSIRA, M.C.B.
4480
GORSKA-DUBOWIK, M.
696
GORSKI, M.
5885
GORSKIJ, L.A.
3983
GORTMAKER, G.C.
3750*
GOSALVEZ, J.A.
8352*
GOSALVEZ, M.
2547, 7189*
GOSCHKE, H.
3527
GOSINK, B.B.
2174*
GOSSELIN, D.
6884
GOSSELIN, M.
4071*, 8394
GOSSET, F.
6181, 7070
GOSSRAU, R.
172*
GOTCH, F.M.
7064*
GOTHLIN, J.
1621
GOTO, S.
6877*
GOTO, Y.
120*, 1893, 3033
GOTOH, M.
159
GOTS, R.E.
1091
GOTTERER, G.S.
2059*, 2963*, 3840
GOTTLIEB, B.
2625
GOTTLIEB, L.S.
173*
GOTTSCHALK, A.
3045*
GOTTWALD, G.
8140
GOTZE, K.J.
738
GOTZE, W.
8069
GOUBRAN, G.F.
4285*
GOUE, O.
3903
GOUEROU, H.
3083, 3181, 3512, 4219*,
6181, 6940*, 7070, 8437

GOUET, O.
2896
GOUFFIER, E.
694, 5657*
GOUFFRANT, J.M.
740, 5562*
GOUGH, M.H.
5735
GOUGH, T.A.
6213
GOULD, R.G.
5415*
GOULD, S.R.
6227*, 6354
GOULD, V.E.
6256
GOULDING, R.
2482*
GOULDING, R.W.
1217
GOULSTON, K.
8471
GOURNET, C.I.
7704
GOVAERTS, J.P.
4359*, 5184, 7739, 8280
GOVDENKO, P.F.
8277
GOVONI, A.F.
468, 748
GOWENLOCK, A.H.
4597
GOWER, P.E.
666
GOY, J.A.E.
1392*
GOYA, T.
3031
GOYAL, R.K.
1843, 2649, 2734*, 4524*,
5268, 6707
GRABMAN, J.P.
2436
GRABNER, G.
3519, 5070*, 6695
GRABNER, P.
2797
GRABOW, W.O.K.
2508
GRABOWSKA-LUBASZKO, U.
793
GRABOWSKI, C.
1840
GRABOWSKI, G.A.
4616*
GRABSKI, D.A.
6964
GRACE, D.M.
2584, 3087, 4149*
GRACE, N.D.
1831*
GRACEY, M.
399, 6074*, 7873, 7911*
GRADY, G.F.
1515*, 5101*
GRAEBER, G.M.
1565
GRAF, J.
909, 1989, 1990, 1991
GRAFE, W.R.
6588*
GRAHAM, D.Y.
2279, 2426, 4979*
GRAHAM, G.G.
896, 3604*, 4146
GRAHAM, J.
7010
GRAHAM, L.S.
4746*
GRAHAM, S.
2377
GRAIVIER, L.
6954
GRAJEWSKI, O.
1022*, 1160, 5414*
GRAMENITSKAIA, M.S.
1404
GRAMLING, J.
7020
GRAMM, H.F.
7725*
GRAMOLI, J.
804
GRAND, R.J.
3368*, 3847, 4466*, 8090*
GRANDITSCH, G.
6994
GRANDJEAN, J.P.
6938
GRANDJOUAN, S.
4136*
GRANEY, D.
4148*
GRANGE, D.
2560, 3402, 5134, 6779*
GRANGER, A.
1048
GRANGER, D.N.
863, 1773*, 3584*, 7498*
GRANGER, H.J.
863, 3584*
GRANICK, S.
2012
GRANIER, P.M.
2561
GRANIT, G.
6558*
GRANJON, B.
3931*
GRANNIKOVA, S.A.
8380
GRANQVIST, S.
5527
GRANSOW, P.
2652
GRANT, A.G.
1988, 5264*
GRANT, A.K.
3190, 3340*
GRANT, D.A.W.
7490*, 7506
GRANZOTTI, J.A.
3621, 4512
GRASBECK, R.
7495*
GRASSETTI, F.
4632*
GRASSI, G.
406, 6280
GRASSI, G.B., JR.
6280
GRASSIGLI, A.
7589
GRASSIN, P.
1158
GRASSLE, B.
6798
GRASSO, G.
4857
GRASSO, P.
2043, 5411*
GRAUBAUM, H.J.
5074*
GRAVGAARD, E.
3214, 7581, 7610, 7619
GRAY, G.F.
4934*, 5659
GRAY, G.M.
7499*
GRAY, G.R.
2256
GRAY, R.K.
4746*, 7657*
GRAY, S.
6739
GRAY, S.W.
1641
GRAY, T.J.B.
5411*
GRAY, W.M.
2674
GRAYSON, P.H.
5079*
GRAYSTON, M.
3614
GRAZIANO, J.L.
6531*
GRAZIKOWSKE, H.
4000
GRBIC, R.
1507
GREANEY, M.G.
4537, 4538, 4941, 5739
GREBENEV, A.L.
4380, 6221
GRECHISHKIN, D.K.
4096
GRECHISHKIN, L.L.
230
GRECHISHKINA, A.F.
7980
GREDZHEV, A.F.
735, 6580*
GREEN, B.
4745*
GREEN, G.
614, 616, 709, 1183*, 5433*
GREEN, G.M.
1963
GREEN, J.P.
3970
GREEN, J.R.B.
7287

GREEN, K.
1617
GREEN, M.K.
1608, 5919*, 7836
GREEN, N.
1668
GREEN, P.H.R.
1297, 6667, 6878*, 7274,
7497*
GREEN, R.
7320*
GREEN, W.E.R.
944, 2761
GREENALL, M.J.
7140*
GREENBAUM, A.L.
6715*
GREENBERG, R.A.
2377
GREENBERGER, N.J.
1230
GREENBURG, A.G.
723*, 1334*, 3692, 3722,
5574
GREENE, H.G.
7627
GREENE, H.L.
7632
GREENE, N.D.
1729
GREENFIELD, N.J.
5435
GREENGARD, O.
6812, 7402*
GREENGERG, H.B.
5480*
GREENGERG, M.
5814*
GREENLEE, H.B.
1117, 1637, 5086*
GREENSTEIN, A.J.
4469*
GREENWALD, A.J.
63
GREENWALD, M.
8043*
GREENWALD, R.A.
3949*
GREENWALT, T.J.
8362
GREENWAY, F.L.
1358
GREGG, J.A.
1440*, 5774*, 6361*, 7725*
GREGOIRE, D.
3133
GREGOR, A.
901
GREGOR, O.
950*
GREGORI, C.
1029
GREGORIADIS, G.
5817*
GREGORY, D.
4385
GREGORY, D.H.
910, 1992, 2006, 3359*
GREGORY, H.
1900, 2117, 4549
GREGORY, P.B.
6506*
GREGORY, R.L.
8105*
GREIDER, M.H.
1891
GREIG, J.B.
1035
GREIG, M.
5596*, 6880
GREILING, H.
8012*, 8030*
GREIM, H.
7443*, 8294*
GREK, O.R.
8058
GRELAC, F.
1911
GRELL, T.
5405*
GRELLA, A.
1082
GREMILLET, C.
3805, 4272, 4656, 7585
GRENET, J.
5562*
GRENIER, J.F.
767, 933, 1777*, 1822*,
1826*, 1835, 2751, 2752,
2753, 3639, 3657, 3844,
3845, 3851, 3883, 5190,
5389*, 7489*
GRESSER, A.
4952
GRESSNER, A.M.
7943, 8012*, 8030*
GRETILLAT, P.A.
3040*
GREWAL, R.S.
6652
GREY, H.M.
7318, 7902*
GRICE, H.G.
2043
GRIENINGER, G.
2012
GRIES, G.
4199*
GRIESEN, G.
5673
GRIFFANTI-BARTOLI, F.
733
GRIFFEN, W.C., JR.
2057, 6322*
GRIFFIN, D.W.
2762
GRIFFIN, R.
4427
GRIFFITHS, G.J.
4788*
GRIGNON, G.
2159
GRIGORESCU, M.
5931*
GRIGOREVA, T.M.
144
GRIGORIEV, P.Y.
7588
GRIGORJEV, V.A.
3899
GRIGORYAN, A.V.
4196
GRIGORYAN, E.G.
6647
GRIGOVICH, I.N.
6622
GRIGOVICH, L.N.
6622
GRIJALVA, C.V.
2822
GRIJM, R.
4327
GRILL, W.
619, 5150*
GRILLIAT, J.P.
3528
GRIMALDI FILHO, G.
4614*
GRIMAUD, A.
3996
GRIMAUD, J.A.
3561*, 4629*, 5972, 6646*,
6759*
GRIMMEL, K.
5788*
GRIMOUD, M.
5147*
GRINBERG, G.K.
243
GRINBERG, V.Y.
243, 3234
GRINER, P.F.
2464*
GRINEVICH, V.B.
7978
GRINSZPAN, I.L.
4408
GRISCELLI, C.
1671
GRISCOM, N.T.
6529*
GRISHAM, J.W.
2538*, 3032
GRMOLJEZ, P.F.
1118
GROB, P.J.
5078*
GRODSINSKY, C.
3116, 5740
GROEN, J.J.
2595
GROENER, J.E.M.
8020*
GROISMAN, S.D.
3647
GROITL, H.
7698
GROMASHEVSKAYA, L.L.
4444
GROMOVA, O.A.
6086*
GRONNIGER, J.
2321, 4474*, 7218*
GROS, C.
5447

GROSBERG, S.
5002
GROSCURTH, P.
8440
GROSDEMOUGE, M.L.
5133
GROSFELD, J.L.
5484, 7770
GROSJEAN-RASSENFOSSE, C.
3804
GROSS, D.R.
1699
GROSSETTI, D.
4103*
GROSSMAN, M.B.
2370*
GROSSMAN, M.I.
357*, 1138, 1342*, 1861, 1863, 1877*, 1901, 1905, 1944, 1948, 2115, 2778, 2780, 3691, 3738, 4579, 5352, 7331
GROSSMAN, Z.D.
5801*
GROSSMANN, H.
167
GROSSNER, D.
3716
GROTH, C.G.
2888*
GROTZINGER, U.
3673*, 5369*, 5624*
GROUSSIN, P.
6314
GROUT, R.M.
1656
GROVE, D.I.
2988*
GROVES, W.G.
6058
GROW, J.R.
7020
GRUBB, M.N.
924, 1854
GRUDEN, N.
5337
GRUEV, I.
8499
GRUN, M.
712, 2047, 5418*
GRUNBERG, G.
286
GRUND, E.R.
3197*
GRUNDMANN, R.
8321
GRUNDY, G.W.
1492
GRUNDY, S.M.
1653
GRUNER, M.
5010*, 7618
GRUNNET, N.
7429*
GRUNST, J.
6079*
GRUSELLE, P.
4041*
GRYBOSKI, J.C.
8109
GRYFE, A.
1496
GRZEBIENIAK, Z.
364, 741, 6936
GUADAGNINO, V.
6930
GUARASCI, G.
4799
GUARDA, P.
5917*
GUARDIA, C.
4602
GUARDIA, J.
2506, 3438
GUARIGLIA, A.
4335*
GUARNIERI, C.
1079
GUASTAVINO, E.
7878
GUBERGRITS, A.I.
8168
GUBERN SALISACHS, L.
5142*
GUBERT, J.P.
3241
GUBETTA, L.
7049
GUBIN, G.D.
148
GUBKIN, V.A.
3655
GUBLER, J.P.
5015*
GUBSKII, L.V.
716, 3423*
GUDAT, F.
5094, 7150*, 8355*
GUDE, H.E.
7278
GUDMAND-HOYER, E.
2610, 5595*, 5707*, 6917*
GUDZENKO, Z.P.
6384
GUENTZEL, M.N.
2658
GUEROULT, N.
5925*
GUERRANT, R.L.
5170*
GUERRE, J.
4136*
GUERRERA, C.
4857
GUERRERO, J.A.
7692
GUERRIN, F.
3357
GUEST, J.
8035*
GUEULETTE, J.
5467*
GUEVIN, R.
7157*
GUGUEN, C.
1029, 1068
GUHA, D.
970
GUIDOBONI, R.
3714
GUIEN, C.
3977
GUIHARD, D.
5557*
GUILLARD, M.T.
4102*
GUILLEM LUENGO, J.
4091
GUILLOUZO, A.
134, 1068
GUILMETTE, R.A.
2921
GUIMARAES, C.L.
4418
GUINDO, A.
4020*
GUISTI, G.
4304
GUIVARC'H, M.
4824, 7732
GUIX-GARCIA, J.
8401*
GUIZAR-VAZQUEZ, J.
7263
GUL'MAN, L.A.
8200
GULACSIK, C.
6733
GULATI, R.B.
834
GULDAHL, M.
5645
GULLER, R.
3936*
GULLICK, H.D.
6365*
GULLIKSON, G.W.
876, 1817, 8086*
GULLO, L.
1954, 2848
GULLOTTA, F.
5721*
GUMAA, K.A.
6715*
GUMPEL, J.M.
1309
GUMUCIO, J.J.
1764, 2925, 4673
GUNASEKERA, S.W.
1217
GUNDALAKH, A.I.
6468*
GUNDERSON, L.L.
7859
GUNN, J.M.
2030
GUNN, T.
7853*
GUNSELMANN, W.
6827
GUNTER, P.J.
1852
GUNTHER, E.
319

GUNTZ, M.
3587*, 4189, 7079*
GUPTA, A.S.
453*
GUPTA, H.L.
4344
GUPTA, J.
7877
GUPTA, J.P.
1528
GUPTA, M.B.
1921
GUPTA, M.C.
6654
GUPTA, S.
1695, 7238
GUPTA, S.D.
5698
GUREWICH, V.
3473*, 7813*
GURLEVA, G.G.
6647
GURLL, N.
562, 980, 1620
GURLL, N.J.
2119, 3773, 4651, 6006*
GURMAN, E.G.
3849, 6823
GURSEL, E.M.
6373
GURSKY, J.M.
2303, 4085, 6911*
GURTOVENKO, V.M.
8059
GURVICH, M.M.
3174
GURWITH, M.J.
3523*, 6637
GUSARSKAIA, I.L.
786
GUST, I.D.
1535, 3432*, 3433*, 8455*
GUST, I.E.
8351*
GUSTAFSON, A.
2451*
GUSTAFSSON, B.E.
1929*, 7389*
GUSTAFSSON, J.A.
129, 1067, 2950, 7389*
GUSTAVSON, L.P.
5795*
GUSTAVSSON, S.
7324
GUSTOT, P.
5903*
GUTH, P.H.
1281*, 1878*, 1916
GUTIEREZ, F.
2179*
GUTIERREZ, A.G.
6202
GUTIERREZ-DIERMISSEN, A.
4298*
GUTIERREZ, J.A.J.
3554
GUTIERREZ, J.G.
4522*
GUTIERREZ, L.V.
1341*
GUTIERREZ, O.H.
260, 1453*, 7529*
GUTMAN, R.A.
2222
GUTTMAN, F.M.
2122, 2374
GUTZ, H.J.
3149, 3160
GUY, O.
1964
GUYET-ROUSSET, P.
5232
GUZE, L.B.
1472
GUZELIAN, P.S.
4611*
GUZMAN, I.J.
5692
GUZMAN, L.G.
6969
GUZZON, A.
1667
GVANTSELADZE, V.I.
4060, 6895
GWEE, M.C.E.
2073
GYEPES, M.T.
2169*
GYORKEY, F.
2659*
GYORKEY, P.
2659*
GYR, K.
3527, 3941*, 5505
GYTE, G.M.L.
855
HAAG, M.
4341
HAAGA, J.R.
1473, 5540, 6854*
HAALEBOS, M.P.
3908
HAAS, J.
3095
HABER, I.
245
HABERLAND, G.L.
7355
HABERMAN, J.D.
4770
HABERMANN, M.
3932*
HABERMANN, H.
5886
HABIB, C.M.
6716*
HABIOR, A.
703, 722
HABLAS, R.
7865
HABTE, D.
5199
HACHEY, D.
6090*
HACKER, D.V.
8115
HACKER, L.C.
6531*
HACKER, M.P.
1504
HACKI, W.H.
3335, 5386*
HACKING, P.M.
1241
HADCHOUEL, P.
1508
HADDAD, A.C.
7484*
HADDAD, H.
4944
HADDAD, J.G.
3223*
HADDEN, D.R.
5945
HADI, N.
1933
HADJIGEORGIOU, E.
7134
HADLEY, G.P.
7132
HADORI, S.
2618
HADORN, B.
2360, 2414*, 3851
HAECKI, W.H.
2860, 6746*
HAENEY, M.R.
4913, 6966
HAENSZEL, W.
469, 2297
HAERTEL, M.
5830, 6856*
HAESSE, W.
4875*
HAEX, A.J.C.
2347*
HAFF, R.C.
2594*
HAFFEN, K.
3845, 3851, 4678*
HAFFENDEN, G.P.
5005*, 8396*
HAFKENSCHEID, J.C.M.
6816*
HAFNER, G.
973, 3193*
HAGEL, J.
4849, 4859
HAGEMANN, J.
8448
HAGEMANN, R.F.
868, 2986*
HAGEN-ANSERT, S.L.
7547
HAGENDER, B.
6308*
HAGERSTRAND, I.
7805*
HAGGIE, S.J.
381, 7663*
HAGGITT, R.C.
294*, 4892
HAGHIGHI, P.
442, 2400

HAGIHARA, P.F.
2057, 5667, 6322*
HAGLUND, M.
2767
HAGLUND, U.
3872*, 3877, 4727, 5832*
HAGUE, N.E.
4144, 4919
HAGUENAUER, J.P.
7557
HAHN, F.J.Y.
2328
HAHN, H.K.J.
2037
HAHN, J.
2947
HAHN, R.G.
7051, 8233*
HAHN, S.
3623
HAHNLOSER, P.
5594*
HAIDER, T.
3980
HAIGHT, G.
4426
HAINES, A.
6323*
HAINES, J.E.
1279
HAIRSTON, J.T.
4415
HAITH, L.R., JR.
97, 2828, 4088
HAIZUKA, S.
1298
HAJAC, T.
6718
HAJDU, E.O.
5761*
HAJDUK, F.
1208
HAJJAR, J.J.
7307*, 7919*, 7929
HAJOS, E.
2177*, 4982
HAKAMI, M.
501, 2231
HAKANSON, D.O.
2592*
HAKANSON, R.
2693
HAKKAL, H.G.
1411
HAKKILUOTO, A.
1370, 2286*, 4045*
HAKKINEN, H.M.
6831*
HALBRECHT, I.
11
HALDIMANN, B.
4451, 5347
HALEK, J.
6858
HALGRIMSON, C.G.
7116*
HALL, A.W.
1263*, 2965*, 5321*, 6030
HALL-BROWN, A.
1608, 5919*
HALL, G.P.
4915
HALL, J.
4921, 7665
HALL, J.A., JR.
5201
HALL, L.
4542, 6710
HALL, R.
66, 5713*
HALL, R.C.
1630, 2072, 2403, 4642
HALL, S.V.
2954
HALL, W.
4523*
HALL, W.H.
358*, 1320, 3086, 6507*
HALL, W.T.
6483*, 7146*
HALLAC, S.
6178
HALLAS, R.
810
HALLBERG, J.
444, 3888, 4874*, 5661
HALLBERG, L.
6691*
HALLENBECK, G.A.
2298
HALLER, J.A., JR.
1690, 2142
HALLIDAY, J.
65
HALLIDAY, J.W.
545*, 1533, 2187
HALLIWELL, M.
6517*
HALLORAN, L.G.
1992, 3359*
HALLS, J.
5163
HALPIN, T.C.
4866*, 5716*
HALSE, C.
2978
HALSE, S.A.
244, 6879*
HALSTED, C.H.
1383
HALTER, F.
3040*, 4072*, 4850, 6157,
7554*
HALTON, D.W.
3822
HALVEG, A.B.
4185
HALVERSON, J.D.
3223*
HALVORSEN, J.F.
306, 6272, 7680
HALVORSEN, L.
5628
HAMADA, C.
1787
HAMADA, S.
3798, 6196, 6222
HAMBLIN, A.S.
2864*
HAMBRIDGE, K.M.
2608, 4412
HAMBURGER, R.J.
1376
HAMELMANN, H.
4855
HAMER, D.B.
7959*
HAMES, C.G.
7515*
HAMILTON, D.G.
5939*
HAMILTON, D.L.
880
HAMILTON, J.
547*, 4958*
HAMILTON, J.C.
3275*, 4141
HAMILTON, J.L.
1390*
HAMILTON, J.R.
33, 2962*, 3607*, 7251,
7261, 8225*
HAMILTON, R.L.
8014*
HAMILTON, S.R.
4697
HAMLYN, A.N.
4326, 5899, 6546*, 8339*
HAMMAKER, L.E.
6778*
HAMMERMAN, K.
2046
HAMOSH, M.
6141
HAMPEL, K.E.
3991, 5130*
HAMPEL, N.
7106*
HAMPSON, L.G.
474
HAMPTON, D.L.
2957
HAMSTER, W.
4349
HAMZA, H.
4137*, 7693
HAN, S.Y.
1502
HANANO, M.
5500
HANCHAR, A.J.
4089
HANCY, A.
3931*
HANDELSMAN, J.C.
5986
HANELIN, L.G.
327, 2568*
HANEVELD, G.T.
7464
HANID, M.A.
4668, 5816*
HANKE, D.
186
HANKE, R.
4902*

HANLEY, J.
6360*
HANLEY, P.H.
479
HANNA, S.S.
8347
HANNIG, B.
5076*
HANG, J.
6729*
HANOUNE, J.
1987
HANS, B.
6585*
HANS, C.
1014*
HANS, S.S.
6585*
HANSBROUGH, J.F.
5803*
HANSELL, J.R.
2164*
HANSEN, F.H.
4185
HANSEN, J.D.L.
1683
HANSEN, O.H.
3139*, 6722*
HANSEN, R.
3526*
HANSKY, J.
2624, 5623*
HANSON, K.M.
3998
HANSON, L.A.
8100*
HANSON, R.F.
4616*, 6090*, 6766*
HANSON, R.W.
2030
HANSON, S.E.
2500
HANSON, V.
6442*
HANSON, W.R.
2100*, 2135, 4675*, 5472*,
7501*
HANSSEN, K.F.
103, 1949, 4068*, 6060*
HANSSEN, L.E.
1949, 2843, 3117, 6060*,
6062
HANTSCHMANN, H.
4965*
HANTSCHMANN, N.
857
HANTZSCHEL, U.
7074
HANYU, F.
6579*
HANZLIK, R.
3812
HAO, K.
6065
HAOT, J.
4041*, 5763*, 7738
HAQQANI, M.T.
6327*
HARADA, H.
5523, 5524, 6590*
HARADA, K.
6590*
HARADA, M.
1919
HARADA, T.
679
HARALDSSON, A.
5629
HARARI, A.
8488
HARASAWA, S.
3148, 6027
HARASIN, J.M.
4673
HARBERT, J.C.
3101
HARBISON, R.D.
3795
HARDCASTLE, J.D.
491
HARDERS, H.
8489
HARDIE, I.R.
1608, 5919*
HARDIN, C.A.
2273, 6963
HARDING, L.K.
2762
HARDING, R.K.
4487*
HARDISON, W.G.M.
2027, 5423*, 7424*
HARDOUIN, J.P.
4956, 5045, 8516
HARDT, F.
3139*, 3371*, 3441, 3452*
HARDY, A.S.
2028
HARDY, B.E.
6529*
HARDY, B.M.
5368*
HARDY, J.D.
6602
HARDY, K.J.
5930*
HARDY, T.
460
HARE, D.K.
2708*
HARE, J.
7665
HARELL, G.S.
52, 298, 2251, 4517*, 7266,
7531*
HARLAFTIS, N.
1641
HARLER, B.
8157
HARMEYER, J.
5304
HARMON, J.W.
5366*, 6143*
HARMS, L.
7991
HARMS, V.
5290*
HARNACK, H.
8343
HAROUCHI, A.
502
HARPER, A.M.
6755*, 7462, 7475
HARPER, N.E.
6954
HARPER, W.K.
7757
HARRIES, J.T.
4218, 5340, 5936*, 6010
HARRINGTON, C.J.
7639
HARRINGTON, D.P.
1547, 6960, 7267
HARRIS, A.R.C.
6592
HARRIS, D.W.
4973
HARRIS, E.D., JR.
6598
HARRIS, E.J.
6804
HARRIS, J.
5474*
HARRIS, L.D.
302
HARRIS, O.D.
5560*
HARRIS, R.A.
5484
HARRIS, R.C.
3368*
HARRIS, R.G.
166
HARRIS, W.G.
5239*, 7471
HARRISON, G.G.
2915
HARRISON, I.
2228
HARRISON, J.D.
5, 3000
HARRISON, M.
3255*
HARRISON, M.W.
5464*
HARRISON, V.C.
185
HARROD, M.J.
411
HARRY, D.S.
2586
HART, F.E.
5401*, 8034*
HART, L.
1818
HARTEL, W.
4720
HARTIG, W.
8081
HARTMAN, A.S.
5591*
HARTMAN, E.
7875

ARTMANN, L.
4676*
ARTNAGEL, R.E.
2145
ARTONG, J.M.
3506*
ARTONG, W.A.
2373, 4966*, 7553
ARTUNG, H.
3501*, 5494, 6159
ARTWICH, G.
4200*
HARTY, R.F.
2335, 2803, 4554*
HARVEY, I.C.
2325
HARVEY, R.F.
115, 996, 1339*, 3650, 4981, 5445*, 6332*, 8127
HARWOOD, R.A.
1666
HASCHEN, R.J.
8411
HASEBE, M.
7482
HASERT, V.
1216
HASHIHIRA, S.
7078*
HASHIMOTO, K.
6771*
HASHIMOTO, M.
1983, 5020*
HASHIMOTO, S.
5333
HASHIMOTO, T.
1039, 4545*
HASHIMOTO, Y.
352
HASHINOTSUME, M.
563
HASIK, J.
1211
HASSAM, A.G.
6124
HASSAN, A.
1674, 6644*, 6660
HASSAN, M.
5013*
HASSELGREN, P.O.
7047
HASSELS, B.F.
1997
HASSELSTROM, K.
6577*
HASUMURA, Y.
7428*
HATA, Y.
7096*, 7103*
HATAKEYAMA, S.
5827*
HATCHER, G.
2639
HATCHER, G.W.
1684
HATFIELD, A.R.W.
5771*, 8267*
HATFIELD, J.
1806
HATFIELD, P.M.
3100, 5914*
HATTANMARU, M.
6081*
HATTEN, T.P., JR.
5667
HATTERY, R.R.
5515*, 6363*, 6853*
HATTORI, M.
4502*
HATTORI, N.
1889, 5813*
HATTORI, T.
1102*, 5665
HATZIOANNOU, N.
2201
HATZITHEOFILOU, C.
2424
HAUG, K.W.
790
HAUGEN, D.A.
1025
HAUPT, R.
4267, 4823
HAURI, H.P.
3851
HAUSAMEN, T.U.
237, 4560*, 6038*, 7603
HAUSCHILD, A.H.W.
1677
HAUSMAN, R.
429
HAUSSLER, E.
6826
HAUSSLER, M.R.
5294
HAUSSWALD, H.R.
7700
HAUTON, J.C.
38, 5424*
HAUZEUR, F.
8142
HAVEL, R.J.
8014*
HAVELKA, J.
6900
HAVEMANN, K.
6310*
HAVEMANN, D.
7700
HAVERMARK, G.
2622
HAVIG, O.
1586
HAVRE, P.
2906
HAVRILLA, T.
1473
HAVRILLA, T.R.
6854*
HAWAY, M.
3287
HAWK, W.A.
2660*
HAWKER, P.C.
5456, 6013
HAWKINS, C.
1326
HAWKINS, H.L.
3464*
HAWLEY, P.R.
472, 4719
HAWORTH, J.C.
5706*
HAY, A.M.
3633*, 4543
HAY, J.M.
3889, 4956, 5045
HAY, L.
1622
HAYAKAWA, K.
2996
HAYAKAWA, S.
2156
HAYAKAWA, T.
5778
HAYASAKA, H.
6657
HAYASHI, I.
3242
HAYASHI, M.
2814, 6121
HAYASHI, N.
7294
HAYASHI, S.
5798*
HAYES, A.
5958
HAYES, T.J.
5489
HAYS, D.M.
1975*
HAYS, M.T.
6828*
HAYSLETT, J.P.
1790, 3833*, 7271
HAYT, D.B.
7229
HAZARD, W.L.
2333
HAZELWOOD, C.F.
2085
HAZENBERG, H.J.A.
4343
HEADING, R.C.
63, 1882*, 6224*
HEALY, T.M.
4481, 5977*
HEAP, P.F.
1868
HEARD, C.R.C.
3861*
HEATHCOTE, J.
625, 3426*, 5024*
HEATON, K.W.
6332*, 6947
HEAZELL, M.A.
5326
HEBEL, J.R.
5714*
HECETA, W.G.
310
HECHT, D.W.
7246

HECK, J.A.
4144, 4919
HECKER, K.
7031
HECKER, W.C.
2457*
HECKETSWEILER, P.
3600*, 4423, 4476*, 5259, 8515
HEDEMAND, N.
6260
HEDGES, A.R.
7962*
HEDLEY-WHYTE, J.
2954
HEDMAN, P.
6669
HEDC, J.A.
3832*
HEENAN, P.J.
2623
HEFFERNON, J.J.
7550
HEFTI, M.L.
6158
HEGARTY, M.M.
4033, 7574*
HEGEDUS, V.
2277, 4158, 4268, 5552
HEGENAJER, J.
1494
HEGER, R.A.
4042*, 4043*
HEGEWALD, G.
3546
HEGG, M.E.
5080*
HEGGE, F.N.
6772*
HEGGLIN, J.
81
HEGNER, D.
155, 1007*
HEHUNSTRE, J.P.
8214
HEIDBREDER, E.
7369*
HEIDELBERGER, K.P.
3407*, 8133
HEIDL, G.
8412
HEIDLAND, A.
7369*
HEIKKINEN, E.S.
1413, 6242
HEIL, T.
7936*
HEILBRONN, L.
1608
HEILMANN, E.
8309
HEILMANN, K.
7633*
HEIM, F.
5315*
HEIMANN, G.
4205, 5061*
HEIMANN, P.
7063*
HEIMANN, R.
7379
HEIMANS, R.L.H.
62
HEIMBERG, M.
2005, 8000*
HEIMLICH, H.J.
5943
HEIN, J.
3245, 7906
HEINEMANN, H.O.
7810
HEINKEL, K.
5886, 6174, 7694
HEINKELMANN, W.
4764
HEINLE, F.
4231
HEINRICH, H.C.
7749*, 8268*
HEINRICHS, I.
5105*
HEIRD, W.C.
7504
HEIRWEGH, K.P.M.
7135
HEISE, E.
4157*
HEISLER, S.
6059*
HEISS, F.W.
1558
HEISSMEYER, H.
5876*
HEITHOFF, K.B.
4797
HEITMANN, C.
3891, 7523
HEITZ, P.
1927*, 3335
HEIZER, W.D.
4692
HEKKENS, W.T.J.M.
2347*
HELANDER, H.F.
1344*, 2683*, 6039*
HELARY, J.
5557*
HELD, H.
1071, 2868*
HELDT, W.
4630*
HELENON, C.
589, 1210
HELIAS, H.
7693
HELL, D.
5112*
HELL, E.
2748, 7623
HELLAWELL, J.M.
652, 658
HELLEMANS, J.
6699, 7323, 7937*
HELLER, F.
4275*
HELLER, H.J.
3119
HELLER, R.
5443*
HELLER, R.M.
6211
HELLER, R.M., JR.
2142
HELLERS, G.
6545*
HELLIER, M.D.
5301, 6982*
HELLSING, K.
5465*
HELMAN, C.A.
5390*
HELMS, R.A.
5984
HELSEN, L.
7946
HEMET, J.
3295, 8209
HEMMELER, W.
4830
HEMMINGS, W.A.
7917*
HEMPEL, D.
8248
HEMS, D.A.
2033, 6761*, 8019*
HENDEL, L.
2794*
HENDEL, P.
6613
HENDEN, T.
6508*
HENDERSHOTT, L.R.
6514*
HENDERSON, B.J.
4033
HENDERSON, C.
1517*
HENDERSON, D.C.
2102*
HENDERSON, M.
929, 3625*
HENDERSON, R.D.
1265*
HENDERSON, S.C.
2581*, 7222
HENDRICKSE, R.G.
1684
HENDRICKSON, A.
2066
HENDRIKS, R.
6830*
HENDRIX, T.R.
2059*, 2963*, 3840, 4035, 4061, 4125
HENEFELD, M.
5034*
HENEGHAN, J.B.
1848
HENGL, G.
3038, 3225
HENGST, K.
2108*
HENGSTEBECK, W.
323

HENI, N.
5876*
HENIN, S.
1766*
HENLEY, K.S.
2871*
HENMI, K.
1754*, 6679*
HENN, R.M.
1342*
HENNESSY, T.P.J.
2763
HENNING, H.
4279*, 6400*
HENRICH, M.
219
HENRICHSEN, L.
6927
HENRICHSEN, S.
3247
HENRIKSEN, F.W.
1874*, 2794*, 2978, 7013
HENRIKSEN, N.T.
2450*
HENRIQUES, U.V.
6577*
HENRY, A.
3476*
HENRY, D.A.
6449*
HENRY, J.E.
1101
HENRY, K.
1278
HENRY, L.G.
2161
HENRY, W.
1596
HENRY, X.
7203*
HENSGENS, C.
813
HENSON, D.E.
1492, 6617
HENSTORF, H.
6389
HENTSCHEL, E.
3079
HEPNER, G.W.
1570, 2467, 2941, 2983*,
4751*, 5023*, 5648*
HEPP, J.
8430*
HERBENER, G.H.
13
HERBERT, L.M.
5976
HERBST, J.J.
1384, 2066, 5564*
HERCZEG, B.
476
HERCZEG, E.
5741
HERFARTH, C.
2717, 7724*
HERICS, M.
2532*
HERINGOVA, A.
3793
HERINGTON, A.C.
2942, 6796
HERLINGER, H.
4742*
HERMAN, E.
410
HERMAN, M.W.
1574*
HERMANN, R.E.
1366, 1587, 2302
HERMANOWSKA-SZPAKOWICZ, T.
5096
HERMANUS, A.
2434, 4016, 4359*
HERMEL, A.A.
8251
HERMODSSON, S.
2515
HERMON-TAYLOR, J.
7490*, 7506
HERMOS, J.A.
1436, 3258*, 5561*
HERMRECK, A.S.
2273, 6963
HERNANDEZ, A.J.
2238*, 5177*
HERNANDEZ, C.J.
6
HERNANDEZ, R.
2343*
HERNANDEZ-SANCHEZ, J.M.
3438
HERNANDO, L.
8044*
HERNELL, O.
903
HEROLD, J.
3352
HERRE, H.D.
565
HERREJON-MIRANDA, R.
256
HERRERA, L.O.
5678
HERRERIAS GUTIERREZ, J.M.
5049
HERRMANN, I.
3472*
HERRMANN, M.
3725*, 4630*, 6096, 6753,
6849
HERRMANN, R.
5674
HERSEY, S.J.
4557*, 6738
HERSH, T.
612, 7638*
HERTZBERG, J.
569, 1586
HERTZER, N.R.
6956
HERVOIR, P.
5757*
HERY, B.
3399
HERZ, A.
5462
HERZOG, B.
8128
HERZOG, D.B.
1387
HERZOG, H.
4663
HERZOG, K.A.
7842
HERZOG, K.H.
2421
HERZOG, R.J.
131, 1965*
HERZOG, V.
5042*
HESPEL, J.P.
5056
HESS, F.
4657
HESS, G.
626, 3439
HESSE, B.
2543*
HETLAND, L.B.
6793
HETTENA, A.J.
7915*
HETU, C.
1037
HEUCK, C.C.
7397*
HEUCK, F.
3301
HEULLY, F.
2216, 4012, 8513
HEUSER, E.T.
7145*
HEWSON, J.W.
3270
HEYKANTS, J.
6830*
HEYMANN, C.S.
2654
HEYWOOD, R.
7476
HEYWORTH, M.F.
1694
HEYWORTH, M.R.
7064*
HIAL, V.
7512*
HIATT, R.A.
5245*
HIATT, R.B.
5989
HIBI, T.
8264*
HICHMAN, R.
3907
HICKMAN, R.
2106*, 8050
HICKMAN, R.R.
3912
HICKS, E.J.
1532
HIDAI, K.
312
HIDALGO, A.
5621

HIDAYET, A.M.
7184*
HIDAYET, M.A.
7184*
HIDAYET, N.M.
7184*
HIEBERT, C.A.
6208
HIERHOLZER, J.C.
8349*
HIETANEN, E.
6763*
HIGASHI, G.I.
6660
HIGASHI, T.
7993*
HIGASHINO, K.
563
HIGGINS, G.A.
7247
HIGGS, R.H.
928, 1829*, 4521*, 4789*
HIGH, J.A.
7460
HIGHSMITH, A.K.
6619
HIGUCHI, W.I.
4544*, 8001*, 8002*
HIGUCHI, Y.
5798*
HILDEBRAND, H.
6356
HILDEBRANDT, A.G.
1031
HILDEBRANDT, P.K.
228, 229
HILDELL, J.
1253
HILDEN, M.
2504, 8281*
HILL, D.
6737
HILL, G.L.
4925*
HILL, L.M.
7153*
HILL, M.D.
6506*
HILL, M.J.
1389*, 2588*
HILL, P.K.
5410*
HILL, R.P.
2372*
HILLBOM, M.E.
4626*, 6831*
HILLEMAN, M.R.
4298*, 6117, 7472
HILLEMAND, P.
3297
HILLYER, G.V.
2670, 5504, 7467
HILTUNEN, K.
3664*
HIMAL, H.S.
1917, 6261*, 6274
HIMMELFARB, E.
4167
HIMSWORTH, R.L.
8291*
HINCHEY, E.J.
3792
HINDER, R.A.
2276, 3629*
HINDMAN, S.H.
3420*, 6481*, 6482*
HINDMARSH, J.T.
2188
HINE, P.
5514*
HINES, C., JR.
6991
HINES, J.
5234
HINKEL, G.K.
7166*
HINOFUJI, T.
5523, 5524
HINTHORN, D.R.
2373
HINTON, R.H.
7407*
HIOKI, M.
8024*
HIPPE, E.
2782*
HIRA, P.R.
2666, 6653
HIRAKI, T.
1442
HIRAMATSU, K.
1571*
HIRANO, H.
613
HIRANO, K.
604, 6137
HIRANO, N.
1166
HIRATA, K.
6249
HIRATA, Y.
2239
HIRATSUKA, H.
6571*
HIRAYAMA, C.
7528*, 8385*
HIRONE, T.
8480
HIROSE, Y.
8480
HIROTA, T.
7669
HIRSCH, H.
189, 4443
HIRSCH, H.C.
7200*
HIRSCH-MARIE, H.
6972
HIRSCHAUER, M.
5494
HIRSCHBERGER, M.
1761, 3413*, 5666
HIRSCHFIELD, J.S.
2578*
HIRSCHHORN, N.
783
HIRSCHOWITZ, B.I.
385, 1192, 1897, 2787*, 2795*, 3753*, 6521*
HIRSCHOWITZ, R.I.
3667*
HIRSH, F.S.
465
HIRST, B.H.
7375*
HIRT, J.J.
4472*
HISADA, K.
1442
HISAKI, H.
7482
HISAMICHI, S.
2618
HISATSUGU, T.
5144*
HITCH, D.C.
2295, 7880
HITCHCOCK, C.R.
4115
HITCHCOCK, C.T.
6963
HITCHINGS, M.
5357*
HIXON, H.H.
7061
HJALMARSSON, S.G.
2647
HJELMQUIST, U.
5323*
HJELT, K.
2696*, 6609, 6989
HJELT, L.
2540*
HJORTLAND, M.C.
7515*
HNIDEC, O.
2995
HO, C.S.
7526*
HO, I.K.
3815
HO, K.J.
3221*, 5413*, 7388*
HO, N.F.H.
4544*
HOANG NGOC MINH
314*
HOARE, A.M.
1326, 3171
HOARE, R.C.
5565*
HOBSLEY, M.
5627*
HOBSON, R.W., II.
5756
HOCHADEL, J.F.
3869*
HOCKERSTEDT, K.
3895
HOCKING, B.V.
3190
HODENBERG, A.V.
6097

HODEZ, C.
3080, 3081
HODGES, J.
1606
HODGSON, H.J.F.
6350*
HODSON, M.E.
2413*
HOEFS, J.C.
4346
HOEK, F.
4877*, 5663
HOENIG, V.
2956, 3820
HOENLE, R.
3963
HOEPFFNER, W.
2725
HOEXTER, B.
5708*
HOF, L.
3580*
HOFF, M.O.
3657
HOFFBRAND, A.V.
7640
HOFFER, R.E.
8114
HOFFMAN, J.L.
7446*
HOFFMAN, N.E.
1968*, 6762*, 7092*
HOFFMANN, E.
4239
HOFFMANN, P.
3896
HOFFMANN, R.
7620
HOFFMEISTER, A.W.
4993
HOFLER, W.
5806*
HOFMANN, A.F.
1486, 1968*, 2348*, 2875*,
3499*, 4180, 4621*, 5276*,
5277*, 5426*, 5510*, 6070*,
6542*, 6762*, 7212*, 7436*,
8001*, 8002*
HOFMANN, F.
1015*
HOGAN, T.F.
6952
HOGAN, W.J.
2184, 4794*, 5308*, 5538,
7335
HOGBERG, N.
2253
HOGG, J.
4584*
HOGH, P.
4185
HOGSTEDT, C.
7886
HOHENLEITNER, F.J.
6728*
HOHMATTER, D.
1826*, 2753, 3883
HOHN, P.
3824*, 5808*

HOJ, L.
851
HOJO, H.
2959
HOJO, K.
7669
HOLBING, N.
2861
HOLCK, P.
5629
HOLDEN, R.
2528
HOLDER, L.E.
1244
HOLDER, T.M.
7015
HOLDSWORTH, C.D.
4129*, 4975, 5210, 7050
HOLDSWORTH, G.
7392*
HOLGUIN, A.H.
8458
HOLIAN, O.
2838*, 2853
HOLIK, B.
1359
HOLLAND, J.W.
2648
HOLLAND, P.
7836
HOLLAND, P.V.
7147*
HOLLANDE, E.
5391*
HOLLANDER, C.F.
2043
HOLLANDER, D.
5280*, 7314
HOLLE, F.
390, 6245, 7364
HOLLE, G.
5073, 7711, 7817
HOLLENBECK, J.I.
50
HOLLENBERG, M.D.
1900, 2117
HOLLENDER, L.F.
6206, 7600
HOLLENHORST, R.W.
2545*, 5822*
HOLLER, M.
1072
HOLLINGER, F.B.
2018, 6471*, 7160
HOLLINGSWORTH, M.A.
7742*
HOLLMANN, G.
721
HOLLOMAN, T.L.
949*
HOLLOWAY, L.S., JR.
3752*
HOLLWARTH, M.
8265
HOLM-BENTZEN, M.
2978
HOLME, R.
624

HOLMES, A.W.
2489*
HOLMES, G.K.T.
6162, 4131*, 6913*, 7635*
HOWEL, G.L.
5760
HOLMES, I.H.
785
HOLMES, J.H.
6394*
HOLMES, K.K.
5875*
HOLMIN, T.
3036
HOLSCHNEIDER, A.M.
252, 1433, 3536
HOLST-CHRISTENSEN, J.
4337*
HOLST, J.J.
6032, 7374*
HOLT, J.F.
5211
HOLT, J.M.
510*
HOLT, P.R.
1795, 2976, 3827*, 3857,
7493*, 7924
HOLT, R.W.
7221
HOLTZ, U.
5030*, 6186
HOLTZAPPLE, P.G.
7505
HOLY, J.
232
HOLYOKE, E.D.
2412*
HOLZBACH, R.T.
2316*, 7395*
HOMAN, W.P.
1733*, 6588*
HOMER, D.R.
4466*
HOMMA, K.
1981
HOMMA, M.
5566*
HOMOLA, M.
8455*
HONDA, F.
7947
HONG, E.
4562*, 5328
HONISCH, N.
4986*
HONJO, I.
174*, 1016*, 1021*, 4704*,
6075*, 7225, 8298*
HONKOMP, L.J.
1678
HONOHAN, T.
6071*
HOOD, J.M.
4077
HOOFNAGLE, J.
7167*
HOOFNAGLE, J.H.
5083*, 5874*

HOOGENDIJK, J.L.
6312*
HOOPER, G.
864
HOOPES, P.C.
2960*
HOPF, J.
3371*
HOPFER, U.
6688*
HOPFNER, C.
424
HOPNER, F.
2457*
HOPPE-SEYLER, G.
6795
HOPPEL, C.L.
2013
HOPWOOD, D.
3037, 4484*, 4485*, 4926*,
5921*
HORACEK, F.
3950, 4004
HORAK, J.
6858
HORAK, W.
3364*, 3519, 3774, 8408
HORAKOVA, Z.
7512*
HORANYI, M.
1377
HORBACH, L.
5121*
HORECZKY, G.
7708
HOREJSI, J.
3107
HORI, R.
1782, 3609*
HORIGUCHI, T.
1505*
HORIIKE, S.
1571*
HORIKOSHI, I.
86, 4502*
HORINO, K.
251
HORIUCHI, Y.
7525*
HORKY, J.
4659
HORN, B.K.P.
3629*
HORNBECK, C.L.
6482*
HORNBERGER, H.R.
1308
HORNE, C.H.W.
6782*
HORNICK, R.B.
784
HOROWITZ, I.
4574*, 6022
HOROWITZ, M.I.
954
HORROCKS, J.C.
1188, 2998, 3171, 6212
HORS, J.
4905*
HORSBURGH, D.S.
1487
HORSING, M.
8272*
HORT, W.
2692
HORTON, L.W.L.
7641
HORWICH, A.
6435*
HORWITZ, M.A.
6618
HOSHI, H.
6248
HOSHI, T.
7920*
HOSHINO, J.
6767*
HOSHINO, K.
5589*
HOSKINS, D.E.
166
HOSKINS, L.C.
1644*, 4715*
HOSODA, S.
6162
HOSOGI, Y.
6196
HOSOKAWA, J.
6239
HOSOKAWA, K.
2989*
HOSSENBOCUS, A.
3138*
HOSTE, J.
3390
HOSTEIN, J.
4226, 4862
HOTHERSALL, A.P.
5490
HOTHERSALL, J.S.
6715*
HOTTENROTT, C.
2831, 3721
HOTTER, H.
3310
HOTTINGER, S.
2414*
HOTZ, J.
995, 1933, 7724*
HOUCKE, M.
3109
HOUDENT, C.
4476*
HOUGHTON, P.W.
6037*
HOUK, J.H.
1561, 1562
HOULT, J.G.
7846
HOULTON, P.J.C.
6051
HOUSE, A.J.S.
4788*
HOUSSET, E.
3811, 4649, 7115*
HOUSSET, P.
3083
HOUSZKA, M.
162
HOUTHOFF, H.J.
659
HOUWEN, B.
659, 3440
HOVDENAK, N.
5628
HOVEIDA, M.
2231
HOVIG, T.
624, 4653
HOVING, J.
4532*, 4681*
HOWARD, A.
8454*
HOWARD, D.J.
704
HOWARD, E.R.
1603, 4771
HOWARD, J.M.
3650, 4235, 4588*, 4981
HOWARTH, C.
1278
HOWAT, H.T.
79*, 3337*
HOWDLE, P.D.
4915
HOWELL, H.S.
508, 6531*
HOWES, R.
526*
HOWLETT, S.A.
788
HOWORTH, P.J.N.
4308*
HOY, C.
5629
HOYLE, M.
5656*
HOYUMPA, A.
893
HRADSKY, M.
848
HRENO, A.
474
HRITZ, A.
1096, 2089
HRUBAN, Z.
570
HRUSKA, J.F.
5862*
HRUSZKEWYCZ, A.M.
2155, 5416*
HSIEH, C.P.
4700*
HSU, H.S.
2651
HSU, I.C.
2148
HUANG, C.C.
1792
HUANG, C.T.L.
1467, 1979, 3799
HUANG, E.S.
2406*

HUANG, K.C.
1812, 5446, 7348*
HUANG, S.S.
440
HUANG, T.L.
4424
HUANG, W.D.
2714
HUAUX, J.P.
7896*
HUBAULT, A.
7626
HUBEL, K.A.
7925
HUBER, A.
5744
HUBER, R.
4072*, 4850
HUBER, W.
2792*
HUCHZERMEYER, H.
3918, 4470*
HUDGINS, M.P.
5204
HUDSON, D.A.
4903*
HUELIN BENITEZ, J.
8175
HUEN, A.H.J.
5404*
HUET, P.M.
1158, 4339*
HUFFMAN, J.H.
1176, 5431*
HUG, G.
1501
HUGH, T.B.
1286*
HUGHES, B.J.
1532
HUGHES, C.A.
2851, 6061
HUGHES, J.H.
1476
HUGHES, J.P.
2385
HUGHES, L.E.
3164
HUGHES, R.D.
6068*
HUGHES, S.R.
938
HUGHES, W.
860, 1232, 2306, 4396*,
4449, 6047
HUGHES, W.S.
2238*, 5177*
HUGON, J.S.
4
HUGUET, C.
1048, 2896, 7721
HUGUIER, M.
5048
HUI, Y.S.F.
94
HUIBREGTSE, K.
4877*, 5663, 5709*
HUIZENGA, K.A.
2408
HUIZENGA, R.
3377
HUKILL, P.
4065
HULLO, A.
6869
HULTEN, L.
2322, 3318*, 4705*
HULTMAN, E.
6610
HUMMELT, H.
915*, 4518*
HUMPHREYS, M.H.
2076
HUMPHREYS, W.G.
2754
HUMPHRIES, A.W.
6956
HUMPHRIES, T.J.
4514*, 4789*, 6708
HUNG, C.R.
2820, 6046
HUNG, H.
904
HUNT, D.R.
71*
HUNT, J.A.
3280*
HUNT, J.H.
6878*
HUNT, J.N.
58, 3995, 7953
HUNT, R.H.
4073*
HURLEY, J.W.
2145
HURLEY, L.S.
5292*
HURMUZACHE, E.
2312*
HURVITZ, H.
7042
HURWITZ, A.
7359
HUSBY, G.
629
HUSEBY, N.E.
7409*
HUSEMANN, B.
405, 1359, 4896, 6827, 7630
HUSSON, J.M.
7115*
HUTAN, L.
3232
HUTCHEON, D.F.
4035
HUTCHESON, D.P.
8115
HUTCHISON, G.A.
2787*, 2795*
HUTCHISON, W.M.
3026
HUTSON, D.
5568*, 8402*
HUTTEROTH, T.
2527
HUTTON, J.E., JR.
1368
HUTTUNEN, R.
1413, 7746*
HUVENNE, R.
6182
HUWELS, G.
5869*
HUXTABLE, R.
6450*
HUYBRECHTS, W.
3089
HWANG, K.
810
HYKES, P.
6094
HYLAND, G.
4732, 6783*
HYMAN, A.L.
2385
HYMAN, R.A.
5708*
IACONO, G.
669
IAKIMENKO, G.V.
8179
IAKOBSON, G.S.
684
IAMMARINO, R.M.
4998
IANCU, T.
2479*
IANCU, T.C.
8301*
IAREMENKO, M.S.
44
IASNOVA, N.N.
5057
IAZIGI, N.
3621, 4512
IBAMOTO, K.
4619*
IBANEZ, G.
2224*
IBANEZ, J.
884
IBARRA-PEREZ, C.
6655
IBRAGIMOV, F.K.
805
ICARDI, A.
6896
ICHENETS, I.G.
746
ICHIDA, F.
1506*
ICHII, S.
7416*
ICHINOSE, H.
6335*
IDA, K.
2165*
IDANPAAN-HEIKKILA, J.E.
1020*
IDE, H.
4633*
IDEHARA, S.
6639
IDEO, G.
224, 1053, 3380, 3808, 4638

IGA, T.
  5500
IGARASHI, Y.
  5996, 7920*
IGIMI, H.
  5144*
IGNESTI, G.
  7814*
IHAMAKI, T.
  1284*, 3058
IHASZ, M.
  2738*
IHM, P.
  3620
IHRE, T.
  497, 1067, 6545*
IHSE, I.
  521, 981*, 2411*, 2423,
  2863, 4222*, 4268, 7722*,
  7723*
IINO, S.
  604, 4209, 6137
IINUMA, Y.
  5687
IJAIYA, K.
  4205
IKARD, R.W.
  5651*
IKEDA, R.M.
  1638
IKEDA, S.
  571
IKEDA, T.
  6549*
IKENOBE, H.
  6362*
IKEUCHI, C.
  2*
IKEUCHI, H.
  6248
IKEUCHI, T.
  6530*
IKEZAKI, M.
  6239
IKKALA, E.
  1489
IKKOS, D.G.
  2605
IKLE, D.
  6394*
IKONEN, E.
  6565*
IKONNIKOV, A.I.
  3914, 3965
IL'INA, N.A.
  5057
ILANGOVAN, S.
  5638
ILJIN, W.
  4454
ILSON, R.G.
  1978*
ILYINSKY, Y.A.
  8377
IMAI, A.
  1703, 4429
IMAI, H.
  458
IMAI, K.
  3088, 3203, 7743*
IMAMOGLU, K.H.
  6373
IMANISHI, H.
  6239
IMHOF, H.
  4749*
IMIELINSKA, H.
  1543*
IMLER, M.
  2026, 4734, 5033*, 8416
IMMELMAN, E.J.
  3912
IMPICCIATORE, M.
  2778, 4534
IMRIE, C.W.
  3341*, 5789*, 6391, 8273*
IMURA, H.
  2239
IMURA, M.
  1039
INABA, T.
  6396*
INAGAKI, T.
  76, 6453*
INAI, S.
  4331*
INDIRA, K.
  3550
INDRA, S.
  5934*
INDURUWA, P.A.C.
  634
INFANTE, A.
  1107
INFANTE, R.
  160, 1059, 1060, 2052, 2945,
  4654
INGELMAN-SUNDBERG, M.
  129, 1067
INGHAM, C.D.
  1519*
INNES, D.J., JR.
  7296
INNES, D.L.
  1866, 5332
INOKUCHI, K.
  574, 3129, 3168, 6403*
INOMATA, I.
  1971*
INOU, T.
  3031
INOUE, H.
  4633*
INOUE, K.
  6196, 6590*
INOUE, M.
  6888
INOUE, T.
  689, 1227
INOUYE, A.
  2694*, 2695*
INOUYE, H.
  5589*
INSHAKOV, L.N.
  4051, 4760, 7564
INJI, K.
  3609*
INUI, K.I.
  1782
INZUNZA, E.
  3569
IOAKIMOVA, N.V.
  1696
IOF, I.M.
  5532
IOFFE, I.B.
  620
IONATA, R.
  4912
IOSELIANI, G.D.
  3215
IPPEN, H.
  7753*
IPPOLITI, A.
  2299, 4031
IPPOLITI, A.F.
  4122
IRETON, H.J.C.
  2250, 7092*
IRIMAJIRI, A.
  2694*, 2695*
IRINESCU, A.
  660
IRISA, T.
  7528*, 8385*
IRITANI, N.
  4619*
IRLE, J.
  5042*
IRNIJS, A.
  7706
IRONS, R.D.
  5407*
IRONS, R.P.
  7230
IRVIN, T.T.
  1398, 4537, 4538, 4941,
  5739
IRVING, A.D.
  4853
IRVING, G.S.
  2661
IRVING, M.G.
  2938
IRWIN, G.R.
  5855*, 6472*
IRWIN, G.R., JR.
  7781*
ISAAC, L.
  3704
ISAACS, J.T.
  7638*
ISAACS, P.E.T.
  5284*, 5456
ISAEV, V.R.
  7668
ISAKA, H.
  6081*
ISAKHANIAN, G.D.
  147
ISELER, G.
  4733
ISENBERG, J.I.
  357*, 1336*, 1342*, 2283*,
  6914*

ISENBERG, J.N.
3106, 7236
ISER, J.H.
3497*
ISHAK, K.
2514
ISHAK, K.G.
1462*, 3434*, 7142*
ISHIDA, N.
1540, 1703, 4429, 8121
ISHIDATE, T.
1414, 3597
ISHIGURO, N.
5670, 8095
ISHIHARA, T.
1474
ISHII, H.
2881*
ISHII, K.
1011*
ISHII, T.
571
ISHII, Y.
377
ISHIKAWA, E.
1971*
ISHIKAWA, K.
1157, 6122, 6789
ISHIKAWA, M.
819, 1738, 3894
ISHIKAWA, R.
6370
ISHIKAWA, S.
3791
ISHIMARU, H.
2497*
ISHIMARU, Y.
2497*
ISHIMORI, A.
819, 1923
ISHIWATA, H.
5336
ISHIYAMA, M.
1157
ISHIZAKI, T.
6567*
ISHIZU, M.
5342
ISLAM, N.
511
ISLAMI, A.
1615
ISMAIL-BEIGI, F.
6309*
ISMAILOVA, A.A.
4760
ISMAN, H.
2757, 3922, 4609*
ISO, T.
61
ISOBE, Y.
1776*
ISOM, K.E.
5501
ISOYAMA, T.
1157
ISPIZJA, I.
8173
ISRAEL, L.
7703
ISRASENA, S.
7111*
ISSA, F.S.
7407*
ISSELBACHER, K.J.
1731*, 2501, 2883*, 5287*, 5430*
ISWARA, K.
3125*
ITABASHI, M.
159, 570
ITAI, Y.
1275, 2260
ITAYA, H.
3014
ITAYA, K.
3894
ITIN, A.B.
636
ITO, H.
3172, 4559*, 7161
ITO, K.
4453, 5221, 5592*, 7525*
ITO, M.
2814, 3348, 5589*
ITO, S.
76, 571, 1239, 2679*, 5992
ITOH, K.
1571*
ITOH, S.
6850*
ITOH, T.
3670*, 5349
ITOH, Z.
3648
ITOSHIMA, T.
689, 7294
ITTENSOHN, O.L.
6117
ITURRIAGA, H.
5109*, 7804*
ITZCHAK, Y.
6291*, 7608*
IURGENSON, G.A.
4361*
IVANETICH, K.M.
2915
IVANOFF, B.
6842
IVANOV, E.
225
IVANOV, G.G.
3205, 6264
IVANOV, S.D.
6115
IVANOV, V.R.
265
IVANOVA, L.M.
3236
IVANOVSKAIA, E.G.
15
IVASHCHENKO, V.V.
3570
IVASHKIN, V.T.
2796
IVERSEN, B.M.
4107*
IVEY, K.J.
946*, 1862, 1864, 1884*, 1895, 2269, 2324, 4536, 6389, 7905*
IVIE, G.W.
1113
IVKOV, V.G.
5909
IWABUCHI, J.
2618
IWAFUCHI, M.
6057
IWAKI, A.
574
IWAMI, T.
4634*
IWANIUKOWICZ, A.
793
IWARSON, S.
2515, 3451*, 5852*, 6479*, 6556*
IWASAKI, K.
3789
IWASAKI, M.
1227
IWATSUKA, H.
150
IWATSUKI, N.
1937, 3037
IWEZE, F.I.
7607*
IYENGAR, V.
597
IZARD, G.
5147*, 5832
IZUMOI, S.
3167
JABLONSKA-KASZEWSKA, I.
5885
JABLONSKA, S.
5219
JABLONSKI, J.P.
5010*
JACEWICZ, M.
5171*
JACK, I.
6460*
JACKSON, A.F.
4568*, 5282*
JACKSON, B.T.
4110*, 4735, 5425*
JACKSON, G.J.
825
JACKSON, L.
7091*
JACKSON, L.H.
803
JACKSON, M.J.
1783, 7985*
JACKSON, N.J.
1870
JACKSON, R.C.
1481
JACKSON, W.P.U.
6378*

JACOB, A.I.
  6540*
JACOB, E.T.
  5660
JACOBS, D.
  7466
JACOBS, G.
  319, 7603
JACOBS, M.L
  1446*
JACOBS, W.
  984
JACOBS, W.H.
  2483
JACOBSON, E.D.
  386, 1934, 2125, 2139, 2994,
  3666*, 3684, 3878, 4558*,
  5379
JACOBSON, F.D.
  1908
JACOBSON, M.P.
  7121
JACOBSON, S.
  3859*
JACOBSON, W.
  3984
JACOBUS, K.E.
  4606*
JACOBY, H.I.
  6739
JACQUESON, A.
  6787
JACQUILLAT, C.
  3388
JAECK, D.
  3639, 5190
JAEGER, M.
  7556
JAEGER, P.
  452*
JAEGER, R.
  6448*
JAFFE, B.M.
  1873*, 2859, 4571*, 6225*,
  6271
JAFFE, E.
  6606
JAGADISH, B.
  1185*
JAGELMAN, D.G.
  7898
JAHADI, R.M.
  1254
JAHNBERG, T.
  2767, 3635*
JAHNKE, R.W.
  7266
JAIN, S.
  628, 687, 688, 1542*, 2556,
  3048*, 3469*, 3942*
JAITLY, K.D.
  2811
JAKAB, F.
  2054, 4723, 5470*
JAKIMOWICZ, J.J.
  7615
JAKOB, A.F.
  8005*
JALALI, H.
  5250
JALAN, K.N.
  2663, 5934*, 7158
JALLING, O.
  1045, 4637
JAMART, J.
  6206
JAMES, A.E., JR.
  2142
JAMES, A.H.
  7284
JAMES, A.M.
  3598*, 6851*
JAMES, G.W.L.
  1786, 3029
JAMES, J.
  7960*
JAMES, J.A.
  1468
JAMES, J.H.
  1564
JAMES, J.M.
  4104*
JAMES, O.F.W.
  4972, 6080*, 8339*
JAMES, W.P.T.
  3624, 4113
JAMIESON, A.M.
  7395*
JAMIESON, J.D.
  7366*
JAMSHIDI, C.
  1567
JANDE, S.S.
  6129*
JANDER, H.P.
  6454*
JANECZKO, J.
  663
JANES, J.O.
  1785
JANEV, A.B.
  5877, 6424
JANEVA, A.B.
  6424
JANICKI, P.
  2252
JANICKI, S.
  49
JANIGAN, D.T.
  5481*
JANIK, J.S.
  5372, 6331*
JANKOWSKI, J.M.
  3182, 4828
JANKU, A.
  3302
JANNEAU, D.
  4062
JANOFF, A.S.
  1986
JANOWITZ, H.C.
  1438, 1732*, 3321*, 4469*,
  4477*
JANSEN, A.
  6871
JANSEN, A.A.J.
  7887
JANSEN, P.L.M.
  2929
JANSSEN, F.G.J.
  7509*
JANSSEN, P.A.J.
  7946
JANSSENS, J.
  3531, 7323, 7937*
JANSSON, G.
  2767, 3635*
JANTSCHULEV, J.
  7990
JANUNGER, K.G.
  1344*, 4808*
JANVIER, G.
  343
JANVOIE, L.
  6313
JAQUES, P.F.
  428
JAQUES, R.
  4529*
JARBOE, G.E.
  1797, 7299*
JARLOT, D.
  348
JARMOLYCH, J.
  7228
JARNUM, S.
  4467*, 6676*
JAROSS, W.
  8069
JARRETT, F.
  7674
JARRETT, L.N.
  7689
JARVINEN, A.
  1419
JARVIS, C.J.
  4797
JASIEL, M.
  1543*
JASKIEWICZ, A.
  737
JASKOWSKI, J.
  743
JASPAN, J.B.
  5404*
JATSUKOV, A.A.
  3244
JAUBERT DE BEAUJEU, M.
  1430
JAUBERT, M.
  1430
JAUS, H.
  6798
JAVITT, N.B.
  1003*, 1004*, 2877*, 3368*,
  7430*, 7880, 7997*
JAVORS, B.
  1623
JAWORSKI, E.
  7713
JAZIK, S.I.
  4370*
JEAN, E.
  3862*

JEAN, G.
1544*
JEANMART, L.
161
JEANNOT, G.
1201
JEANPIERRE, R.
2159, 2216
JEANS, W.D.
3062
JEFFARES, M.J.
7772*
JEFFCOAT, G.L.
2307
JEFFERY, P.J.
4204
JEFFREY, G.E.
1864, 4536
JEFFRIES, G.H.
2340, 6290*
JEKIC, M.
7046
JELASO, D.V.
2578*
JELONEK, A.
2722
JENKINS, D.J.A.
917, 1198, 1389*, 5188, 5598*
JENKINS, N.
7867
JENNER, R.E.
1603, 4771
JENNEWEIN, H.M.
915*, 4518*, 5559*
JENNY, S.
4846, 6887
JENSEN, D.M.
1841, 4540, 6709
JENSEN, E.
5646
JENSEN, H.E.
5646, 6281
JENSEN, I.
5247
JENSEN, J.
6958
JENSEN, K.B.
4467*, 5595*, 6917*
JENSEN, K.M.
7045
JENSEN, M.T.
1111
JENSEN, R.T.
7399*
JENSEN, S.L.
5482*
JEPPSSON, B.
4660
JEPSEN, O.B.
3247
JERINA, D.
2912
JERUSALEM, C.R.
3910, 4663
JERVIS, H.R.
210, 228, 229, 1660
JESSOP, A.
6212

JEWEL, K.L.
7038
JEWELL, D.P.
6350*
JEWELL, W.R.
2273, 6963
JEZEQUEL, A.M.
2587, 3378, 3514
JICK, H.
6329*
JILLY, P.
5220
JIMENEZ, F.A.
573
JIMENEZ, M.
3569
JIMENEZ SAENZ, M.
5049
JINDRA, J.
2490*
JINNOUCHI, S.
5020*, 5811*, 7747*
JIRSA, M.
751, 6094
JIRSCH, D.W.
8347
JIRSOVA, V.
3793
JOACHIM, G.
1179*
JOB, C.
8315
JOBSIS, A.C.
4327
JOCK, C.
3769
JODAL, U.
8100*
JOFFE, N.
4040*, 7036, 7606*
JOFFE, S.N.
2193, 2784*, 2804, 2824, 3492*, 3717, 3876, 4696, 4884
JOHANNESSEN, J.V.
595
JOHANSEN, A.
3139*, 4740*, 6045, 6722*
JOHANSEN, T.S.
7661*
JOHANSSON, B.
2885*
JOHANSSON, C.
87, 859, 2768, 2770, 4874*, 5661, 6745*
JOHANSSON, H.
2730*, 2764, 2769
JOHANSSON, S.V.
6611, 7648
JOHN, T.J.
3526*
JOHNS, M.
2629
JOHNS, M.E.
8487
JOHNSON, A.G.
6026*, 6243, 6726*

JOHNSON, B.J.
3753*
JOHNSON, C.L.
3708
JOHNSON, D.
3596
JOHNSON, D.G.
5564*
JOHNSON, E.A.
425
JOHNSON, E.E.
2954
JOHNSON, F.E.
3748, 4591*
JOHNSON, G.F.
4870*
JOHNSON, G.H.
5163
JOHNSON, G.J.
1693
JOHNSON, G.K.
6440*
JOHNSON, G.M.
7301*
JOHNSON, I.T.
872
JOHNSON, J.A.
6919*
JOHNSON, J.C.
8147*
JOHNSON, J.D.
2363
JOHNSON, K.
542*
JOHNSON, K.R., JR.
300
JOHNSON, L.F.
294*, 1263*, 1270, 2180
JOHNSON, L.M.
6279
JOHNSON, L.R.
1138, 1712, 1940, 2115, 2829, 3672*, 4398, 4528*, 4551*, 5353
JOHNSON, M.A.
2001
JOHNSON, M.J.
1823*
JOHNSON, P.
1477, 2451*, 3391, 4347
JOHNSON, R.C.
7769
JOHNSON, R.J.
8016*
JOHNSON, R.J.R.
5711*
JOHNSON, S.
833
JOHNSON, S.G.
3343*, 3937*
JOHNSON, W.D.
6334*
JOHNSON, W.P.
1832*, 2232
JOHNSTON, D.
4048
JOHNSTON, D.G.
8335

JOHNSTON, G.W.
4802
JOHNSTON, I.D.A.
1233, 5635
JOHNSTONE, J.M.S.
2899
JOINER, P.D.
2385
JOKELAINEN, P.T.
2676*
JOKINEN, K.
6216
JOLESZ, J.
4982
JOLLER-JEMELKA, H.I.
5078*
JOLY, J.G.
1037, 5398*
JOLY, J.P.
4475*
JONA, J.Z.
1196, 2613, 4815*
JONAS, L.
4201*
JONASSON, J.L.
655
JONES, A.L.
1807, 2677*, 7382*
JONES, B.E.
1629
JONES, C.A.
119*
JONES, D.C.L.
6037*
JONES, D.M.
652, 658, 3443
JONES, E.A.
1569, 2350, 8399*
JONES, E.L.
1326
JONES, G.
1035
JONES, I.S.C.
2378
JONES, K.G.
6785
JONES, M.M.
3795
JONES, M.R.
4385, 5671
JONES, P.
2941
JONES, P.D.
2040
JONES, P.D.E.
7465
JONES, P.E.
3252*
JONES, P.F.
6352*
JONES, R.E.
7304*
JONES, R.S.
4650, 4790*, 8108*
JONES, R.T.
5237
JONES, S.E.
1393*
JONES, T.C.
6641*
JONSSON, J.
1985
JONSSON, P.E.
2585
JOPPICH, I.
8324
JORDAN, G.L., JR.
591
JORDAN, P.H., JR.
4032
JORDAN, S.C.
5786*
JORDANOVA, J.
270, 278
JORGE, A.
7149*
JORGE, A.D.
6894
JORGE, S.M.
4512
JORGENSEN, B.J.
1553*
JORGENSEN, E.
6076*
JORGENSEN, F.S.
883, 2782*
JORGENSEN, T.G.
1879*, 2827, 3663*
JORGENSON, H.S.
6743
JORI, G.P.
6497*
JORKE, D.
699
JOS, J.
2345*, 4130*
JOSEPH, G.J.
1263*
JOSHI, G.S.
2227
JOSHI, P.H.
7808*
JOSHI, S.R.
1673
JOSKE, R.A.
6401*
JOSS, A.
6103
JOST, F.
235
JOST, R.G.
8124*
JOSTARNDT, L.
2126, 5310*
JOUANNEAU, P.
3295, 8445
JOUANY, J.M.
694
JOUBAUD, F.
7089*
JOUBERT, S.M.
2602
JOURDE, L.A.
255
JOWETT, T.
2553
JOYEUX, A.
7566
JOYEUX, H.
3294
JOYEUX, R.
5940*
JUAREZ FERNANDEZ, C.
8175
JUGGI, J.S.
4725
JUGO, S.
21
JUHL, E.
2504, 2557, 8281*
JULER, G.L.
5910*
JUMAWAN, J.
5444*
JUNEMANN, A.
3311
JUNG, A.L.
1384
JUNG, B.
7324
JUNG, C.J.
6727*
JUNG, R.C.
1713
JUNGE, O.
1043, 4070*
JUNGERMAN, K.
2000
JUNGERS, P.
5868*
JUNGINGER, T.
4472*
JUNGK, K.
3063
JUNNARKAR, A.R.
5209
JURUKOVA, Z.
7938*
JUSKIEWENSKI, S.
5018*, 5183
JUSSILA, J.
5702*, 6263*, 6988
JUST, M.
2343*
JUSTESEN, T.
1652, 4185, 4878*
JUSTICH, E.
3346, 3947*, 5772*
JUSTRABO, E.
6144*
JUSZCZYK, J.
3961, 6438, 8368
JUUTI, M.
6254
JYNGE, P.
6508*
KABAKIAN, H.A.
3277*, 3557*
KABAKINC, T.
329
KABOTH, U.
2526
KACHAEVA, L.N.
6924

KACHELHOFFER, J.
1826*, 1835, 2753, 3883
KACZMAREK, B.
765
KACZMAREK, M.J.
6063, 6064
KACZMAREK, W.
1449*
KACZMARSKI, M.
3358, 5890
KADELL, B.M.
6548*
KADHIM, J.K.
1717
KADIAN, R.S.
7315, 7333, 7334
KADIR, S.
6874*
KADJI, H.
5833
KADLUBOWSKA, M.
1088
KADOWITZ, P.J.
2385
KADUK, B.
6827
KADZIOLKA, R.
8428*
KAGAN, A.
7515*
KAGAN, I.G.
4457*
KAGELER, W.V.
4875*
KAGNOFF, M.F.
2985*, 3015, 3025
KAHL, H.
3985
KAHLMETER, G.
7283
KAHN, L.B.
1351*, 6241, 8468
KAHN, P.
3966
KAHN, S.P.
2396
KAI, Y.
1143, 6033
KAIBARA, N.
3168
KAIRALUCMA, M.I.
2282*, 5309*, 6031, 6214,
6216
KAISER, B.
235
KAITO, I.
571
KAJITSUKA, T.
4525*, 4526*
KAJIYAMA, Y.
1227
KAKISHITA, M.
6222
KAKIZAKI, G.
3597, 5777
KAKO, H.
2156
KAKU, R.
5818*
KAKUMU, S.
76, 6511*
KALBFLEISCH, H.
6310*
KALEDIN, V.G.
3899
KALICA, A.R.
7863
KALIMA, I.
3898
KALIMA, T.V.
2268, 2286*, 3895, 3897
KALINICHENKO, N.I.
7979
KALINKA, R.F.
8169
KALINOS, V.L.
8238
KALINOVSKII, V.P.
1324
KALINOWSKA, B.
1604
KALISZAN, S.
8476
KALLAL
4139
KALLFELZ, F.A.
8114
KALLNER, A.
444
KALLOOR, G.J.
297
KALPOYIANNIS, N.
7134
KALRA, T.M.S.
2320, 7118
KALSBEEK, H.L.
6258
KALTIALA, E.K.
6242
KALTWASSER, J.P.
3620
KALYANARAMAN, U.
7285
KAMADA, T.
7093*
KAMALOV, Y.R.
6369
KAMATAKI, T.
3818
KAMATH, S.
657
KAMEDA, H.
1506*
KAMEKO, L.T.
730
KAMENEVA, S.I.
4409
KAMINSKI, D.L.
1118, 1597, 2947
KAMINSKY, L.S.
2915
KAMIYA, N.
5778
KAMIYAMA, S.
6324*
KAMIYAMA, Y.
8298*
KAMME, C.
7283
KAMMERMANN, B.
7379
KAMOI, I.
6148
KAMPER, J.
412, 776
KAN, S.
1571*
KAN, S.P.
6662
KANAGALINGAM, K.
188
KANAGASUNTHERAM, P.
2774
KANAGHINIS, T.
4671
KANAI, Y.
7449
KANARENS, J.
3614
KANAYAMA, T.
1157
KANDA, Y.
1484, 3103
KANE, J.G.
2449*
KANE, J.L.
6483*
KANE, J.M.
433
KANE, P.
4797
KANE, P.E.
6279
KANEKO, T.
6639
KANEMATSU, Y.
2156
KANETAKA, T.
1506*
KANG-HYUN, L.
4247*
KANG, S.H.
198
KANNO, H.
6249
KANO, T.
3168
KANO, Y.
5370*
KANTOROVICH, R.A.
8406
KAO, C.C.
5410*
KAPADIA, C.R.
3711
KAPANADZE, G.V.
4452
KAPANDJI, M.
70, 731
KAPIKIAN, A.Z.
5173*, 5935*, 7863, 8456*,
8481
KAPINOSOV, I.K.
3925

KAPITANENKO, A.M.
8186
KAPITULNIK, J.
2912
KAPLAN, I.
196
KAPLAN, M.H.
2427, 7736*
KAPLAN, M.M.
5101*, 6537*
KAPLAN, P.M.
8360*
KAPPAS, A.
586
KAPPELMAN, N.B.
2346*, 8330
KAPRAL, W.
4890
KAPUSTIN, N.P.
6306
KARADY, G.
799
KARAGEZIAN, K.G.
149, 165
KARAGJULJAN, R.G.
1221
KARAHARJU, E.
1370
KARAKOUSIS, C.P.
7825*
KARAMAN, N.V.
6553*
KARASAKI, S.
2152
KARASAWA, T.
3463*
KARASEV, V.V.
8435
KARASINSKA, M.
6494*
KARBHARI, R.S.
777
KARBOVNITSKAIA, L.P.
513
KARCZ, D.
6156, 6860
KARDEL, T.
1552*, 1553*
KARELINA, E.A.
6223
KARGAEVA, V.G.
4372
KARIM, S.M.M.
3187
KARIM, S.M.N.
2284*
KARJALAINEN, P.
5702*, 6254, 6988
KARJOO, M.
517
KARKOLA, P.
6216
KARL, I.
3842
KARLAGANIS, G.
2045, 5007*
KARLI, I.
3786
KARNAKY, K.A.
1803
KARNAUKHOV, Y.N.
8186
KARNOVSKY, M.J.
48*
KAROBATH, H.
5722*
KAROTKIN, E.H.
6435*
KAROUTSOS, K.
560
KARP, S.
5683
KARPINSKI, E.
5345
KARPPANEN, H.
2282*, 3664*
KARTASHOVA, O.Y.
583, 1545, 4336*, 4382,
5928
KARVONEN, A.L.
726
KARWOWSKI, A.
6844
KARZON, D.T.
6374
KASA, P.
2773*
KASAFIREK, E.
5511*
KASAHARA, Y.
3306
KASAI, M.
4156*
KASAI, S.
3971
KASAI, Y.
3971, 7096*, 7103*
KASAKOV, L.
206
KASATKIN, Y.N.
5839
KASATKINA, T.N.
786
KASCHULA, R.C.C.
4950
KASHIAWARA, S.
401
KASHIKI, Y.
5182, 5212
KASHIMA, K.
6162
KASKEVICH, L.M.
6439*
KASMAN, S.R.
8179
KASPAR, R.L.
8054
KASPAR, Z.
232
KASPER, H.
1150, 5788*
KASSAB, H.J.
6461*
KASSEL, H.
7875
KASSENS, W.D., JR.
481
KASSOUNY, D.Y.
2667
KASTIN, A.J.
66
KASUMIAN, S.A.
6267
KASYANENKO, V.V.
6110
KASZUBA, Z.
7559
KATAMADZE, N.G.
3763*
KATAYAMA, K.
1969*
KATCHIAN, A.
1435
KATER, L.
645, 4327
KATHER, H.
5359*, 6283, 6735
KATHOLI, R.E.
6421*
KATIYAR, B.C.
4329*
KATO, H.
5665
KATO, K.
8181*
KATO, R.
3789
KATO, Y.
76, 1080, 1081, 5665
KATON, R.M.
2581*, 4439, 6419*
KATORKIN, E.N.
7668
KATSAVOCHRISTOS, K.
6284
KATSUKI, S.
7947
KATSUTA, N.
69
KATSUYAMA, T.
4491*, 4492*
KATTAN, Y.B.
1724
KATTERLE, D.
266
KATZ, D.
6856*
KATZ, J.
7421*
KATZ, M.
332, 3131, 4390*
KATZ, N.
2000
KATZ, R.L.
6537*
KATZ, S.
5103*, 5761*
KATZIN, B.T.
5819*
KATZKA, D.
1151, 5502
KATZKA, I.
5761*
KAUFFMAN, G.L., JR.
4703*

KAUFMAN, H.
1402
KAUFMAN, H.D.
493
KAUFMAN, R.A.
5211
KAUFMAN, S.L.
6960
KAUFMANN, H.
7622
KAUFMANN, H.J.
4872*
KAUL, B.K.
1702
KAUR, J.
223
KAUSCH, H.
7346*
KAUTZ, G.
4883
KAUTZSCH, E.
3152
KAUZLARIC, D.
4879*
KAVKALO, N.N.
3986
KAWAI, K.
280, 352, 2165*, 3115, 3118,
5528, 7298*
KAWAMURA, I.
7941
KAWAMURA, K.
5165
KAWAMURA, T.
1923
KAWANA, T.
5858*
KAWANISHI, H.
3522*, 3933*, 5882*, 6498*
KAWANISHI, N.
7525*
KAWARADA, Y.
7463
KAWARAZAKI, M.
69
KAWASAKI, H.
8385*
KAWASHIMA, K.
3191
KAWASHIMA, O.
3130
KAWATANI, H.
1143
KAY, G.
5514*
KAY, G.H.
79*
KAYE, M.D.
1832*, 2232
KAZANBIEV, N.K.
6469*
KAZANTSEVA, G.P.
3761*
KAZARIAN, P.A.
165
KAZIC, T.
4530*
KAZIL, P.
3302
KAZIMIRCHIK, A.P.
7570, 8497
KAZINETZ, Z.F.
164
KAZMAGAMBETOV, Z.K.
1403
KAZMINA, N.P.
145
KAZNACHEEV, V.P.
8058
KEANE, J.
1564
KEANE, J.T.
2499*
KEANE, R.
448
KEARNEY, M.S.
3266
KEATING, J.
4278
KEATING, J.P.
3368*, 5946
KEATING, J.W., JR.
518
KECKER, K.
8325
KEDAR, I.
8043*
KEDDIE, N.
467
KEDINGER, M.
3845, 3851, 4678*
KEEFE, R.T.
2901
KEENAN, K.P.
228, 229
KEENTER, J.
2322
KEHAYOGLOU, K.
3786
KEIDING, S.
257, 1038, 2034, 3782
KEIFER, W.S., JR.
7745*
KEIGHLEY, M.R.B.
1672, 2381, 2762, 3171,
4386, 4948, 4970, 5632,
7017, 7202*
KEINER, F.
3952
KEISTER, D.B.
5497
KEITEL, R.
4260*
KEITH, R.G.
529
KEKKI, M.
1284*, 4045*, 5620
KEKOMAKI, M.
1406
KELADA, A.S.
3560*
KELBER, M.
6605
KELCH, L.
4000
KELLAWAY, I.h.
7445*
KELLEHER, J.
4915
KELLER, B.
5088*
KELLER, H.M.
4072*, 4850
KELLER, K.F.
3869*
KELLER, M.
3040*
KELLER, R.T.
2614
KELLETT, M.J.
7054
KELLEY, R.
6085*
KELLUM, J.M., JR.
1873*, 6225*
KELLY, J.
2211, 4112
KELLY, J.D.
5508
KELLY, J.M.
4302
KELLY, K.A.
55, 942, 3004, 3627*, 4865*
KELLY, M.H.
2962*, 3607*
KELLY, T.J.
2976, 3857
KELLY, T.R.
3338*
KELLY, W.J.
468
KELSEY, M.I.
1116
KELVIN, F.M.
3147*, 7735*
KEMENESI, W.
3519
KEMENY, L.G.
1111
KEMMER, C.
5034*, 7166*, 8412
KEMPEN, H.J.
990
KEMPERS, R.D.
7153*
KEMPGENS, U.
3472*
KEMPSON, R.L.
4416
KENDALL, F.M.
1866, 5332
KENNEDY, A.
5656*
KENNEDY, L.A.
2535, 3398, 4314
KENNEDY, M.
1548
KENNEDY, P.A.
5044
KENNEDY, P.S.
7748*
KENNEDY, T.
809, 4077

KENNEDY, T.L.
3886, 3887
KENNER, M.
1764
KENNES, B.
2368
KENNETT, M.L.
8455*
KENNEY, M.
2667
KENT, P.W.
5717*
KENT, T.
5234
KENWRIGHT, S.
906, 6288*
KENYON, G.
974
KEPES, J.J.
8148*
KERAAN, M.
3907
KERBAOL, M.
5056
KERBER, C.
5153*
KEREN, D.F.
4697
KERESZTURY, S.
2532*
KERK, L.
5926*
KERMODE, J.C.
7918*
KERN, F., JR.
2049, 4909*, 7399*, 8004*
KERN, H.F.
2420, 2835*, 4589*, 7987*
KERR, A.I.G.
7686
KERR, G.R.
1106
KERR, J.C.
1142, 1175, 2118, 3864*, 8006*
KERREMANS, R.
2580*
KERSAUDY, L.
4116
KERSTEIN, M.D.
2196, 2436
KERTSMAN, V.I.
7972
KERWAR, S.S.
8023*
KERYER, G.
2999
KERZNER, B.
2962*, 7251
KESSIE, F.
1560
KESSLER, G.
3716
KESSLER, J.I.
623
KESSLER, M.
6011
KESSLER, R.E.
701, 3806
KESTEN, M.
1498
KESTENS, P.J.
5213, 5225, 7708, 7737, 7739
KETCHAM, A.S.
4151*
KETILADZE, E.S.
3423*
KETTLEWELL, M.G.
5735
KETTUNEN, K.
6254
KEULEMANS, K.
42, 4635
KEULEN, H.J.M.M.
4699
KEUPPENS, F.
961, 1885*
KEUSCH, G.T.
5171*
KEW, M.
5809*
KEWENTER, J.
64
KEYES, S.R.
1028
KEYMER, I.F.
3022
KHACHATRIAN, A.G.
4055
KHACHATURYAN, N.M.
6341
KHAIRALLAH, P.A.
7327
KHAMBATTA, P.B.
3481*
KHAMIDKHODZHAEVA, D.
8053
KHAN, A.J.
1698
KHAN, A.K.A.
6357
KHAN, F.M.
1061
KHAN, O.
5725
KHARCHENKO, V.T.
6305
KHARE, R.D.
5209
KHARITONOV, L.G.
8152
KHARTCHENKO, N.M.
3647
KHASAROV, G.B.
6343
KHASNULIN, V.I.
8058
KHATSKO, V.V.
735
KHAYAT, E.
2262
KHEGAI, E.N.
1405
KHERSONSKAYA, R.Y.
6489
KHILNANI, M.T.
4442
KHIZHNYAKOVA, L.N.
8342
KHLYSTOV, V.N.
4759
KHODZHIMETOV, A.K.
4063
KHOKHLOV, A.P.
5057
KHOMENKO, A.M.
7593
KHORANA, J.
182
KHORLIN, A.Y.
5438
KHOSLA, S.N.
6633
KHOURY, G.A.
5724*
KHRAMKOVA, N.I.
6846
KHRISTICH, A.D.
6576*
KHUBCHANDANI, I.T.
4163
KHUBUTIYA, R.D.
6228
KHUDOLEY, I.F.
3331
KIBBEY, W.E.
460
KIBLER, J.
6890
KICZKA, W.
6438, 8368
KIDDER, G.W., III
2992*
KIDOKORO, T.
8181*
KIEFER, W.
2652
KIEFFER, J.
770
KIEKENS, R.
1935, 7739, 8280
KIENINGER, G.
2755, 3020, 3690, 3867*, 4050
KIENLE, J.
276
KIENYA, A.I.
3678
KIESEWETTER, W.B.
1431
KIESOW, L.A.
6770*
KIFFER, B.
8202
KIHARA, A.
806
KIHL, B.O.
7390*
KIJIMA, M.
6251
KIJIMA, T.
6888
KIKKAWA, K.
8138

KIKUCHI, K.
6249, 7103*
KIKUCHI, S.
309, 7093*
KILAM, S.
7935*
KILGORE, A.
182
KILMAN, W.J.
4977*
KILSTRUP, M.
1214
KILWAY, J.B.
5694
KIM, C.
198
KIM, D.K.
4215
KIM, E.
7219*
KIM, G.
1805
KIM, H.W.
5582, 5935*, 7863, 8456*,
8481
KIM, J.K.
198
KIM, K.C.
5582
KIM, M.
2032
KIM, M.S.
198
KIM, S.H.
4445
KIM, Y.M.
2500
KIM, Y.O.
8058
KIM, Y.S.
74, 1085*, 1778*, 3852,
5305, 7503
KIMBERG, D.V.
5298
KIMBERG, V.
34
KIMMIG, J.M.
7694
KIMOTO, K.
2165*
KIMURA, H.
3031
KIMURA, K.
2176*, 5165, 5342, 6642*,
8296*, 8298*
KIMURA, S.
8235*
KIMURA, T.
5300, 6815*
KIN, L.C.
4748*
KINALSKA, I.
1451
KINAST, H.
6768*
KINCAID, R.L.
2957
KINDBLOM, L.G.
5612
KING, C.
1134
KING, K.K.
6442*
KING, M.
5006*
KING, R.F.G.J.
4915
KING, R.W.F.
5623*
KING, S.D.
7522
KINKHABWALA, M.
6200*
KINNARD, M.S.
4669
KINNE, R.
887
KINNIBURGH, D.W.
4666
KINOSHITA, F.
6429
KINOSHITA, H.
7198*
KINOSHITA, M.
104
KINSEY, M.D.
2550
KINTER, W.B.
1803
KINTZEL, J.E.
6916*
KINUGASA, K.
6162
KINZLMEIER, H.
6885
KIRCHGESSNER, M.
3612*
KIRCHNER, J.P.
7142*
KIRCHNER, S.G.
6211
KIRIACOS, J.
4240
KIRICHENKO, A.A.
6428
KIRILENKO, M.P.
8504
KIRK, D.
7328
KIRK, H.
5673
KIRK, R.M.
7579
KIRKLAND, W.G.
2628
KIRKPATRICK, B.V.
5201
KIRKPATRICK, J.R.
6273, 7016
KIRN, A.
3821, 6721, 6786
KIRPATOVSKY, I.
2726
KIRSCH, K.
5270
KIRSCH, W.D.
4267
KIRSCHNER, P.
5808*
KIRSH, M.M.
1280
KIRSNER, J.B.
5734, 5950
KIRUKI, K.
7914*
KIRWAN, W.O.
5720*
KIRYU, Y.
1011*
KIRYUKHIN, I.F.
8170
KISELEV, Y.I.
6909
KISHI, M.
309
KISHI, S.
1239, 6925
KISHIMOTO, H.
6122, 6789
KISHORE, G.S.
4624*
KISLOFF, B.
1781*
KISSANE, J.M.
2898, 7726*
KISSEBAH, A.H.
8008*
KISSLING, U.
3041*
KITA, S.
6142*
KITAEV, V.V.
6909
KITAGAWA, A.
6955
KITAGAWA, H.
4636, 8024*
KITAGAWA, T.
2151, 5813*
KITAJIMA, K.
7758
KITAMURA, H.
4331*
KITAMURA, K.
5687
KITAMURA, T.
4453, 5179*, 5221, 6639
KITAMURA, Y.
6925
KITAZAWA, S.
3613, 5342
KITAZIMA, K.
613
KITO, F.
8095
KITSUKI, T.
1571*
KIUCHI, M.
5167*
KIVELITZ, H.
3900
KIVILAAKSO, E.
2268, 3710, 3895, 3897,
3898

KIWAKI, S.
212
KIYANOV, V.I.
8073
KIYOMOTO, A.
7949, 7951
KIYONAGA, J.
3894
KIYOSAWA, K.
686, 3369*
KIZU, M.
4983
KLAASSEN, C.D.
2878*
KLAEVEMAN, H.
1686
KLAIC, A.
3361*
KLAPDOR, R.
4643, 4644
KLASTERSKY, J.
813
KLATSKIN, G.
1600, 2501, 3372*, 6474*, 8293*
KLAUDA, H.C.
2072, 2403, 4642
KLECZKOWSKA, A.
1343*
KLEE, J.
8110
KLEEN, U.
7694
KLEHR, P.
3536
KLEIN, A.
3256*
KLEIN, C.A., JR.
674
KLEIN, H.J.
4576
KLEIN, J.
6034
KLEIN, P.
2194
KLEIN, P.D.
5510*, 5649*, 7552
KLEIN, R.M.
5471*
KLEIN, U.
721
KLEIN, U.E.
7214*
KLEINBERGER, G.
3768
KLEINER, A.I.
8342
KLEINHAUS, S.
4935*
KLEINMAN, M.S.
5726
KLEINMAN, P.
1593
KLEINMAN, P.K.
2168*
KLEINSCHMIDT, E.G.
3387
KLEINSCHMIDT, J.
3956
KLEIT, S.A.
1376
KLEMISCH, W.
6097
KLEPACKI, A.
534, 762, 8243
KLEPPING, C.
5113*
KLETT, U.
6684
KLEY, H.K.
128, 5135
KLIEMS, G.
3137
KLIMA, M.
2659*
KLIMA, T.
8262
KLIMASHEVSKI, V.F.
82
KLIMASHINA, T.A.
3653
KLIMENKO, A.I.
7907
KLIMENKO, E.D.
6749
KLIMKIEWICZ, E.
268, 3400, 6533*
KLIMMT, G.
5074*
KLIMOV, P.K.
6845, 7977
KLIMOVA, M.E.
3983
KLINCEWICZ, H.
3478*
KLINGE, O.
2526
KLINKEN, L.
8110
KLIPSTEIN, F.A.
4695, 5595*
KLITGAARD, N.A.
4203*, 7718*
KLOCKARS, M.
7062*
KLOPPEL, G.
3335, 5100*, 5894
KLOPPER, P.J.
1140, 1912, 2821, 7960*
KLOS, D.
6514*
KLOS, I.
3018
KLOSE, H.
2457*
KLOSS, J.
4011
KLOSS, R.
3136
KLOTZ, A.P.
4966*, 5807*
KLOTZ, U.
7848
KLOTZER, B.
4260*
KLUCAS, C.A.
6149
KLUPINSKA, G.
3212
KLURFELD, D.M.
1304
KLUSENER, H.
1064
KLUTH, D.
2226
KNAPP, H.R.
1924
KNAPP, W.A.
2564
KNAUER, C.M.
6506*
KNECHT, G.L.
4233
KNEPIL, J.
6449*
KNEPSHIELD, J.H.
2452*
KNIGHT, A.R.
6326*
KNIGHT, M.
5724*
KNIGHT, N.
3693
KNIGHTS, E.M.
6585*
KNIPP, J.
6942*
KNIPPER, A.
2746, 2819, 4811*
KNOBEL, H.
4643
KNOBLAUCH, M.
854, 5870*
KNODELL, R.
2514, 4646
KNODELL, R.G.
2550, 3434*
KNOEPP, L.F., JR.
5526
KNOFLACH, P.
3519
KNOKE, M.
455
KNOLLE, J.
626, 3439
KNOOK, D.L.
5405*, 7418*
KNOP, J.
2133
KNOPP, R.
5118*
KNOTHE, H.
3530
KNOX, E.G.
6601
KNOX, M.T.
7953
KNUDSEN, L.
6676*
KNUTRUD, O.
6408*, 7098*
KNUTSON, U.
2830

KOBA, S.
662
KOBAYASHI, A.
5146*
KOBAYASHI, M.
69, 574, 6403*
KOBAYASHI, S.
200, 3007, 6579*
KOBAYASHI, T.
1080, 1081, 1539, 3242, 6429
KOBLER, E.
4820, 4940, 6173, 6887, 8256
KOBRUSEV, V.V.
757
KOCH, G.
3599*, 4818, 7709
KOCH, H.
842, 1573*, 2219, 4995, 4997, 5154*, 6551*, 7535, 8266
KOCH, M.
3514
KOCH, M.J.
4504*
KOCHBAR, D.M.
2110
KOCHLAMAZASHVILI, A.I.
4452
KOCISOVA, M.
7365
KOCK, N.G.
1356, 2322
KODAIRA, S.
7669
KODAMA, M.
2823
KODAMA, R.
4633*
KODRAT, G.
5615
KODSI, B.E.
3125*
KOEHL, C.
3381
KOEHLER, P.R.
3092
KOEHLER, R.E.
1259*, 2314*
KOEKKOEK, P.H.
2811
KOELSCH, K.A.
8144
KOELZ, H.R.
4687, 7340, 7560, 7561
KOEP, L.
7116*
KOERPERICH, G.
5213
KOFF, R.S.
579, 2501, 3419*
KOFFMAN, C.G.
4549
KOGA, I.
6148, 7235
KOGA, Y.
1975*
KOGAN, E.M.
3091
KOGAWA, K.
321
KOGURE, T.
1275, 2260
KOGUTT, M.S.
6454*
KOH, K.S.
3217*
KOHAMA, T.
8121
KOHL, S.
2640
KOHLER, J.
4258*, 6586*
KOHLER, M.
2607
KOHLI, Y.
352, 6239
KOHN, J.
2454*, 6405*
KOHN, R.
3010
KOHNEN, P.
6450*
KOHNO, A.
6075*
KOIKE, Y.
3369*
KOIKKALAINEN, K.
1419
KOISCHWITZ, D.
2234, 3039*, 4473*, 5156*
KOISS, I.
2738*
KOIVULA, T.
2025
KOIVUSALO, M.
2025
KOJECKY, Z.
7696
KOJI, T.
675, 6434
KOJIMA, J.
4331*
KOJIMA, M.
603
KOJIMA, S.
874, 1787
KOJIMA, T.
2813
KOJO, A.
3156
KOKAREVA, L.V.
1224
KOLARIC, K.
1459*
KOLDKJAER, O.
4203*, 7718*
KOLDOVSKY, O.
5444*
KOLHO, L.
1489
KOLINSKA, J.
3830*
KOLLATH, Z.
2532*
KOLLIN, E.
2177*, 4982
KOLLING, K.
2759, 2760, 3963
KOLLINS, S.A.
1366
KOLMORGEN, K.
7700
KOLODEJ, A.
47*, 5325*, 6053, 7945
KOLODZIEJCZYK, Z.
7604
KOLOSOV, A.I.
6623
KOLSTAD, D.L.
902
KOLTS, B.E.
1956, 2097*, 2308, 3731
KOLTUSHKINA, G.G.
6823
KOLYAKOVA, T.A.
3244
KOMAI, T.
7298*
KOMALARINI, S.
7865
KOMALEVA, R.L.
5438
KOMARKOVA, O.
1327
KOMAROV, F.I.
6265
KOMATSU, T.
5396*, 5397*
KOMINE, Y.
69
KOMISSARCHIK, I.I.
15
KOMMERELL, B.
1611, 2776, 4303, 5904*
KOMOROWSKA, M.
384, 8180*
KOMURO, T.
3613
KONARSKA, L.
183, 1093
KONDA, S.
8480
KONDE, W.L.
7394*
KONDE, W.N.
7448*
KONDI, E.S.
1295
KONDO, H.
8017*
KONDO, K.
8181*
KONDO, M.
2989*, 6239, 6429
KONDO, S.
45, 4603, 7340
KONDO, T.
5364*, 5376, 5592*, 6525*, 7362, 7790*, 7965*
KONDO, Y.
3658
KONDOU, N.
679

KONDRACHENKO, O.V.
4250*
KONDRASHOVA, Z.D.
8418
KONDRATIEV, N.P.
6297
KONEGAWA, R.
3644
KONG, Y.F.
637
KONGTAWNG, T.
5662
KONISHI, Y.
2959, 3913
KONNO, T.
1703, 4429, 5996
KONONUCHENKO, V.P.
7569
KONOPLIA, P.P.
735, 6580*
KONRAD, K.D.
5399*
KONSTANTINOV, B.
7990
KONTUREK, S.
986
KONTUREK, S.J.
99, 114, 117, 1898, 1939, 1950, 2093, 2264, 3696, 4593*, 5387*, 5388*, 6711, 7347*, 7967*
KONYAEVA, A.G.
6114
KOO, A.
1171
KOOIJ, M.
4607*
KOOISTRA, J.B.
1387
KOOP, H.
2437
KOOPMAN, J.P.
7509*
KOORNHOF, H.J.
6612, 7875
KOPCKE, W.
252
KOPECKY, R.
1860
KOPELOVICH, L.
7032
KOPEN, D.F.
4571*
KOPETSCH, K.
4840
KOPLAN, J.P.
5170*
KOPLOVITZ, I.
6049
KOPPENFELS, R.V.
1325
KOPSA, H.
1654
KOPYLOV, F.N.
6295
KOPYLOVA, L.S.
8061
KOPYLOW, A.
1449*
KORDAC, V.
751
KORDYSH, I.G.
3162
KOREF, O.
6527*
KORELITZ, B.I.
4178, 5982*, 5983*
KOREN, E.
2116
KORESAWA, S.
7758
KORETZ, R.L.
2498*, 2525*
KORFF, L.
3522*
KORKUSCHKO, C.W.
6748
KORNER, B.
3247, 4337*
KORNFALT, S.A.
3874
KORNILOVA, S.N.
4057
KOROBKIN, M.
5546
KOROLENKO, T.A.
684, 3764*, 7468
KORONES, S.B.
2192
KOROSTOVTSEV, S.B.
365
KOROSTYLEV, V.I.
719
KOROT'KO, G.F.
3735, 6751
KOROTEEV, A.V.
6629
KORSMEYER, S.J.
4962*
KORSTEN, F.W.
3963
KORT, W.J.
3890, 4699
KORTEZOVA, N.
7938*
KORZYCKI, J.
8213
KOSAK, D.
5722*
KOSAKA, K.
1506*, 1539, 2603
KOSAKAI, M.
1971*
KOSEK, J.
8299*
KOSENKO, A.F.
4087
KOSHAL, A.
434
KOSHY, A.
3414*
KOSKELO, P.
5821*
KOSLOWSKA, K.
6719
KOSSAKOWSKI, R.
5890
KOSTEROVA, V.V.
718, 3471*
KOSTIAL, K.
21
KOSTIC, K.
1159, 1507
KOSTICH, N.D.
1519*
KOSTIN, V.N.
3954
KOSTOVA, N.
3324
KOSTULAK, A.
6719
KOTAS, J.
950*
KOTHE, W.
5149*, 8156
KOTI, S.T.
6663
KOTODA, K.
4246*
KOTOOR, R.
5004*
KOTRLIK, J.
3950, 4004
KOTT, I.
196
KOTZ, H.
3623
KOTZAUREK, R.
3768
KOURA, M.
6081*
KOURA, S.
6081*
KOURI, J.
1380
KOURIDES, I.A.
5907*
KOUROUNAKIS, P.
2914, 7457
KOVACS, J.
7614
KOVACS, K.
1124, 1982
KOVALCIK, P.J.
7277, 7672
KOVALENKO, N.Y.
3921
KOVALENKO, O.K.
3735
KOVALYOV, M.M.
8277
KOVAMEES, A.
7886
KOVAR, K.A.
5360*
KOVEN, I.H.
2718
KOVIC, M.
416
KOWALCZYK, C.
6465*
KOWALEWSKI, K.
47*, 1904, 4566*, 5325*, 6053, 7945, 7969*

KOWALSKI, R.L.
2145
KOWARSKI, S.
1802
KOWELL, A.
5792*
KOYAMA, K.
6033
KOYAMA, Y.
7669
KOZAKIEWICZ, H.
1543*
KOZINN, P.J.
3125*, 6540*
KOZLOV, V.A.
1224
KOZLOVA, E.P.
1670
KOZLOVA, Z.P.
8182
KOZLOWSKI, W.
724
KOZMA, M.
2773*
KOZUKA, S.
1394*, 5592*
KRACHUNOV, M.
234
KRAG, B.
849, 3577*
KRAG, E.
412, 776, 849, 851, 1652,
1794, 3577*, 4499*, 4878*,
5595*, 6689*, 6917*
KRAL, J.G.
8303*
KRAL, V.
5151*, 8447
KRALIK, J.
6900
KRAMANN, B.
286, 5519*
KRAMAR, V.S.
7668
KRAMER, B.
90
KRAMER, D.C.
788
KRAMER, M.F.
894, 4607*, 7352*
KRAMER, P.
4097*
KRAMER, S.
7114*
KRAMM, H.J.
3646
KRAMP, B.
3387
KRARUP, N.
1023, 1050, 2019
KRASINA, G.A.
708, 1204
KRASNA, I.H.
7670
KRASNER, N.
1477, 2535, 4347, 7302*
KRASNOVA, I.N.
805
KRASNOVA, I.S.
6294
KRASOVITSKIY, Z.I.
1364
KRASSNER, S.M.
1719
KRASZNAI, A.
8326
KRATOCHVIL, P.
3113, 3200, 3346, 3947*,
4017, 4807*, 5772*, 6971
KRATZER, G.L.
506
KRATZSCH, K.H.
3307
KRAUS, L.
5956*
KRAUS, M.
1287*
KRAUSE, C.
235
KRAUSE, U.
843, 1744
KRAUSE, W.J.
2269, 2324, 4536, 7905*
KRAUSS, J.
3183, 7617
KRAUSS, R.M.
3342*
KRAUSZ, M.
4628*
KRAUSZ, Y.
3431*
KRAVCHENKO, L.V.
3817
KRAVCHUK, A.N.
6553*
KRAVCHUK, I.P.
3289
KRAVITZ, J.J.
1839, 2750
KRAVTSOV, V.N.
3236
KRAWCZYNSKI, K.
672
KRAWIEC, J.
3697
KRAWITT, E.L.
2701*
KREAM, B.E.
5458
KREEFTENBERG, H.G.
3377
KREEL, I.
7023
KREEL, L.
1319, 3978, 4742*, 6856*
KREIG, H.
3272*
KREINER, I.
240, 3309
KREJS, G.J.
81, 2749, 4391*, 4556*,
6253
KREMER, D.
7063*
KREMER, G.J.
5869*
KREMER, H.
6164
KREMER, K.
3900
KRESS, H.G.
3384
KRESSEL, H.Y.
5546
KRETCHMER, N.
2363, 7646
KREULEN, D.L.
5306*
KREY, G.
8355*
KREZOSKY, S.C.
1764
KRICUN, M.E.
6943
KRIEG, H.
2321, 4474*, 8511
KRIEG, T.
8025*
KRIEGSMANN, L.
699
KRIER, J.
1856
KRIGER, A.G.
3733
KRIKSTOPAITIS, A.
7706
KRIKSTOPAITIS, M.
7706
KRINER, A.F.
3147*
KRIPKE, D.F.
3692
KRISHNAMURTHY, L.
2521, 3414*
KRISTENSEN, E.M.
6879*
KRISTENSEN, P.
7661*
KRITIKOU, P.
2201
KRIVCHIK, A.A.
6112
KRIVENKO, E.V.
1221
KRIVONOS, V.A.
3881
KRIVULIS, D.B.
4373, 8060
KROGER, H.
6767*
KROGER, W.
4767
KROGH, E.
5126*
KROKER, R.
1007*
KROL, R.
114, 6711, 7347*
KRON, K.A.
2925
KRONBERG, O.
7576
KRONCHEN, A.
7943

KRONMAN, J.H.
6716*
KRONQUIST, K.E.
4583*
KROPACOVA, K.
6109
KRUDY, A.G.
7549
KRUEGER, P.
4007
KRUEGER, W.A.
2960*
KRUGER, R.E.
6073*
KRUGLIK, G.D.
6677*
KRUIZINGA, K.
4343
KRUKOWSKI, Z.H.
5962
KRUMDIECK, C.L.
443, 5413*
KRUPA, V.
2948
KRUPKIN, R.G.
6623
KRUS, S.
1132
KRUSE, A.
281, 283, 1190, 6260
KRUSE-BLINKENBERG, H.
3061
KRUSE-JARRES, J.D.
5494
KRUSH, A.J.
5172*
KRUSKEMPER, H.L.
128, 5135
KRUSS, D.M.
5638
KRUSZEWSKA, M.
2722
KRYGIER, T.
703, 722, 3262
KRYLOV, A.A.
4009
KRYLOVA, N.P.
5834
KRYSHANOVSKAYA, N.A.
3417
KRYSHEN, P.F.
3994
KRYSKA, A.
3961, 6438, 8368
KRYSL, I.
6886
KRYSZEWSKI, A.
695, 1103*, 8391
KRYUCHOK, A.G.
3732
KRYUKOVA, L.V.
3468*
KRYZHANOVSKAYA, I.I.
4378
KRZYSIK, B.A.
3828*
KSHIRSAGAR, V.
7020
KUAKUVI, N.
1560
KUBA, J.
4245*
KUBASIK, N.P.
4799
KUBATO, Y.
2165*
KUBICKI, B.
3879, 3880
KUBICKOVA, Z.
6923
KUBIEN, E.
1343*
KUBIK, S.
8440
KUBO, A.
6429
KUBO, K.
8320
KUBO, R.
7318
KUBO, R.T.
7902*
KUBO, Y.
5020*, 5811*, 5812*, 7747*
KUBOTA, H.
3306
KUBOTA, K.
1394*, 5592*
KUBOTA, M.
689, 5798*, 6033
KUCHAR, O.
4245*
KUCHEL, F.
5494
KUCZLER, F.J.
2709*
KUDO, N.
3640
KUDO, S.
563
KUDOH, N.
912*
KUGELBERG, C.
1439*
KUGLER, S.
8448
KUHARA, K.
1081
KUHL, C.
5482*
KUHN, A.
1027
KUHN, H.A.
5853*
KUHNE, A.
3110
KUHNE-HEID, R.
4053, 5938*, 6883, 8172
KUHNE, U.
6767*
KUHNS, L.R.
5211
KUHR, J.
3039*
KUIJTEN, R.H.
6452*
KUIKEN, L.
1042, 3464*, 4669, 7173*
KUKSIS, A.
192
KULCSAR, A.
7426*
KULCSAR-GERGELY, J.
7426*
KULHANKOVA, J.
8215
KULICH, V.
4313
KULIG, A.
724
KULKARNI, P.B.
3482*
KULPA, L.
3347
KUMAGAI, M.
7525*
KUMAR, A.
102
KUMAR, P.J.
4921
KUMAR, S.
3807
KUMEKAWA, Y.
2816
KUMMERLE, F.
5793*
KUMPE, D.A.
1322
KUNATH, H.
5938*, 6587*
KUNATH, U.
3873*
KUNDLATSCH, C.A.
1721
KUNIEDA, T.
5182, 5212
KUNII, Y.
6249
KUNIN, A.S.
2701*
KUNINA, N.A.
4306
KUNIYASU, Y.
2176*
KUNTZ, J.L.
8201
KUNZ, G.L.
7446*
KUNZE, E.
8331
KUNZER, W.
5805*
KUNZLE, J.E.
8190*
KUPA, A.
5631
KUPCHIK, A.G.
4143
KUPCSULIK, P.
8042*
KUPFER, A.
2478, 2897
KUPPER, W.
3918

KURAMOTO, M.
3644
KURAMOTO, S.
401
KURAMOTO, T.
3359*
KURASZ, S.
739
KURATA, Y.
2823
KURBANOV, S.K.
3846
KURCHATOV, M.K.
6924
KURDYBAILO, F.V.
8139
KURENKOVA, L.V.
4381
KURIUKHIN, I.F.
4056
KURODA, K.
7516
KUROE, K.
1104*
KUROKAWA, S.
6453*
KUROKI, K.
3156
KUROSAWA, A.
6362*
KURSTIN, R.D.
5756
KURTZ, W.
7401*
KURYLOWICZ-SIDUN, B.
739
KURZBAN, J.D.
1268
KURZINGER, R.
602
KUSACHI, T.
7920*
KUSAKABE, K.
6370
KUSANO, S.
1571*, 5043
KUSCHE, J.
180, 1099
KUSHCH, N.L.
7569
KUSHCH, Y.B.
6343
KUSHELEVSKY, A.
2719
KUSHNER, J.P.
7755*
KUSHNIR, V.E.
4087
KUSIC, D.
3315
KUSMIESZ, H.
803
KUSTRZYCKI, A.
6890
KUSUMOTO, Y.
675, 6434
KUTAS, J.
5356*
KUTCHAK, S.N.
3468*
KUTESHEV, F.K.
8216
KUTSEMILOVA, A.P.
4447
KUTTER, E.
6928
KUTZ, K.
6788
KUWASHIMA, T.
3644
KUZIN, A.I.
6539
KUZIN, N.M.
6909
KUZMIN, Y.S.
3901
KUZNETSOV, V.M.
3997
KUZNETSOVA, N.I.
8059
KVIETYS, P.R.
2972, 3767
KVITSINSKAYA, E.A.
8060
KWAN, K.H.
8001*, 8002*
KWIATKOWSKA, H.
419
KWIECIEN, N.
3696
KWIECINSKI, P.
3535
KYLE, L.
3936*
KYOSOLA, K.
5759*
KYRAL, V.
8498
L'HERMINE, C.
584, 1707, 3109
L'HERMITE, A.
3*
L'HEUREUX, P.R.
6945, 7024, 7236
L'HIRONDEL, C.
6940*
LA GRUTTA, A.
669
LA TOUR, J.
3727*
LAATIKAINEN, T.
6565*
LABADARIOS, D.
2105*, 3374*, 4351, 7190, 8295*
LABADZE, R.F.
708
LABAS, P.
6897
LABAYLE, D.
3226, 3466, 5196, 6320, 8392
LABBE, F.
2345*, 4130*
LABBE, J.P.
4130*
LABEJEV, S.P.
4318*
LABHART, A.
4897
LABO, G.
1231, 2257, 2848, 3330, 3632*, 4899
LABRID, C.
6043, 6044
LABRUNE, B.
3241
LABRUNE, M.
4353*
LABURTHE, M.
3903, 5468*, 6820*
LACAINE, F.
5048
LACHANCE, C.
8431*
LACHANCE, P.A.
6773*, 6774*
LACHMANN, D.
5159*
LACK, L.
870*, 7400*
LACKI, M.
8247
LACKNER, K.
4473*
LACOMBE, M.L.
1987
LACROIX, A.
4142
LADIZESKY, M.
3605*
LAFFI, G.
683, 690
LAFFITTE, M.
3567
LAFFORGUE, D.
540
LAFLAMME, G.
6093
LAFONT, H.
6775*
LAGE, G.L.
7306*
LAGER, I.
2309
LAGERLOF, H.C.
87, 2768
LAGHI, A.
7584
LAGNEAU, A.
6144*
LAHET, C.
4750*
LAI, C.K.
387
LAI, C.L.
4845
LAI, H.C.
1857
LAI, H.Y.
7012
LAI, J.C.K.
7751*

LAING, F.C.
7842
LAING, R.R.
6152*
LAIRON, D.
6775*
LAISHES, B.A.
4717*
LAITINEN, M.
6763*
LAITIO, M.
2676*, 3273*
LAKE, A.M.
7257
LAKE, B.G.
1032, 1980, 2918
LAKE, W.T.
4014
LAKSHMANAN, M.R.
2032
LAL, K.
2521
LAL, P.
5040*
LAL, S.
572
LALOR, D.
461
LAM, A.
480
LAM, K.C.
3429*, 5115
LAM, K.H.
295
LAM, S.K.
356*, 387, 1340*, 4834*,
4845, 5128*, 5641, 7185*
LAM, W.K.
7185*
LAMAR, C., JR.
3752*
LAMARCA, S.
8422*, 8446
LAMARQUE, J.L.
725, 1209, 3940*, 3957,
3967, 6192
LAMB, J.C.
3032
LAMBERT, A.
308, 933, 1822*, 2752, 3639
LAMBERT, D.E.
2998
LAMBERT, H.P.
7870
LAMBERT, R.
355, 2531*, 3178, 3202,
3875, 4240, 4863, 6759*,
6901, 6931, 8187
LAMBERT-ZECHOVSKY, N.
3538
LAMBETH, L.A.
4392*
LAMBIET-COLLIER, M.
5467*
LAMBILLIOTTE, J.P.
5129*
LAMBOTTE, L.
3908, 8041*
LAMBRECHT, R.M.
3974
LAMERS, C.B.H.
4395*, 6591*
LAMERTON, L.F.
221
LAMESCH, A.
758
LAMMENS, M.
2849
LAMMENS, P.
5225
LAMMLI, J.
854
LAMONT, J.T.
2061*, 3853
LAMPEL, M.
4589*
LAMPERT, F.
7900
LAMPERT, I.A.
7465
LAMY, J.
1229, 1531, 7730
LANCASTER, C.
4089, 4127
LANCASTRE, F.
3573
LANCE, P.
7846
LANCIAULT, G.
95, 2125, 2994
LANCIEN, G.
154
LANDA, I.
5244*
LANDAAS, S.
2450*
LANDABURU, R.H.
7995*
LANDAU, B.R.
2906
LANDAU, L.I.
6215
LANDE, A.
3218*
LANDE, G.
6408*
LANDECKER, K.
6042*
LANDERS, T.A.
5480*
LANDES, D.R.
885
LANDIN, W.E.
1765
LANDOR, J.H.
982*, 6740, 7372*, 7390*
LANDRES, R.T.
2383
LANDRIEU, P.
4261*
LANDSBERG, L.
2977
LANE, C.
2661
LANE, M.
7748*
LANE, R.H.S.
7033
LANE, W.
4031
LANFRANCHI, G.A.
4541
LANG, F.
332
LANGE, A.J.
2934
LANGE, L.
8063
LANGER, B.
199, 3885
LANGHANS, P.
4042*, 4043*
LANGIEWICZ, J.
710, 1451
LANGLEY, P.G.
3395, 6413*
LANGMAN, M.J.S.
350, 362, 1346, 3317*, 4230,
5539, 6198*
LANGMARK, F.
2450*
LANGSLOW, D.R.
136
LANIGAN, M.W.
800
LANKEN, P.N.
4783
LANKISCH, P.G.
2437, 4223*, 5658*
LANSET, S.
2063
LANSKY, L.
1501
LANSMANN, M.
3131, 4390*
LANTER, B.
7019
LANZ, W.
286
LANZA, F.L.
1234
LANZINGER-ROSSNAGEL, G.
5904*
LAPALUS, F.
3955
LAPERCHE, Y.
1051, 1077
LAPINA, E.B.
5438
LAPIS, K.
8027*
LAPOINTE, G.
8375
LAPORTA, A.J.
8274*
LAQUEUR, G.
2043
LARANJEIRA, M.R.
6520*
LARCHER, V.F.
5936*
LARGIADER, F.
81, 3533, 4556*, 4687,
4816*

LARGMAN, C.
1959
LARI, J.
496
LARIN, E.F.
141
LARINA, E.V.
5839
LARMI, T.K.I.
1413, 2282*, 5309*, 6031,
6214, 6216, 6242
LARCSE, L.
1943, 6747*
LAROUZE, B.
6473*
LARREGUE, M.
3131, 4390*
LARRIEU, H.
4353*
LARSEN, C.R.
4374
LARSEN, J.A.
1023, 1050, 2019
LARSEN, J.K.
6722*
LARSEN, L.
3618
LARSEN, S.
3980
LARSON, H.E.
4931*
LARSON, S.M.
1279, 6772*
LARSSON, E.J.
137
LARSSON, L.I.
3592, 4804*
LARUSSO, N.F.
2875*, 4621*
LASALLE, R.
1483, 2583, 5700*
LASHERAS, B.
27
LASRY, G.
3889
LASSAR, K.H.
300
LASSER, A.
500
LASSITER, J.W.
2703*, 2957
LASZCZ, M.
2748
LATASTE, J.
7075*, 7077*, 7199*
LATENKOV, V.P.
148
LATHAM, M.
5199
LATIMER, R.G.
7833
LATORRE, J.J.
2462*
LAUCHART, W.
3716
LAUDANNA, A.A.
770
LAUER, C.
4584*
LAUFER, I.
2170*, 3049*, 4958*, 6355
LAUGESEN, L.P.
2120
LAUGHLIN, J.S.
1568
LAUGHLIN, L.W.
6644*
LAUGHREY, E.G.
2871*
LAUGIER, R.
112, 1942, 2862, 3743
LAUGROS, A.
4471*
LAUNAY, J.F.
3739, 5389*
LAUNIALA, K.
5701*
LAUNOIS, B.
4071*
LAURENT, J.C.
4722, 6108
LAURENT, J.X.
2216
LAURITSEN, K.B.
3247
LAUSCHKE, G.
6432
LAUTEL, J.
540
LAUTERBACH, F.
6000*
LAUTT, W.W.
6757*
LAUVERGEON, B.
1671
LAUWERS, W.
4177
LAVAETZ, D.
2209
LAVAL, J.
3726*, 5385*
LAVAL-JEANTET, M.
284, 332
LAVALLARD, M.C.
1048
LAVARDE, M.A.
181
LAVELLE, M.I.
1241, 6546*
LAVEN, R.
2739*
LAVERDANT, C.
8512
LAVOIE, P.
4339*
LAVY, U.I.
2811
LAWINSKA, B.
380
LAWINSKI, M.
3347
LAWRENCE, D.N.
789
LAWRENCE, G.
4433
LAWRENCE, G.A.
7934
LAWRENCE, J.R.
3340*
LAWRENCE, S.
5867*
LAWRENCE, W., JR.
6596, 7860
LAWS, H.
6454*
LAWS, J.W.
4024*
LAWSON, D.W.
1446*
LAWSON, H.H.
1751*, 2107*, 2278
LAWSON, T.A.
152
LAWSON, T.L.
2384, 8123*
LAXENAIRE, M.C.
3715
LAYDEN, T.
570
LAYDEN, T.J.
3771, 5421*
LAZAN, D.W.
4571*
LAZAR, G.
6123
LAZAREV, I.M.
8238
LAZAREVA, M.N.
3751*
LAZARINI, W.
3310
LAZORTHES, F.
5147*
LAZZARINI, A.
3355
LAZZARONI, M.
3714
LE BODIC, L.
4137*, 7693
LE BODIC, M.F.
4137*, 7693
LE BORGNE, J.
4360*
LE BRAS, M.
1347
LE CAM, A.
1068
LE CANUET, R.
4139
LE CHEVALLIER, P.
6313
LE GALL, J.R.
8488
LE GOFF, P.
3556
LE GRIX, A.
3537, 4423
LE HAUAN, J.
2752, 3639
LE MAGUET, A.
540
LE MAREC, B.
543*
LE MENN, G.
3556

LE NEEL, J.C.
4360*, 5653*
LE PAGE, J.
2202
LE PAGE, J
5541
LE PAGE, J.
5568*, 8402*
LE QUINTREC, Y.
3268, 3316, 5757*
LE ROITH, D.
6378*
LE ROUX, B.T.
4033
LE TREUT, A.
3399
LEACH, K.G.
3164
LEACH, T.M.
5795*
LEAKE, R.D.
1903, 4553*
LEAKEY, J.E.A.
6807
LEATHERDALE, B.
2552
LEBACQ, E.G.
4275*
LEBEDEV, D.A.
7989
LEBEDEV, S.P.
4319*, 4325*, 6369
LEBEL, B.
1100
LEBORGNE, J.
5653*
LEBOUTON, A.V.
1073
LEBREC, D.
3920, 4776
LEBRETON, E.
2757
LEBREUIL, G.
1499, 4371*
LECHAGO, J.
9, 1358, 2392, 5267
LECHENE DE LA PORTE, P.
7376
LECHIN, F.
5738, 8167
LECHNER, G.
3960
LECLERC, P.
287
LECOMPTE, Y.
3517
LEDERER, B.
4803*
LEDERER, I.
5806*
LEDERER, P.
4990*
LEDERLIN, P.
3265
LEDESMA, C.L.
3344*
LEDINGHAM, I.M.
5490
LEDOSSEUR, P.
4907*
LEDUC, J.L.
5588*
LEE, C.C.
1044
LEE, C.M.
5449
LEE, C.S.
2164*
LEE, C.Y.
7039
LEE, D.
7470
LEE, E.G.
2899
LEE, F.
4884
LEE, F.A.
2632
LEE, J.
5483
LEE, J.A.
3396
LEE, J.C.K.
7118
LEE, J.S.
5279*
LEE, K.Y.
945
LEE LIN, M.C.M.
3818
LEE, M.
2235, 7370*
LEE, P.T.
6585*
LEE, P.W.G.
7664*
LEE, R.
2661
LEE, S.
1129
LEE, S.C.
1792
LEE, S.J.
6705
LEE, S.K.
338, 2244, 3993
LEE, T.C.
5449
LEE, T.G.
2581*, 6419*, 7222
LEE, T.H.
5847*
LEE, W.M.
1518*, 2503, 8354*
LEE, Y.E.
1698
LEEDS, A.R.
5598*
LEEMAN, W.
7379
LEERS, W.D.
6476*
LEESE, H.J.
4508*
LEEVY, C.M.
3051*, 5119*, 6511*
LEFEBVRE, D.
7750*
LEFEVRE, R.
3938*
LEFFALL, L.D., JR.
5258*, 5775, 7058
LEFFELL, D.
4645
LEFKOWITZ, R.J.
7336*, 7337*
LEFRANC, G.
3*, 7693
LEFRANCOIS, R.
3537
LEFRECHE, J.N.
8198
LEGENDRE, H.
6315
LEGER, L.
697*, 3120, 3350, 4062,
4237, 6697*, 8224
LEGG, M.A.
6361*
LEGGE, D.
6393*
LEGGE, D.A.
1631
LEGLISE, P.
3755*
LEGOUT, J.
6697*
LEGOUX, M.
6694*
LEGRAND, G.
3547
LEGRAND, J.C.
5123*
LEGRAS, B.
154
LEGUIT, P., JR.
6975
LEGUTKO, J.
3207
LEHANE, D.E.
1393*, 7748*
LEHER, L.
2861
LEHMAN, G.A.
1240, 4775
LEHMANN, F.G.
1238, 2559
LEHMANN, H.
611
LEHMANN, H.U.
7165*
LEHMANN, N.I.
1535, 8351*
LEHNER, T.
8465
LEHTOLA, J.
726, 6724*
LEHY, T.
1753*, 3591, 3701
LEIBERMAN, D.P.
6755*, 7462
LEIBOWITZ, S.
8284*

LEIBSON, V.
5362*
LEICHTMANN, G.A.
3081, 8513
LEIGH, K.E.
2200
LEIGHTON, M.
472
LEIGHTON, P.M.
8470
LEIS, P.
1934
LEITAO, C.N.
5392
LEITCH, G.J.
2084
LEITER, E.H.
2417*, 2418*
LEJA, Y.Y.
8169
LEKOMTSEVA, G.A.
6426
LELIEVRE-GASSIN, C.
8202
LEMAIGRE, G.
697*, 3238
LEMAIRE, A.
8369
LEMAIRE, M.C.
6694*
LEMAITRE, R.
3858
LEMEVEL, B.P.
5557*
LEMKINA, L.M.
6106
LEMON, M.J.C.
1868
LEMOZY, J.
3564, 5147*
LEMPINEN, M.
561, 2268, 3895, 3897, 3898
LENKEI, R.
7090*, 7291*, 7787*
LENNARD, E.S.
2648
LENNARD-JONES, J.E.
350, 509*, 1742, 2387,
3576*
LENNE, Y.
4137*
LENNER, V.
4046*
LENNON, J.
299, 929, 3625*
LENOIR, C.
5891
LENORMAND, Y.
4104*
LENRIOT, J.P.
697*, 3345, 3350, 3919
LENTI, G.
1220, 3975
LENZ, J.
4720
LENZ, K.
4467*, 4963*
LEO, M.A.
7439*
LEONARD, A.S.
153, 1141, 3106
LEONARD, E.J.
2028
LEONARD, G.
1014*
LEONARD, J.P.
5225
LEONARDI, L.S.
3163
LEONE, R.
8076
LEOPOLD, G.R.
2174*, 5535, 7025
LEPAGE, B.
4367*
LEPAGE, G.
1483
LEPELTIER, M.
3709
LEPIDI, A.
6821
LEPKOVSKY, S.
1137
LEPORE, G.
3923
LEPORE, R.
4826
LEPORRIER, M.
3476*
LEPORTZ, J.
4137*
LEPPER, K.
5993
LEPRINCE, C.
3606*, 3755*, 4714*, 6005*,
6693*, 7440*
LEPSIEN, G.
2733*, 4687, 5559*
LEQUERLER, Y.
4020*
LERNER, J.
5296
LERNET, P.
5059
LESBRE, F.
8350*
LESBROS, F.
6901
LESCH, R.
1040
LESESNE, H.R.
7778
LESLIE, B.A.
4547, 5269
LESNA, M.
4326, 5899, 8339*
LESOBRE, B.
3573
LESPERANCE, P.
4795
LESSARD, Y.
8067
LESSING, J.B.
5679
LESTER, R.
1078, 1890, 5425*, 6495*,
8457
LETOURNEAU, J.
4609*
LETSIS, T.A.
1203
LETUTA, A.S.
6620
LEUPOLD, D.
2351
LEUPOLD, H.
8376
LEUSCHNER, F.
6849
LEUSCHNER, U.
3500*, 3769, 7401*
LEUTENEGGER, A.
3527
LEUTHOLD, E.
6158
LEV, R.
3191, 5473*, 7309
LEVEEN, H.H.
5002
LEVEILLE, G.A.
2010, 5412*, 7441*
LEVENS, N.R.
7932
LEVEQUE, B.
3538
LEVERMENT, J.N.
925
LEVESQUE, D.
112, 2855, 4601, 7368*
LEVESQUE, M.
8315
LEVEY, G.S.
7338*
LEVI, A.J.
906, 6288*, 6671*, 7286
LEVI, G.C.
5966
LEVI, J.J.
2202
LEVI, M.
5917*
LEVIN, B.
5950
LEVIN, D.
7766
LEVIN, D.C.
5521*
LEVIN, I.M.
3091
LEVIN, J.
5809*
LEVIN, K.J.
7778
LEVIN, L.G.
2798
LEVIN, R.J.
91, 2699*, 4129*, 5210
LEVIN, S.
2499*
LEVIN, W.
2912
LEVINA, G.A.
3964
LEVINE, B.A.
1334*

LEVINE, E.
7091*
LEVINE, G.M.
1119, 3839
LEVINE, J.B.
7193
LEVINE, R.W.
5872*
LEVINE, S.M.
5578
LEVINE, W.G.
1170, 3816
LEVINSON, M.J.
6477*
LEVISON, D.A.
3037, 4926*
LEVITIN, P.M.
6421*
LEVITSKY, A.P.
3331
LEVITT, M.D.
1120, 2124, 3343*, 3937*, 4743*
LEVITT, R.G.
6855*, 8124*
LEVKOVSKY, A.V.
6624, 8185
LEVO, Y.
6461*
LEVOWITZ, B.
6292*
LEVY, A.
3984
LEVY, A.G.
3342*
LEVY, B.S.
7163
LEVY, E.
4766, 6552*, 7721
LEVY, J.
7215*
LEVY, J.I.
5912*
LEVY, L.L.
5119*
LEVY, V.G.
1508, 8242
LEWAN, L.
7447*
LEWANDOWSKI, A.
7702
LEWICKI, A.M.
1306, 2341
LEWIN, K.J.
1351*
LEWIN, M.
1911
LEWIN, M.R.
5384
LEWINSKI, A.
7586
LEWINSKI, U.
8282*
LEWIS, A.A.M.
5719*
LEWIS, B.
2873*
LEWIS, B.A.
2675*
LEWIS, D.S.
1961
LEWIS, F.A.
8112, 8455*
LEWIS, J.C.
1750*, 7483*
LEWIS, J.D.
8403*
LEYDA, H.
4767
LEYMARIOS, J.
1665, 3233, 4219*
LEZEU, R.
1174
LEZHNEV, A.N.
265
LEZHNEV, I.A.
8377
LEZOCHE, E.
953*, 994
LI, F.P.
473
LI, T.K.
6758*
LIACOPOULOS, P.
4676*
LIANG, I.Y.S.
1171
LIASHCHENKO, P.S.
127
LIAU, Y.H.
954
LIAVAG, I.
2287*, 5382
LIBESKIND, M.
1706, 5232
LIBOV, A.S.
8216
LICASTRO, R.
7124, 7878
LICCIARDELLO, L.
5613
LICHTENBERGER, L.M.
2828, 4088
LICHTIG, C.
7106*
LIDGARD, G.
299, 929, 1882*, 3625*
LIDIN-JANSON, G.
8100*
LIDMAN, K.
5099*
LIE, T.S.
3035
LIEB, R.J.
5460
LIEBER, C.S.
1036, 1385, 3760*, 3806, 4411, 7428*, 7439*
LIEBERMAN, D.P.
7475
LIEBERMANN-MEFFERT, D.
7, 6247, 8165*
LIEBMAN, W.M.
3068, 6741
LIEBOWITZ, D.
2459*
LIEDBERG, G.
2693
LIEDTKE, C.M.
6688*
LIEHR, H.
712, 4337*
LIEM, H.H.
3796
LIEPINSH, M.A.
8275
LIERSCH, M.
7397*
LIERSE, W.
3300
LIFSHITS, R.I.
3450
LIFSHITZ, F.
6993
LIFSON, N.
2058*, 2068
LIGHTDALE, C.J.
516, 1251
LIGHTNER, E.S.
3526*
LIGHTWOOD, R.
1926*
LIGNY, G.
3206, 4936
LIGUORI, L.
7589, 7613
LIGUORY, C.
3120, 3350
LILJA, P.
2423, 2863, 7722*, 7723*
LILLEHEI, R.C.
3900
LILLEHOJ, E.B.
1503
LILLJEQVIST, A.C.
5461
LILLY, J.R.
2295, 7088*, 7880
LIM, F.E.
5591*
LIM, K.S.
7783*
LIM, M.S.
7036
LIMA GONCALVES, E.
1482
LIMA, [illegible] C.
3353
LIMAL, J.M.
4259*
LIMBOS, P.
3444
LIMBOSCH, J.M.
92
LIMLOMWONGSE, L.
4572*
LIN, A.W.M.
2196
LIN, G.J.
7394*, 7448*
LIN, J.I.
6969
LIN, T.M.
1899, 4592*

LIN, T.Y.
1458*
LIN, W.S.J.
1458*
LINARES, C.A.
3140*
LINCHENKO, I.F.
6628
LINDBERG, J.
3451*, 5852*
LINDBERG, R.D.
2633
LINDBLAD, L.
1576*, 6523*, 8425*
LINDBLOM, J.B.
1744
LINDE, J.
6379*
LINDELL, B.
8045*
LINDEMAN, J.
4869*
LINDENAUER, S.M.
2396
LINDENBAUM, A.
2921
LINDENBRATEN, L.D.
7187*
LINDENFELSER, L.A.
1503
LINDENMAIER, H.
6154
LINDENSCHMIDT, T.O.
8248
LINDER, A.E.
2241
LINDER, M.C.
5341
LINDER, M.M.
4720
LINDERKAMP, O.
2457*
LINDHAGEN, J.
3318*, 4705*
LINDHOLM, A.
3451*
LINDHOLM, E.
2822
LINDNER, A.
6969
LINDNER, A.E.
2329, 3192, 5747, 6949
LINDNER, H.
4317, 5100*, 5894
LINDNER, H.H.
3589*
LINDQUIST, B.
6356
LINDQUIST, L.
1472
LINDQVIST, L.
5354
LINDSTEDT, G.
6541*
LINDSTROM, C.G.
7206*
LINDSTROM, R.
1574*
LINDSTROM, R.L.
2568*
LINDSTROM, R.R.
4783
LINEHAN, J.H.
5308*
LINEVSKY, Y.V.
3235, 3237, 8207
LING, C.
7155*
LING, N.R.
7635*
LING, V.
2069
LINGUITI, C.M.
6728*
LINKE, M.
3304
LINKENS, D.A.
5334
LINNEKE, P.
5158*
LINNEMANN, C.C., JR.
5080*
LINSCHEER, W.G.
5933*, 7486*, 7487*
LINSS, W.
6684
LINTHORST, J.M.
7493*
LINTOTT, D.J.
4925*, 7664*
LIOMIN, E.
1112
LIOT, F.
4136*
LIPATOVA, V.A.
164
LIPINSKA, I.
3473*, 7813*
LIPINSKI, B.
3473*, 7813*
LIPKIN, M.
2134, 7890, 8111
LIPNER, A.
2336
LIPNITSKY, E.M.
4228
LIPPER, S.
6241
LIPPMANN-NIELSEN, I.
4902*
LIPPMANN, W.
1316, 1886*, 5363*, 7966*
LIPSCHUTZ, H.S.
3044*
LIPSHUTZ, G.R.
6419*
LIPSHUTZ, W.H.
938, 7961*
LIPSKY, M.H.
1973*
LIPSKY, R.
5800*
LIPTON, A.B.
6506*
LIQUORY, C.
2218
LISE, M.
4604
LISEWSKI, G.
3646
LISSEN OTERO, E.
5084*, 5122*
LISSNER, R.
8025*
LISTER-ROSENCER, L.M.
2546
LITINSKAYA, E.V.
7605
LITTLE, J.M.
1078, 4584*, 5425*
LITTLE, P.K.
6673*
LITTMAN, A.
5625*
LITVIN, I.
5849
LITVINCHUK, M.D.
6092
LITVINENKO, M.D.
513
LITWIN, A.
3207, 7594
LIU, H.Y.
6981*
LIU, M.S.
2997, 3097
LIVADITIS, A.
304
LIVNI, N.
7181*
LIVOLSI, V.A.
6594, 8463
LIVREA, A.
1128
LIVSHITS, E.G.
243, 3234, 6303
LIVSTONE, E.M.
2196
LIZUAIN, M.C.
371
LJASHCHENKO, P.S.
6099
LJUNGGREN, B.
6179
LLACH, F.
1448*
LLANOS, O.L.
4683*, 5358*, 5387*, 7967*
LLOMBART BOSCH, A.
8163*
LLOYD, A.G.
1032, 2928
LLOYD, D.A.
5614
LLOYD, E.A.
151
LLOYD, J.K.
4109*
LLOYD, J.W.
6375
LLOYD-STILL, J.D.
5198, 7765
LO BUONO, M.L.
8378

LO PRESTI, P.A.
564
LO, S.F.
2718
LO SCHIAVO, F.
1128
LO, T.C.M.
2631
LOBARBO, S.
2039
LOBBAN, D.I.
4900
LOBIS, I.F.
51, 1260*, 1276, 2229, 4111
LOCARNINI, S.A.
3433*, 8351*
LOCH, T.
8359*
LOCK, R.
4719
LOCKE, F.
2297
LOCKHART, A.M.
596
LOCKWOOD, A.H.
1568
LOCKWOOD, J.H.
7637*
LOCKWOOD, T.E.
2243
LODER, R.E.
5675
LOEB, H.
3257*
LOEB, J.N.
1075
LOEB, P.M.
1785, 2024, 2204
LOEBICH, F.
5960
LOEBL, D.M.
801
LOENING, W.E.K.
6364*
LOESCHKE, K.
1796
LOEWENSTEIN, J.E.
5932*
LOEWENSTEIN, M.S.
1440*, 4777
LOEWENTHAL, M.
1498
LOEWI, G.
6671*, 7286
LOF, A.
6078*
LOGAN, A.
4033
LOGAN, G.M., JR.
2614
LOGAN, K.R.
4484*
LOGAN, R.
1387, 7122
LOGAN, R.A.
1882*
LOGAN, R.F.A.
2569*
LOGINOV, A.S.
3468*, 3924, 6436*, 8418
LOH, T.T.
4725
LOHMANN, D.
7816
LOHRS, U.
8091*
LOHSOONTHORN, P.
1396
LOIKO, E.E.
6347
LOJDA, Z.
3843
LOKSHINA, K.A.
3334
LOLUDICE, T.A.
7228
LOMAZZI, A.G.
3179
LOMBARD-PLATET, R.
8254
LOMBARDI, A.R.
5222
LOMBARDI, B.
2162, 2854, 4998
LOMBARDINI, J.B.
3770
LOMBECK, I.
7252
LONCAREVIC, F.
4011
LONCHAMPT, M.F.
5547
LONDON, F.A.
3124*
LONDON, W.T.
6473*, 8353*, 8360*
LONDONG, W.
6285
LONG, B.W.
999
LONG, D.M.
2997, 3097
LONG, J.A., JR.
6199*
LONG, R.G.
1559, 2542*, 3048*, 3363*,
3386, 6519*
LONG, S.S.
7253
LONG, W.B.
5617
LONGACHER, J.W., JR.
3053
LONGINELLI, A.
2428
LONGMIRE, W.P., JR.
1450, 7009
LONGSTRETH, G.F.
4832*
LOOF, L.
2253
LOON, N.
7191, 7768
LOOS, R.
7401*
LOPASSO, F.
6934
LOPES, C.
5781
LOPES, J.D.
93
LOPEZ, C.
4562*
LOPEZ DE ROMANA, G.
896
LOPEZ, E.
1209, 4223*
LOPEZ, H.M.
330
LOPEZ, H.P.
768
LOPEZ, M.
3549
LOPEZ, M.A.
4594*
LOPEZ-NOVOA, J.M.
8044*
LOPEZ PEREZ, G.A.
2101*
LOPEZ, R.
821
LOPEZ VIZCAYA, F.
8245
LOPUNOVA, Z.K.
513
LORBER, S.H.
2458*, 4111, 4927*
LORD, M.G.
1849
LORENC, R.S.
2722
LORENZ, E.
1134
LORENZ-MEYER, H.
1133, 3010
LORENZ, W.
180, 973, 1099, 3193*,
3194*, 4756, 4855, 6736
LORENZINI, C.
8289*
LORENZINI, C.I.
7715
LORENZINI, I.
2587
LORENZINI, L.
3514
LORENZSONN, V.
1685, 8086*
LORIE, N.Y.
5095, 8406
LORRIAUX, A.
314*, 4475*
LORTAT-JACOB, J.L.
5791*
LORUP, C.
7423*
LOSOWSKY, M.S.
1378*, 2185, 2355, 3253*,
4311*, 4904*, 4915, 4920,
4922, 6133, 6978*, 7634*
LOSTANLEN, D.
3759*
LOTERO, H.
4114

LOTHROP, D.A.
2867*
LOTVEIT, T.
2447, 5606
LOTZSCH, M.
1208
LOU, M.A.
7834
LOUANT, P.H.
3539
LOUBIERE, M.
3075, 3996
LOUGH, J.
1463*
LOUGHNAN, P.
7683
LOUHIMO, I.
1406
LOUIS, A.
6754
LOUIS, S.L.
1058
LOUISOT, P.
6131*
LOUP, P.
6250, 6282, 8158
LOURIA, C.J.
3525*
LOUVARD, D.
2077
LOUVEL, A.
4128, 4237, 5181, 8224
LOUVEN, B.
6161
LOUW, J.H.
2265, 2266, 4837*, 4852,
5636
LOVE, A.H.G.
2754, 4503*
LOVE, K.
3523*
LOVE, L.
2570*, 3043*
LOVE, R.J.
4739, 8119
LOVELL, D.
8508*
LOVETT, E.
2627
LOVISETTO, P.
3410, 7775
LOW-BEER, T.
1225
LOW-BEER, T.S.
7459
LOWCHAREONKUL, S.
142
LOWE, C.F.
1613
LOWE, M.C.
5652*
LOWRY, P.J.
8291*
LOWRY, R.B.
2356
LOYATO, H.
5253*

LOYGUE, J.
3313, 4766, 6872, 7721
LOZANA ARRANS, E.
8496
LOZOFF, B.
1692
LOZON, A.A.
1420
LU, C.T.
3050*, 7841
LUBER, U.
7065
LUBIN, F.
2377
LUCAS, C.R.
3432*
LUCAS, D.O.
5493
LUCAS, M.L.
2065
LUCAYA, J.
3157
LUCCHELLI, P.D.
333
LUCCHELLI, P.E.
8384*
LUCCHI, A.
5260
LUCCIONI, P.
342, 7082, 8278
LUCHSHEV, V.I.
8377
LUCIAK, M.
3879, 3880
LUCIANI, M.
7930
LUCK, S.R.
4441
LUCKMANN, K.
1837, 3643
LUDERS, C.J.
6400*
LUDWIG, J.
6459*
LUFFAU, G.
227
LUFT, F.C.
1376
LUFT, R.
3660*
LUFTNER, J.
4214*
LUGAGNE, F.
1706, 5232
LUGARO, G.
214
LUGLI, R.
630
LUIS ABELLO, I.
505
LUISI, A.
8312
LUJAN PUJANTE, E.
8163*
LUKAC, M.
3180, 6897
LUKES, J.
3457

LUKESOVA, M.
3457
LUKIE, B.E.
1815
LUMENG, L.
6758*
LUMINARI, M.
3582
LUNA-DEL VILLAR, J.
6316
LUNAZZI, G.C.
7930
LUND, B.L.
5682
LUNDBERG, P.A.
6541*
LUNDBERG, Y.
2173*
LUNDGREN, C.E.G.
1688
LUNDGREN, G.
2888*
LUNDGREN, K.C.
6964
LUNDGREN, O.
3318*, 3872*, 3877, 4705*,
4727, 6832*
LUNDH, B.
8400*
LUNDHOLM, K.
3872*, 6523*, 6541*, 8303*
LUNDQUIST, F.
7429*
LUNDQUIST, I.
981*, 2863, 7723*
LUNDQVIST, G.
2309, 4804*, 4805*, 7324
LUNGAROTTI, M.S.
2352
LUNN, P.G.
4639, 7245, 7524
LUNZENAUER, K.
6184
LUNZER, M.R.
2932, 7417*
LUOMA, P.V.
7803*
LUPIANI, M.J.
4594*
LUPOLD, M.
7618
LUQUE, M.T.
371
LUQUE MARTIN, A.
8245
LURHUMA, A.Z.
4183
LURIE, I.
4276*
LUSCOMBE, D.K.
1786
LUSK, R.H.
3522*
LUSKA, G.
3918
LUSSIER-CACAN, S.
8046
LUSZPINSKI, G.
7752*

LUTHIER, F.
6313
LUTOLF, U.
854
LUTSEVICH, E.V.
4196, 6223
LUTTON, C.
1005*
LUTWICK, L.I.
3332
LUTZ, H.T.
266, 4814*, 6359*
LUTZ, J.
4731
LUX, G.
2732*, 2735*, 3195*, 3676,
4943, 4997, 5626*
LUX, S.E.
2867*
LYAKHOVICH, V.V.
6086*
LYDON, S.B.
499
LYKOSINA, E.E.
3078
LYNCH, A.
2939
LYNCH, P.R.
193*
LYNEN, F.K.
7466
LYNN, D.
1878*
LYNN JAMES, G.W.
1041
LYON, A.
2141, 4564*
LYON, N.C.
1680
LYONS, L.L.
5303
LYSENKO, A.
2726
LYSENKO, I.I.
1195
LYTTLE, J.A.
5736
MAAS, R.
3991
MAASS, G.
5205
MAAZ, E.
3110
MABUCHI, C.
5630
MACABUHAY, M.R.
1698
MACAK, J.
4252*
MACARONE-PALMIERI, R.
3227
MACARTNEY, J.C.
4974
MACCARI, T.
3553
MACCARTY, R.L.
5515*, 6363*, 6853*
MACDICKEN, I.
3890
MACDONALD, C.M.
6077*
MACDONALD, I.A.
5004*, 7280
MACDONALD, J.S.
3795, 6606, 7242
MACDONALD, T.H.
1369, 6029, 8099*
MACDOUGALL, B.R.D.
1261*, 2471, 3367*
MACFADYEN, B.V., JR.
5765
MACFERRAN, S.N.
4507*
MACGREGOR, A.B.
199
MACGREGOR, B.A.
3885
MACGREGOR, I.L.
2323, 3370*, 5107
MACH, J.P.
452*
MACHADO, A.E.C.
1049
MACHADO, G.
1225
MACHADO, M.C.C.
1482, 3333, 3353
MACHADO, N.
4274*
MACHALSKA, M.
6494*
MACHALSKI, M.
7066
MACHANEK, M.
6768*
MACHELL, R.J.
4971
MACHEN, T.
1907
MACHIDA, K.
242, 3130
MACHIDA, T.
6248
MACHII, K.
3033
MACHOTKA, S.V.
8040*
MACINOT, C.
4471*
MACK, U.
2187
MACKAY, C.
4787
MACKAY, D.M.
6616
MACKAY, I.R.
8381*
MACKENNEY, R.P.
5166
MACKENZIE, C.
7251
MACKENZIE, M.
2838*
MACKENZIE, R.L.
4668, 5902*
MACKERCHER, P.
2324, 7905*
MACKES, K.G.
5615
MACKEY, W.A.
557
MACKINNON, M.
400, 1601, 2607
MACKINTOSH, P.
8263*
MACKOWIAK, P.A.
674
MACLEAN, L.D.
592, 623, 1357
MACLEAN, W.C., JR.
896, 3604*
MACLENNAN, I.C.M.
7064*
MACLENNAN, R.
8234*
MACLEOD, I.N.
5240*, 5241*
MACLEOD, W.M.
449
MACLER, J.
8269
MACMILLAN, S.
7785*
MACNICOLL, A.D.
5403*
MACPHERSON, B.
3021
MACQUEEN, A.
3319*
MACRAE, K.D.
375, 4077
MACSWEEN, R.N.M.
2528
MACYSZYN, R.
3216
MADAAN, T.R.
477
MADANAGOPALAN, N.
837
MADDEN, D.L.
6483*, 7146*
MADDEN, J.W.
4724
MADDING, G.F.
5044
MADDREY, W.C.
23, 1547, 1549, 4348, 5119*,
8083*
MADEWELL, B.R.
2653
MADEWELL, J.E.
2338
MADRAZO, A.C.
1400
MADSEN, D.
2876*
MADSEN, E.H.
6260
MADSEN, O.G.
4227, 7580
MADSEN, T.
6210
MADURA, J.A.
5484

MADUREIRA FILHO, D.
3176
MAEDER, H.U.
1573*
MAES, J.M.
2895
MAESTRACCI, D.
4, 1090
MAETANI, S.
401
MAEYAMA, R.
7612
MAFART, Y.
3573
MAFFIOLI, B.
1053
MAFFIOLI, C.
1219
MAGAGNOTTO, S.
2981
MAGALHAES, A.F.N.
1252
MAGALINI, S.I.
6126
MAGARIBUCHI, T.
7949, 7951
MAGDIEV, T.S.
3926
MAGE, K.
4366*, 7208*
MAGEE, A.I.
7490*, 7506
MAGEE, D.F.
5376, 7362, 7965*
MAGID, E.
8272*
MAGLI, C.
1155
MAGNITSKY, G.S.
3924
MAGNUSSON, G.
8018*
MAGNUSSON, O.
8018*
MAGOMEDOV, A.Z.
6230
MAGOMEDOV, S.M.
6230
MAGOTTEAUX, P.
3939*
MAGRIS, D.
271
MAGUIRE, M.H.
46*
MAGYAR, D.
5081*
MAGYAR, Z.
2913
MAHALANABIS, D.
2663, 5934*, 7158
MAHBOOB, S.
6130*
MAHBOUBI, S.
4872*
MAHER, J.W.
50
MAHLER, D.J.
6772*
MAHMOOD, A.
8088*
MAHMOUD, A.A.F.
226, 4462, 4737
MAHN, I.
7431*
MAHNKE, P.F.
4260*
MAHNOVSKI, V.
7145*
MAHON, W.A.
6396*
MAHR, G.
290
MAIDMAN, J.
3776
MAIE, M.
7843
MAIER, K.P.
682, 4316, 6795
MAILLARD, J.N.
1566, 4955, 5045, 6898
MAILLET, P.
5918*, 6188
MAILMAN, D.
4507*
MAILMAN, D.S.
5993
MAIMON, H.N.
186
MAIN, I.H.M.
966, 7363
MAINGUET, P.
4041*, 7857*
MAIO, G.
2509
MAIORE, A.Y.
4382, 5928
MAIR, W.S.J.
2431*
MAISIN, J.
5467*
MAITRA, T.K.
2663, 5934*, 7158
MAIYA, P.P.
7871
MAJBORODA, Y.N.
140
MAJEKODUNMI, A.E.
7162
MAJEWSKA, M.
1449*
MAK, I.T.
7427*
MAKARENKO, T.P.
8152
MAKAREVICH, Y.A.
718, 3471*, 3477*, 4207,
7597
MAKAROVA, L.A.
8183
MAKAROVSKAYA, A.I.
6489
MAKHIJA, S.J.
1062
MAKHLOUF, G.M.
178, 998, 1945, 4555*
MAKHMUDOV, O.S.
8373
MAKI, M.
6370
MAKI, T.
4049
MAKIEVSKAYA, S.E.
3544
MAKINO, I.
6567*
MAKINO, N.
6877*
MAKITA, T.
212
MAKKONEN, H.
1488, 1489, 5075*
MAKLANSKY, D.
1268, 2241, 2329, 3192,
5747, 6949
MAKOKHA, N.S.
4370*
MAKOTCHENKO, E.P.
8342
MAKOWSKA, K.
3478*
MAKOWSKA, U.
8372
MAKSIMOVA, L.A.
583, 4336*
MAKSUMOV, D.C.
5839
MAKSUMOV, D.N.
4063
MALAFOSSE, M.
7721
MALAGELADA, J.R.
1636, 3601*, 4832*, 4833*,
4978*, 5367*, 5773*, 5933*,
6070*, 7486*, 7487*
MALAISSE-LAGAE, F.
109
MALAISSE, W.J.
109
MALAJCZUK, A.
7911*
MALAMUD, D.
1748*, 1749*, 4708*
MALATINO, E.
4388*
MALBRAN, J.
1706, 5232
MALDONADO ELCY-GARCIA, J.
8175
MALEEV, A.
3324
MALEK, H.
6209
MALEKI, M.F.
1567
MALENKOV, A.G.
2711
MALESCI, A.
3392, 8383*
MALETTI, M.
2856
MALEYEV, V.V.
4447
MALHURET, A.
3583

MALINI, S.
5157*
MALINOVSKY, N.N.
764
MALINOWSKI, S.
8494
MALIS, F.
3843, 5511*
MALJKOVIC, T.
21
MALKEROVA, N.N.
7071
MALKINSON, F.D.
2499*
MALL, K.
4882
MALLARD, R.E.
6374
MALLAS, E.G.
8263*
MALLEGOL, D.
7030
MALLET, E.
4907*
MALLET-GUY, P.
7210*
MALLET-GUY, Y.
7102*
MALLINSON, C.N.
296
MALLORY, A.
4991*
MALMSTROM, J.
3139*, 4074*
MALMUD, L.S.
51, 1260*, 1282*, 2229
MALOBABIC, Z.
2741*
MALONE, J.D.G.
3317*
MALT, R.A.
1748*, 1749*, 4685*, 4698,
4708*
MALTSEVA, G.V.
727
MALUSZEK, S.
6501*
MALVER, E.
5922*
MALVY, P.
4360*
MALYSHENKO, L.V.
277
MALYSHEV, N.A.
3423*
MALYSHEV, Y.I.
7668
MAMBRINI, A.
154
MAMCHICH, V.I.
1605
MAMEDOVA, L.D.
7587
MAN, B.
5956*
MANABE, T.
4704*
MANAK, P.
5151*
MANANKOVA, N.M.
5437, 6119
MANCUSO, G.
669
MANDAL, A.K.
7834
MANDEL, E.M.
8282*
MANDIOLA, S.
7330
MANDOUR, T.
8008*
MANESS, P.F.
8462
MANEVSKA, B.
3208
MANGAT, S.
7998*
MANGEAT, P.
2845
MANGLA, J.C.
2320, 2500, 4099*, 4799,
7118
MANGOLD, G.
3351, 3354, 5793*, 5808*
MANGOLD, H.K.
8092
MANI, M.
1296
MANICH, B.
7547
MANIER, J.W.
1745, 4754, 5548
MANIS, J.
1805
MANKES, R.
6023
MANKODI, N.A.
6650, 6652, 6663
MANLY, J.
4431
MANN, D.L.
4144, 4919
MANN, M.D.
1683
MANN, N.S.
977, 1918, 5488, 5751, 7315,
7333, 7334
MANN, W.
113
MANN, W.N.
1557
MANNERING, G.J.
2900
MANNESCHI, M.
2548
MANNING, A.P.
6332*
MANNING, A.S.
7931
MANNING, J.A.
2932, 7417*
MANNING, R.J.
4217
MANNSTADT, C.
699
MANNWEILER, E.
5806*
MANNY, J.
4628*
MANOCCHIO, G.
681
MANOUSOS, O.N.
2736*
MANSBACH, C.M., II
815, 1098, 2130, 2971
MANSOUR, N.S.
6660
MANSUROV, K.K.
4328, 5046, 5892, 8316
MANTA, F.A.
2373
MANTEL, E.
1163
MANTOVANI, E.
8341*
MANTOVANI GUERREIRO, C.A.
8312
MANTOVANI, M.
3163
MANTZ, F.
2672*
MANZILLO, G.
568, 2509, 6475*, 8384*
MARAGALL, S.
4809*
MARAI, L.
7396*
MARANGOLA, J.P.
7845
MARCEL, Y.L.
8046
MARCELLI-BARGE, A.
2063
MARCHAL, G.
2422, 4985, 5835, 6180,
6382
MARCHALONIS, J.J.
6145*
MARCHE, C.
436*, 4139, 6940*, 6972
MARCHE, P.
5447
MARCHESI, L.
392
MARCHESINI, G.
5860*
MARCHETTI, G.
6803
MARCHIS-MOUREN, G.
2845
MARCO, J.
3832*
MARCON, N.
5902*
MARCONDES, M.D.
8453*
MARCOULLIS, G.
7495*
MARCUELLO GASPAR, E.
4172
MARCUS, J.C.
5203
MARCUS, W.M.
7153*

MARCUSSEN, H.
4961*, 6676*
MARECEK, Z.
751
MARECKI, N.M.
2651
MARES-GUIA, M.
2758
MARESCA, R.M.
3521*
MARESCAUX, J.
767
MARGARIDO, N.F.
1482
MARGETA, V.A.
6058
MARGIN, P.
5051
MARGOLIS, I.B.
4729
MARGOLIS, J.M.
2906
MARGOLIS, S.
4596*
MARGULES, R.M.
525
MARGULIS, A.R.
327, 939, 1259*, 7054
MARGULIS, M.S.
4373, 8060
MARIE, C.
8340*
MARIE, F.
4907*
MARIER, G.
6884
MARIER, S.H.
4547
MARIETTI, G.
7148*
MARIN, B.
2890*
MARINA-FIOL, C.
2425
MARINGHINI, L.
1479
MARINI, U.
291
MARINI, W.
6868
MARINOV, M.
3208
MARINOVIC, Y.
2955, 5422*
MARINOZZI, G.
2407*, 5758*
MARION, M.A.
7844
MARIOTTI, G.
2352
MARISCAL, J.
6316
MARKER, P.H.
2083
MARKERT, R.
8450
MARKESBERY, W.R.
4815*
MARKET, R.
724
MARKHAM, R.
687, 3942*
MARKIEWICZ, A.
4454
MARKOV, Y.G.
8060
MARKS, C.G.
472, 7055
MARKS, G.
462
MARKS, G.S.
2948, 7435*
MARKS, I.N.
2265, 2266, 4852, 5636
MARKS, J.
1378*, 3697, 7829
MARLEAU, D.
1158, 3462*, 4339*
MARLETTA, F.
4581, 7971
MARLICZ, K.
1449*
MARMO, E.
1082
MARNIEMI, J.
1030
MARONE, G.
1155
MAROUX, S.
2077
MARQUAND, J.
4824, 7732
MARQUARDT, H.
6881
MARQUET, G.
7895
MARRANO, D.
7589
MARRIE, A.
7600
MARRIOTT, C.
7445*
MARRONE, J.O.
1094
MARRS, T.C.
7912*
MARSAN, R.E.
2172*, 4772, 6550*
MARSELOS, M.
8033*
MARSH, A.R.
2873*
MARSH, G.W.
7640
MARSH, J.A.
2915
MARSH, T.
2894
MARSHAK, R.H.
1268, 1355, 2241, 2329, 3192, 5747, 6949
MARSHALL, J.S.
2941
MARSHALL, R.D.
1269
MARSHALL, W.H., JR.
7531*
MARTA, J.B.
4013
MARTEAU, C.
2926, 4618*
MARTELLOTTA, G.
5927*
MARTENS, H.
5304
MARTI, M.C.
8255
MARTI VICENTE, A.
4769
MARTIGNON, C.
8197
MARTIN, A.
363, 1187, 2554, 4863, 6131*
MARTIN, C.W.
7717*
MARTIN, D.
7209*
MARTIN, D.W., JR.
5755
MARTIN, E.
4290*, 4608*, 5891
MARTIN, E.W., JR.
460, 947, 969
MARTIN, F.
3057, 5113*, 6144*
MARTIN, J.
1723
MARTIN, J.F.
1218, 5028*
MARTIN, J.L.
1850, 1851, 1855, 2657
MARTIN, J.S.
1866, 5332
MARTIN, M.S.
3057, 6144*
MARTIN, R.E.
5550
MARTIN, R.J.
6335*
MARTIN, T.R.
6733, 6734
MARTIN, W.T.
4420
MARTIN ZARATE, J.M.
4769
MARTINEAU, G.
8404
MARTINEL, C.
4586*
MARTINELLI, R.P.
1049, 7453
MARTINEZ, A.F.
768
MARTINEZ-ALMCYNA, C.M.
3023, 3074
MARTINEZ-ALMCYNA, R.C.
4711*
MARTINEZ, C.R.
5762*
MARTINEZ DIEZ, M.
3747

MARTINEZ GARCIA, C.
4172
MARTINEZ, J.
7744*
MARTINEZ, J.R.
2777
MARTINEZ, L.O.
7852
MARTINEZ-MURILLO, R.
3683
MARTINEZ RAPOSO, A.
4968
MARTINEZ-RODRIGUEZ, R.
3683
MARTINEZ-VAZQUEZ, J.M.
2506, 3438
MARTINI, G.A.
850, 2559, 6310*
MARTINO PARODI, A.M.
6317
MARTINON, F.
5160*
MARTINS CAMPOS, J.V.
175
MARTINS, J.
2536*
MARTINSON, J.
57, 2767, 3635*
MARTY, A.T.
6862*
MARTY, F.
3967
MARTY, J.
181
MARTY, M.L.
8379
MARTYAK, S.N.
5782
MARUBBIO, A.T., JR.
2455*
MARUGO, M.
77
MARUMO, H.
2813
MARUYAMA, M.
414
MARUYAMA, T.
5827*
MARUYAMA, Y.
7006
MARX, F.W., JR.
7657*
MARY, J.Y.
22, 4500*
MARZIO, L.
4541
MARZO, A.
6803
MARZOLI, G.P.
3349
MAS, A.
715, 2558, 4809*, 6532*
MASAMUNE, O.
1738
MASBERNARD, A.
4182
MASCIA, A.
641
MASDEU, S.
566, 3516, 5797*
MASEK, J.
3689
MASERA, G.
1544*
MASESA, P.C.
1127, 2966*
MASFERRER SALA, L.
6933
MASHFORD, M.L.
4932*, 5454
MASHIGE, F.
3088, 7743*
MASI, A.T.
6477*
MASKENS, A.P.
222, 4929*
MASLENNIKOVA, A.A.
6235
MASLINSKI, S.
1881*, 5360*
MASLOWSKI, W.
8372
MASON, A.N.
4446
MASON, D.Y.
2623
MASON, E.
7272
MASON, E.E.
403
MASON, G.R.
6336*, 6698*
MASON, K.A.
3005
MASON, L.B.
1401
MASON, N.S.
2714
MASON, R.W.
7478
MASON, W.F.
4435
MASON, W.H.
8301*
MASSA, F.
3568, 6182, 7072
MASSARAT, S.
4282*
MASSART, J.P.
5113*
MASSET, F.
8257
MASSEYEFF, R.
3485
MASSON, B.
343, 3626*
MASSON, J.M.
363
MASSON, P.L.
4183
MASSRY, S.G.
1448*
MAST, A.
274
MASTERS, R.S.S.
2053
MASTERS, Y.F.
6730*
MASTYNSKA, M.
1088
MASUDA, K.
3005
MASUDA, M.
2989*
MASUZAWA, M.
5587*
MATAIX, F.J.
4677*
MATARAZZO, S.A.
514, 930, 1828*, 2236, 234
3281*, 6290*
MATAS, A.J.
1162, 1974*, 3803, 5434*
MATE JIMENEZ, J.
4968
MATERIA, A.
953*, 994
MATERN, S.
1112, 4341
MATEJ, L.
2123
MATEVOSCV, A.L.
277
MATHAN, M.
7871
MATHARU, S.
3028
MATHE, D.
3756*, 7413*
MATHE, J.C.
6319
MATHE, Z.
6899
MATHEWS, J.A.
6528*
MATHIAS, J.R.
1850, 1851, 1855, 2657,
7048
MATHIASEN, M.S.
281, 283, 6260
MATHIE, R.T.
6755*, 7462, 7475
MATHIEU, B.
3931*
MATHIEU, M.
4750*
MATHIEU, P.
8260
MATHIEU, S.
2926
MATHIS, P.
424
MATHON, C.
8254
MATHUR, P.P.
2902
MATHY, J.P.
7738
MATIN-SIDDIQI, S.A.
1684
MATINCEVA, R.
3324
MATLIN, S.A.
2949

MATOLO, N.H.
7027
ATOLO, N.M.
3944*, 3945*, 4123
ATCS, M.L.
2536*
ATOSSIAN, R.M.
5974
ATSUBARA, K.
212
ATSUBARA, Y.
6057
ATSUBAYASHI, T.
1571*
ATSUDA, M.
370, 6934
ATSUE, H.
2171*, 5640
ATSUI, S.M.
5415*
ATSUI, T.
8296*
ATSUI, Y.
6888
ATSUKURA, S.
2239
MATSUMOTO, H.
7954
MATSUMOTO, K.
3065, 6549*
MATSUMOTO, T.
5616
MATSUMOTO, Y.
7225
MATSUO, T.
150
MATSUO, Y.
5688
MATSUOKA, A.
6815*
MATSUOKA, Y.
8296*
MATSUURA, K.
7235
MATSUYAMA, S.
1571*
MATSUZAKI, M.
6639
MATSUZAKI, S.
3760*
MATTE, R.
4142
MATTER, R.
1393*
MATTERN, C.F.T.
5497
MATTES, P.
7936*
MATTEY, W.E.
1615
MATTHAEI, C.
170
MATTHEWS, D.M.
895, 5281*, 7912*
MATTHEWS, J.G.W.
5475*, 5476*
MATTHIESEN, T.
5355
MATTHIJS, E.
6524*
MATTILA, M.J.
891, 2600
MATTIOLI, F.
733
MATTOS, S.
196
MATTOX, K.L.
591
MATTY, A.J.
2065
MATUCHANSKY, C.
450, 782, 3181, 4181, 5174*, 5196, 6351*, 6902
MATURE, J.
7163
MATVEEV, Y.E.
6584
MATYUSHINA, E.D.
3924
MATZANDER, U.
4340*
MATZKU, S.
4806*, 7568*
MATZUK, A.
5959
MAULEON, F.
5050
MAURI, M.
715
MAURICE, M.
43, 7115*
MAURON, J.
7866
MAUSKOPF, J.
870*
MAUTALEN, C.
3605*
MAUUARY, G.
7715, 8289*
MAVROMICHALIS, J.
2166*, 2463*
MAX, M.H.
6544*
MAXIMENKOVA, A.
3863*
MAXTED, K.J.
6029
MAXWELL, J.D.
2634, 6293*
MAY, B.
6443*, 7201*
MAY, C.S.
509*
MAY, D.S.
1808
MAY, E.S.
4498*
MAY, H.
4199*
MAY, J.P.
6315
MAY, V.
6678
MAYBURY, N.K.
5627*
MAYCOCK, W.D'A.
3391
MAYER, B.S.
7086*
MAYER, C.J.
2759, 2760, 6700
MAYER, D.
8063
MAYER, E.
1840
MAYER, M.
3472*, 4712*
MAYNARD, C.D.
5660
MAYNARD, E.P., III
8506
MAYNARD, J.E.
1538, 2484*, 3420*, 6481*, 6482*
MAYO, D.R.
2651
MAYORAL, L.G.
4114
MAYOROV, V.M.
4076
MAYR, K.
6566*
MAYR, W.
2877*
MAYRHOFER, H.P.
3966, 4749*
MAYS, B.J.
1042
MAYS, E.T.
1469, 4273
MAYUMI, M.
2497*, 3369*
MAZAEV, A.P.
3334
MAZAHERI, M.R.
2864*
MAZALON-KUMALA, K.
3535
MAZANEK, E.
7066
MAZARRO VALLE, A.
8249
MAZCHENKO, N.S.
421
MAZET, P.
1655
MAZITOVA, O.P.
7720
MAZUREK, W.
380
MAZURIN, A.V.
760, 6924
MAZURIN, B.G.
6344
MAZZA, L.
4294*
MAZZACCA, G.
587, 2529
MAZZAFERRI, E.L.
947, 969, 1872*, 7885
MAZZANTI, R.
683, 690
MAZZELLA, G.
1607, 2549, 4670

MAZZOLA, G.
214
MCADAM, L.
1281*
MCADAM, W.A.F.
1188, 2998, 4812*, 6212
MCAFEE, J.G.
5522, 5801*
MCALHANY, J.C.
415, 818
MCALISTER, W.H.
3158
MCALLISTER, T.A.
2668
MCANULTY, P.A.
6806
MCARDLE, A.H.
1902
MCARTHUR, J.
7545
MCAULIFFE, V.J.
8360*
MCBRIDE, J.
8482
MCCABE, B.F.
8485
MCCABE, R.
3772
MCCABE, R.P.
1440*
MCCAIN, T.
5294
MCCALL, J.T.
2545*, 4621*, 6536*
MCCALLUM, D.I.
2674
MCCALLUM, R.W.
1841, 4031, 4540, 6709
MCCANDLESS, D.W.
2014
MCCARTHY, B.
517
MCCARTHY, C.
1548
MCCARTHY, C.F.
2344*, 2354, 3251*, 3260, 4916, 5685
MCCARTHY, D.M.
74
MCCARTNEY, A.J.
5774*
MCCARTNEY, P.R.
3861*
MCCAULEY, R.G.K.
4124
MCCAUSTLAND, K.A.
6482*
MCCHESNEY, A.E.
2653
MCCLATCHEY, K.D.
2629
MCCLOY, R.F.
4854
MCCLOY, R.M.
3143*
MCCLURE, J.P.
1645*
MCCOLL, I.
37, 7533
MCCOLLUM, J.P.K.
4218, 7244
MCCOLLUM, R.W.
1522*
MCCOLLUM, R.W., JR.
2501
MCCONE, J.
2021
MCCONNELL, E.E.
2923
MCCONNELL, J.B.
3374*, 4351, 8295*
MCCONNELL, R.B.
2301, 7239
MCCOY, G.D.
7260
MCCOY, K.E.
4616*
MCCREADY, V.R.
5749, 6852*
MCCREARY, R.H.
8233*
MCCREDIE, J.
5583
MCCULLOUGH, R.A.
6149
MCDERMOTT, F.T.
2099*, 4709*
MCDEVITT, D.G.
2933, 7432*
MCDEVITT, J.J.
2708*
MCDONALD, A.P.
1956, 3731
MCDONALD, D.G.
6361*
MCDONALD, G.B.
5704*, 7316
MCDONALD, J.M.
1568
MCDONALD, T.F.
5460
MCDONNELL, M.E.
7395*
MCDONNELL, W.F., III
2007
MCDONNELL, W.V.
2628
MCDOUGALL, R.M.
2571*, 4363*
MCELLIGOTT, T.F.
30
MCEWAN, J.
1510*
MCFARLANE, I.G.
590, 1659, 3461*, 5428*
MCGEE, J.O'D.
2556, 3469*
MCGEEHAN, S.
4921
MCGEENEY, K.F.
993, 1955, 1962
MCGHEE, E.
6755*
MCGHIE, D.
2650
MCGILL, C.
8434*
MCGILL, D.B.
1186*, 2348*
MCGINN, T.
7764
MCGINNIS, J.
8016*
MCGIVAN, J.D.
6760*
MCGOWAN, S.
3771
MCGOWN, E.L.
902
MCGRATH, H.
7458
MCGREEVY, J.M.
3003
MCGREGOR, D.H.
1277
MCGREGOR, G.I.
6613
MCGREGOR, J.C.
2339
MCGUCKIN, D.
5957*
MCGUFFIE, C.
6445*
MCGUFFIE, C.A.I.
608, 635
MCGUIGAN, J.E.
50, 1845, 2097*, 2803, 4521*, 4554*, 4789*
MCGUIRE, J.L.
2405
MCHUGH, A.M.
4932*
MCILMURRAY, M.B.
4230, 6198*
MCINERNEY, D.P.
1631
MCINNIS, W.D.
4126, 7207*
MCINTIRE, K.R.
3372*
MCINTOSH, W.
3492*, 3981, 6358*, 6381
MCINTYRE, N.
2586
MCKEERING, L.
1533
MCKELVEY, S.T.D.
3071
MCKENDRICK, G.D.W.
4430
MCKENNEY, J.R.
5460
MCKENZIE, A.W.
1386
MCKENZIE, S.G.
4527*
MCKINLEY, T.W.
674
MCKITTRICK, J.E.
7833
MCLAREN, D.J.
5507
MCLAUGHLIN, S.M.
7543
MCLEAN, J.R.
1084*

CLEAN, P.
6715*
CLEAN, R.
2704*
CLEISH, A.R.
7017
CLOUGHLIN, J.C.
4140
CMAHON, M.J.
2431*, 4048
CMAHON, R.E.
2907
CMASTER, P.
3909, 8307*
CMICHAEL, H.B.
6986
CMULLAN, J.M.
7931
CNAIR, M.M.
7666
CNEIL, N.I.
3624
CNEISH, A.S.
2131, 2166*, 2191
CNICHOLL, B.
2354, 3251*
CNULTY, S.
6546*
CNURLAN, M.
4923
CNUTT, N.S.
2923
MCPHEE, L.
822
MCPHIE, J.L.
8287*
MCQUEEN, E.G.
7478
MCQUILLAN, G.
2211
MCSHERRY, C.K.
1582, 1616
MCSORLEY, P.
2756
MCSWEENEY, W.J.
807
MEAD, G.M.
4230, 5539
MEADOWS, J.R.
4775
MEAKINS, J.L.
1443
MEALS, R.A.
5218
MEANEY, T.F.
1473, 6854*
MEANI, A.
3382
MEARNS, M.B.
2413*
MEBUS, C.A.
6149
MECKE, D.
7992*
MEDD, R.
3909
MEDELSI, M.
6313
MEDIANU, D.
3401
MEDINA, E.
331
MEDKOVA, I.L.
2022
MEDLINE, A.
1496, 2390, 5071*
MEDLINE, N.M.
2390
MEDNE, T.A.
6303
MEDVEDEV, M.A.
141
MEDVID, M.V.
6649
MEE, A.D.
5633
MEEK, E.M.
6834*
MEEK, J.B.
1992
MEEK, M.E.
975
MEERSSEMAN, F.
7738
MEEUWISSE, G.W.
6356
MEHENDALE, H.M.
3810
MEHTA, S.K.
4133*
MEIER, C.
5082*
MEIER, H.
3934*
MEIER, W.L.
2202, 5541
MEIER ZU EISSEN, P.
7200*
MEIGEL, W.N.
2351
MEIJER, D.K.F.
42, 907, 1170, 4635
MEIJER, S.
429
MEIKLE, D.D.
4835*
MEINHARD, E.
3386
MEIRA, D.A.
1715
MEIS, P.J.
1903
MEISEL, J.L.
393*, 4148*
MEISSNER, A.J.
1830*
MEISSNER, W.A.
5591*
MEITNER, E.R.
1*
MEIXNER, M.
7530*
MEJEAN, C.
3606*, 3755*, 4714*, 6005*,
6693*, 7440*
MEJIA, J.
7852
MEKHJIAN, H.S.
1872*, 4498*, 4590*, 4836*,
6025, 8147*
MELAMED, S.
3431*, 5331, 5332
MELANDER, A.
7283
MELANGE, M.
7737
MELARANGE, R.A.
7363
MELCHIORRI, P.
953*
MELDOLESI, J.
73, 865, 1173, 2847
MELE, A.
3923
MELENTIEV, M.G.
6220
MELIGRO, C.
393*
MELIKJANTS, A.G.
2711
MELIKOVA, M.Y.
3647
MELIN, Y.
3229
MELISSINOS, K.
6284
MELLITS, E.D.
7645
MELLON, P.J.
4668, 5816*
MELLOW, M.
5567*
MELMED, R.N.
6467*
MELNICK, J.L.
2018, 6471*, 7160
MELON, C.
3688
MENA, I.
1358
MENA, R.V.
4748*
MENARD, D.
4713*
MENARD, J.
3489
MENDEL, C.
933, 1826*, 2751
MENDELOFF, A.I.
457, 2635, 2638
MENDELOFF, G.
1287*
MENDELSOHN, D.
2604
MENDELSOHN, L.
2604
MENDENHALL, C.L.
5106*
MENDES DE OLIVEIRA, J.P.
2809, 2852, 2855, 3745
MENDES, J.P.
1954
MENDES-MOURAO, J.
6760*

MENDES-PEREIRA, E.
6712*
MENDES, R.
5971
MENDEZ, J.
3083, 3512, 8437
MENDIS, K.N.
6668
MENDISOVA, A.
6929
MENDONCA, H.L., JR.
4178
MENDOZA, C.G.
4736, 7692
MENDOZA, M.
1500
MENEGHELLI, U.G.
8162*
MENESES, L.
8398*
MENG, C.H.
5534
MENGE, H.
1123, 1133, 3617, 3837,
5990*, 6012, 6134, 6310*
MENGUY, R.
2337, 6730*
MENTION, J.
154
MENU, R.
2368
MENUCK, L.
3184, 7002*
MENUCK, L.S.
1422, 5590*
MENZEL, C.
2748
MENZEL, K.
3304
MENZIES, I.S.
877
MERADJI, M.
4953
MERALI, N.R.
2713
MERCADANTE, G.
4969
MERCADER MARTINEZ, J.
371
MERCHANT, C.
5900
MERCIER, J.C.
8229
MERCKE, C.
8400*
MERDLER, C.
4276*
MERETO, G.C.
7213*
MERGER, C.
7215*
MERHAV, A.
5679
MERIADEC, B.
5113*
MERIKAS, G.
2736*
MERINO, C.G.
3565
MERINO, G.E.
1823*
MERINO, M.J.
8463
MERINO, Y.
3740
MERIWETHER, T.W.
550*
MERK, K.H.
4317
MERKEL, H.
7431*
MERKER, H.J.
4279*
MERKIEL, K.
710
MERKLE, P.
2717
MERLAT, M.
4103*
MERLO, G.
934
MERLO, L.
6803
MERRITT, A.M.
1922
MERSHEIMER, W.L.
1267
MERSON, M.H.
4420
MERTENS, B.F.
7121
MERTHELOT, P.
5148*
MERTL, L.
950*
MESA, A.V.
8271*
MESCHERAYKOVA, S.A.
4241
MESHALI, M.M.
875
MESHKINPOUR, H.
4810*
MESSIAN, R.A.
5561*
MESSING, B.
4181, 6351*
MESSORI, D.
3555
MESTIRI, S.
3543
METAIS, P.
1066, 5452
METAYER, J.
3295, 8209
METCALFE, J.
2004
METHAN, E.
6313
METILDI, L.A.
7035
METMAN, E.H.
4324*, 6314
METREAU, J.M.
596, 3517, 4364*, 5148*,
5845
METS, T.
4436
METTRICK, D.F.
4738, 5485, 6002*
METZ, G.
1198, 5598*, 6323*
METZ, J.
2679*, 3749*
METZ, R.J.
1490
METZE, H.
8077, 8338
METZGER, H.
14
METZGER, W.H.
1281*
METZKE, H.
5105*
METZNER, C.
4267
MEUNIER, P.
1430
MEUWISSEN, J.A.T.P.
39
MEUWISSEN, J.H.E.T.
7273
MEUWISSEN, S.G.
4468*
MEWES, W.
1027
MEYER, C.
6206, 7600
MEYER, H.J.
6736
MEYER, J.H.
5785, 7330
MEYER, K.F.
1729
MEYER, P.D.
1620, 3773, 4651
MEYER, R.J.
8304*
MEYER, U.A.
4611*
MEYER, W.
3900
MEYER ZUM BUSCHENFELDE, K.H.
626, 1024, 2527, 3371*,
5022*, 7087*
MEYERS, C.
1626
MEYERS, H.I.
2203
MEYERS, J.D.
5875*
MEYERS, M.A.
498, 1391*, 2168*, 4934*,
6330*
MEYERS, O.L.
3907
MEYERS, S.
1438, 1732*, 3321*, 4901*,
5580
MEYNIEL, D.
3573
MEYNIEL, G.
3955

EYUHAS, O.
2030
EZEY, E.
2872*, 4625*, 7815*
EZZANOTTE, B.
7705
EZZEDIMI, R.
3288, 3532
IAN, G.
271
ICCI, D.
7194
ICFLICKIER, A.B.
1120
ICHAELIDES, K.
612
ICHAELIS, W.E.
2055
ICHAL, J.A., III
3092
MICHALAK, J.
8217
MICHALEK, H.
2036
MICHALKCVA, K.
6191
MICHALOWSKI, J.
3011, 7297*
MICHALSKA, Z.
162
MICHEL, B.
465, 7827*
MICHEL, C.
589
MICHEL, H.
2561, 4010, 6187, 6516,
7182*
MICHEL, M.F.
6144*
MICHEL, R.
1936, 1964
MICHEL, S.L.
5800*, 7109*
MICHELL, R.H.
2675*
MICHELS, J.A.
1767*
MICHELSCHN, N.H.
8403*
MICHENER, W.M.
844
MICHETTI, P.
4851
MICHIELIN, E.
4778
MICHIELS, M.
6830*
MICHOT, F.
5841
MIDDLETCN, H.M., III
890, 6021
MIDDLETCN, P.
7251
MIDDLETCN, P.J.
7872
MIDEJEAN, A.
2745*
MIEDERER, S.E.
6161
MIELECH, H.
710
MIENO, H.
7482
MIERSCH, H.
8203
MIES, S.
137
MIETTINEN, T.A.
1489
MIGASENA, P.
7856*
MIGLIO, F.
3404, 4912
MIGLIOLI, M.
3593
MIGNON, F.
3583
MIGNON, F.C.
8488
MIGNON, M.
3581, 3583, 3677, 4827,
4967*, 5941*
MIGNON, M.F.
5987
MIGNONE, C.
4393*
MIGUEL, P.R.
2460*
MIGUEL, S.G.
3785
MIGUEL VELASCO, J.E.
5244*
MIGUET, J.P.
4281, 5654*
MIHAILOS, P.
1740
MIHALY, F.
3323
MIHALY, K.
2054
MIHAS, A.A.
1192, 1910, 3753*, 4575,
6454*, 6521*
MIKHAIL, A.A.
6835*
MIKHAIL, I.A.
1674
MIKHAILOV, A.T.
8322
MIKHAILOV, E.A.
4054
MIKHAILOVA, A.M.
4444
MIKHEEVA, S.M.
6426
MIKHOPULOS, T.A.
3655
MIKI, H.
6771*
MIKI, K.
4209, 6137
MIKI, S.
2*
MIKKELSEN, K.
3638*, 7322*
MIKKELSON, B.
7388*
MIKOSCH, H.
4712*
MIKUS, L.
6780*
MILANESE, M.
2775
MILANO, A.F.
5774*
MILBAUER, K.
241
MILDVAN, D.
8285*, 8473
MILENOV, K.
206
MILES, A.E.
6146*
MILEV, N.
8499
MILEWSKI, B.
703, 722, 5836, 7558
MILFORD, H.E.
486
MILHAUD, G.
3181
MILITAREV, J.M.
7026
MILITELLO, C.
4604
MILLA, P.J.
5340, 6010
MILLAN, J.
1373
MILLAR, D.B.
1960
MILLAT, B.
1146, 3674*
MILLER, B., JR.
5079*
MILLER, B.R.
484
MILLER, C.W.
4210, 4211
MILLER, D.
5138*
MILLER, D.J.
6474*
MILLER, D.L.
1764, 2879*, 4673
MILLER, F.J., JR.
1547
MILLER, H.
295
MILLER, J.
885
MILLER, J.H.
5531, 8290*
MILLER, J.P.
542*
MILLER, L.J.
5985
MILLER, M.H.
1178*
MILLER, M.S.
473
MILLER, O.N.
130, 1999
MILLER, R.E.
1240, 4535

MILLER, R.R.
6329*
MILLER, S.
1859
MILLER, S.A.
3766
MILLER, S.F.
6326*
MILLER, S.S.
5962
MILLER, T.A.
207, 5358*
MILLER, T.B., JR.
4667
MILLER, W.J.
2703*, 2957, 6117
MILLER, W.N.
4794*
MILLIGAN, F.D.
1743
MILLMAN, I.
6473*
MILLS, L.R.
3746
MILLWARD-SADLER, G.H.
7796
MILMAN, N.
3618
MILNER, R.D.G.
1656
MILOSAVLJEVIC, J.
3408*
MILOSZEWSKI, K.
2185
MILSOM, J.P.
7171*
MILTON-THOMPSON, G.J.
4073*
MILUNSKY, A.
411
MIMURA, T.
6732
MIN, K.W.
2659*
MINAIRE, Y.
2416*, 4234, 6905, 8187
MINARD, P.
5968
MINAZZI, M.
889
MINDELL, H.J.
518
MINE, H.
3129
MINEO, T.C.
4028
MINER, W.F.
1674, 6644*, 6660
MINERVINA, S.S.
6621
MING, S.C.
193*, 2990*
MINIAILENKO, M.I.
6843
MINICONI, P.
5588*
MINKIN, S.D.
7219*
MINO, M.
6121
MINOLI, G.
889
MINSKI, M.J.
1032, 2918
MINTON, J.P.
460
MINTZ, U.
8126
MINTZER, R.A.
6677*, 7839
MINUTILLO, S.
271
MIR, J.
4352
MIR, S.S.
6698*
MIRACHIAN, R.
289, 2221, 2850
MIRAKHMEDEOV, M.M.
700
MIRAKHMEDOV, M.
8053
MIRALLES GARCIA, J.M.
2530*
MIRELMAN, D.
1761
MIRHOM, R.
3844, 7489*
MIRJAH, D.D.
215
MIRKOVITCH, E.V.
6012
MIRKOVITCH, M.
3227
MIRKOVITCH, V.
1123, 2893, 3617, 3837,
3866*, 5990*, 6134
MIRKOVITCH, W.
6282
MIRODZHOV, G.K.
8316
MIRONENKO, G.A.
4361*
MIRONOV, S.P.
5839
MIROSHNICHENKO, A.G.
4377
MIRZA, A.H.
6912*
MIRZOYAN, S.A.
7981
MISAKI, F.
5528
MISAUTOVA, A.A.
3544
MISCHER, W.
4000
MISEVICHUS, I.R.
6233
MISIEWICZ, J.J.
4073*, 4533
MISRA, P.S.
368
MISRA, R.
2935
MISRA, R.C.
826, 5690
MISRA, U.K.
2935
MISUROVA, E.
6109
MISZLAI, Z.
2524*
MITA, M.
3065
MITAL, I.
1967*
MITAMURA, K.
7743*
MITANI, K.
5810*
MITCH, W.
1549
MITCHELL, C.H.
4427, 7258
MITCHELL, C.J.
3976, 4212*
MITCHELL, C.S., JR.
6912*
MITCHELL, D.
2448*
MITCHELL, D.N.
8507*
MITCHELL, E.K.
7451
MITCHELL, G.F.
5509, 6145*
MITCHELL, J.D.
4392*
MITCHELL, J.R.
2103*, 7136*
MITCHELL, K.J.
440
MITCHELL, S.J.
713, 5197
MITCHELL, W.
6380*
MITCHELL, W.D.
1392*, 7060
MITCHELL, W.G.
3795
MITCHENKO, I.K.
671, 5097
MITHAL, S.
6654
MITO, M.
3971
MITOLO-CHIEPPA, D.
7948
MITRA, G.
6127
MITROFANOFF, P.
3104
MITROPOL'SKII, A.N.
7068
MITROVIC, M.
5489
MITSCHE, R.
4362*
MITSCHKE, H.
3765*, 4811*, 6036
MITSUI, S.
3007

MITSUOKA, T.
7510*
MITSUYOSHI, Y.
3115
MITTELMAN, A.
7667
MITTELSTAEDT, A.
378
MITTELSTAEDT, C.
2174*, 5535
MITTELSTAEDT, W.
137
MITZNEGG, P.
952*, 2735*, 2984*, 4069*,
4693, 5315*, 5386*, 5388*,
6746*, 7325
MIURA, T.
6196
MIURA, Y.
1923, 7482
MIWA, I.
6027
MIWA, K.
1299, 4171
MIWA, M.
6027
MIWA, T.
3148
MIYAGAMI, H.
8181*
MIYAHARA, J.T.
7947
MIYAI, K.
2877*
MIYAJI, T.
5827*
MIYAJIMA, T.
5167*
MIYAKE, J.I.
874
MIYAKE, N.
3713
MIYANO, T.
2569*
MIYAZAKI, H.
1983
MIYAZAKI, I.
8235*
MIYAZAKI, M.
2154
MIYAZAWA, S.
1039
MIYOSHI, A.
205, 7941
MIYCSHI, Y.
5300
MIZE, K.S.
5377
MIZRACHI, Y.
4906*
MIZUMOTO, R.
174*, 6075*
MIZUNO, F.
3348
MIZUNO, H.
5790*
MIZUNO, K.
3031
MIZUNO, S.
1283*
MIZUNO, Y.
1227, 8264*
MIZUSHIRO, H.
5336
MIZUTA, M.
679
MJOS, O.D.
6508*
MLEKUSCH, W.
2197
MLYNEK, H.J.
5149*
MOAKE, J.L.
4875*
MOATTI, J.P.
1947
MOBERG, S.
2791*
MOCANU, N.
4368*
MOCHIZUKI, F.
2618
MOCHIZUKI, Y.
159
MOCQUOT, G.
1671
MODAI, J.
4394*
MODAN, B.
2377
MODAN, M.
2377
MODENA, J.L.P.
747
MODIGLIANI, E.
6941*
MODIGLIANI, R.
450, 4500*, 5174*, 5196,
6320, 6941*, 8208
MODIS, L.
6718
MODLIN, I.M.
4693, 5197
MODRZEWSKA, F.
272, 273
MODZELEWSKI, B.
535, 8213
MOENGINAH, P.A.
2644
MOERTEL, C.G.
4978*, 5773*, 6360*, 7051,
7858, 8233*
MOESNER, J.
8297*
MOGAN, G.R.
5787*
MOGG, F.
2064
MOGHISSI, K.
5573, 7566
MOGILEVSKAYA, K.A.
6347
MOGOSCANU, M.
4368*
MOHALLATEE, E.A.
2400
MOHAMADI, M.
1480
MOHAMED, A.H.
1664
MOHAMED, F.I.
2756
MOHAMMED, S.F.
5552
MOHR, W.
5806*
MOHRI, T.
8024*
MOIR, D.J.
510*
MOKHOBO, K.P.
642
MOKKA, R.E.
7746*
MOKKA, R.E.M.
5309*, 6031, 6214
MOLAS, C.
4289*
MOLDEUS, P.W.
1028
MOLDOVAN, V.I.
3986
MOLE, R.H.
1798, 5192
MOLINA, F.
873
MOLINA, J.R.
394, 395, 396, 397, 1380
MOLINARI, F.
943, 4208
MOLINARI, J.A.
4702*
MOLINE, J.
363, 1187
MOLINIE, C.
8512
MOLINO, G.
2446
MOLINO, G.P.
2775, 3449
MOLLARD, P.
1430
MOLLBY, R.
2647
MOLLER, B.B.
6958
MOLLER, C.
7062*
MOLLER, E.
4253*
MOLLER, J.
5062*
MOLLER JENSEN, C.
6879*
MOLLER, S.H.
3214, 7581, 7610, 7619
MOLLICA, F.
5857*
MOLLMANN, K.M.
2610
MOLOKHIA, A.M.
8001*, 8002*
MOLSTER, A.
1314

MOLYNEUS, G.
7836
MOMBELLONI, P.
3355
MONACELLI, M.
1464
MONALDI, B.
2352
MONDON, F.K.
6483*
MONEREO, J.
3023, 3074, 4711*
MONERET-VAUTRIN, D.A.
3528
MONGEAU, R.
3724*, 7373*
MONGES, A.
5051
MONGES, H.
5189
MONIOT, A.L.
3970
MONKS, J.L.
7922
MONNET, P.
4105*
MONNIER, J.P.
284, 8242
MONOD, E.
8493
MONOD, R.
4103*
MONROY-RODRIGUEZ, O.
256, 8313
MONTAGNE, J.P.
4008
MONTAGUTI, M.
1063, 4652
MONTANARO, D.
2554
MONTANT, A.
8257
MONTARIOL, T.
536, 6898
MONTEIRO DA CUNHA, J.E.
1482
MONTERO VAZQUEZ, J.
5091
MONTESANO, R.
862
MONTESI, A.
236
MONTET, A.M.
38, 5424*
MONTET, J.C.
38, 5424*
MONTGOMERY, C.
4591*
MONTGOMERY, C.W.
2992*
MONTGOMERY, D.A.D.
5945
MONTGOMERY, R.D.
1737, 4913
MONTOREANO, R.
3605*
MONTORO, J.A.
8379
MONTOWSKI, J.
8244
MONTRASIO, P.L.
3179
MONTZ, R.
8448
MOODIE, H.
3366*, 3416*
MOODY, D.E.
2920, 7454, 8052
MOODY, F.G.
1317, 1635, 1880*, 2267,
3003, 4552*
MOOG, F.
7288*, 7502, 8085*
MOON, H.W.
1680
MOONEY, J.S.
2677*, 7382*
MOORE, A.F.
7327
MOORE, B.F.
6981*
MOORE, D.B.
7022
MOORE, E.W.
988, 1781*, 2094, 7313
MOORE, J.G.
3702
MOORE, J.P.
2171*
MOORE, K.T.H.
199
MOORE, M.N.
3822
MOORE, M.R.
6077*
MOORE, R.C.
5731
MOORE, W.H.
7778
MOORHOUSE, D.E.
5957*
MOORTHY, S.
3258*
MOOSEKER, M.S.
4486*
MOOSSA, A.R.
1266*, 2965*, 3050*, 4523*,
5321*, 5404*, 6030
MORA LARA, R.J.
5120*
MORA, R.
2221
MORALES, P.
7688
MORAN NESTARES, A.
106
MORAND, P.
6314
MORAVEC, R.
6897
MORAWSKI, S.G.
4391*
MORCHIO, P.G.
4208
MORDINI, M.
4826
MORDOVIN, S.M.
250
MORE, M.H.
330
MOREAU, M.F.
3955
MOREAUX, J.
3233
MORECKI, R.
5723*
MOREIRA, A.
370, 6934, 8120
MOREL, F.
4226
MORELEY, C.G.
5404*
MORELL, A.G.
7422*
MORELLI, A.
6510*
MORENO GONZALEZ-BUENO, C.
8154
MORENO LOPEZ, J.M.
8175
MORENO OTERO, R.
4968
MORENZ, J.
6160, 7165*
MORGAN, A.G.
1188, 2998, 4812*, 6212
MORGAN, B.
5726
MORGAN, D.F.
6287*
MORGAN, J.E.
5782
MORGAN, J.M.
1328
MORGAN, M.Y.
3458*, 7171*
MORGAN, R.G.H.
3037
MORGAN, W.J.B.
8116
MORGAT, J.L.
1146, 3674*
MORGENSTERN, L.
464, 5800*, 6614, 7109*
MORGENTHALER, F.
3389
MORGON, A.
3133
MORI, M.
2886*
MORI, T.
5827*
MORI, W.
5802*
MORI, Y.
6033
MORICCA, F.
6906
MORIEARTY, P.L.
6670
MORIGA, M.
205
MORII, H.
373

MORIN, C.
2122
MORIN, C.L.
802, 2069, 2583, 5700*, 8228
MORIN, D.
3132
MORIN, M.
7732
MORIN, M.E.
2172*, 4772, 6550*, 7125
MORIN, R.J.
2332
MORIN, Y.
4136*
MORISHIMA, N.
6118
MORISSET, J.
997, 1943, 2837*, 3724*, 6747*, 7371*
MORITA, I.
6794
MORITA, K.
6148, 7235
MORITA, M.
414
MORITA, T.
8296*
MORIWAKI, C.
7914*
MORIYA, H.
7914*
MORKBAK, N.K.
244, 6879*
MORKRID, L.
4509*
MORL, M.
842, 4200*, 8388, 8397*
MORLAND, J.
7174*, 7408*, 7409*, 8011*
MORLEY, C.G.D.
1169, 6091*
MORLEY, J.E.
3256*
MORLOCK, G.
7697
MORMINO, J.
5942
MORNET, P.
7732
MORODER, L.
7325
MOROI, T.
6530*
MORON, K.
268, 737
MORONI, M.
7671
MOROZOV, I.A.
3595, 6843, 7599
MOROZOWICH, W.
4544*
MORRIS, A.
5539
MORRIS, A.F.
3062
MORRIS, A.I.
4542, 6710
MORRIS, D.W.
2164*
MORRIS, F.
2923
MORRIS, G.K.
4420
MORRIS, G.P.
4487*
MORRIS, H.P.
159, 559, 1481
MORRIS, J.A.
8116
MORRIS, J.F.
2681*
MORRIS, J.G.
8009*
MORRIS, J.S.
6348*
MORRIS, K.E.
7000*
MORRIS, M.
1236
MORRIS, M.D.
3396
MORRISON, F.R.
5204
MORRISON, F.S.
1393*
MORRISON, W.J.
5214
MORRISSEY, J.F.
5555, 7540
MORRISSEY, K.P.
1582
MORRISSEY, R.L.
2079
MORSE, E.V.
4448
MORSE, J.W.I.
5004*
MORSELLI, P.L.
889
MORSELT, A.F.
4330*
MORSON, B.C.
7008, 7551
MORTARA, G.
7806*
MORTEL, R.
5648*
MORTENSEN, N.J.M.
2681*
MORTILLARO, N.A.
7498*
MORTOLA, G.P.
337, 1302
MORTON, A.G.
7994*
MORTON, D.L.
6615
MORTON, I.K.M.
1820, 2930
MOSAVY, S.H.
501, 2231
MOSBACH, E.H.
1994, 2952, 3359*, 3762*, 4640
MOSCA, L.E.
4752*
MOSCA, L.G.
4752*
MOSCARELLA, S.
683, 690
MOSCHINI, A.
7714
MOSER, B.
171
MOSER, G.
8257
MOSHAL, M.G.
359, 2602, 5327, 5634, 7345*, 7574*
MOSHCHICH, P.S.
6487
MOSIMANN, J.
3246
MOSIMANN, R.
6250, 6282, 6939*, 8158
MOSIN, V.I.
7957
MOSKOWITZ, H.
6200*
MOSLEN, M.T.
2922
MOSLEY, E., JR.
5258*
MOSLEY, J.W.
2494*, 5859*, 5873*, 8361
MOSLI, P.R.
6802
MOSS, A.A.
1259*, 2314*, 2358, 3114, 5542, 5546
MOSS, C.M.
6135
MOSS, D.W.
1103*, 7403*
MOSS, E.G.
5578
MOSS, J.N.
5331, 5332
MOSSELMANS, R.
5400*
MOSSINGER, P.
3308
MOSSINI, F.
2778
MOSTOWYCZ, L.
5667
MOTA-SANTOS, T.A.
6150
MOTIN, J.
4295*
MOTOIKE, Y.
414
MOTOVIC, A.
5956*
MOTOYAMA, Y.
6525*, 7790*
MOTSON, R.W.
5920*, 6568*
MOTT, C.B.
3333, 3353
MOTTA, G.
582
MOTTA, P.
2680*

MOTTA, U.
316
MOTTAZ, P.
5283*
MOTZOK, I.
2112
MOUCHET, A.
4824
MOUGENOT, J.F.
4905*, 6167, 6319, 7618
MOULE, B.
2193
MOULINIER, B.
4863, 6901
MOUNIER, C.A.
5253*
MOUNTAKALAKIS, T.
2605
MOUNTFORD, R.A.
6517*
MOUROT, M.
8210
MOUSSEAU, C.
1946
MOUSSEAU, R.
7196*
MOUSSOUROS, A.
1659, 3461*
MOWAT, A.P.
627, 1639, 7094*
MOXEY, P.C.
866
MOXLEY, R.T.
7637*
MOZSIK, G.
5356*
MRAZ, F.R.
2705*
MROZ, C.T.
942
MROZEK, B.
1359, 4896
MROZIK, H.
5959
MRYGLODOWICZ, A.
80, 383
MUCCIOLI-CASADEI, D.
2407*, 5758*
MUCHNICK, C.
6651
MUCKLE, T.J.
5705*
MUDGE, G.H.
3819
MUELLER, D.G.
5201
MUELLER, T.M.
5368*
MUFLIH, I.W.
1811
MUJAHED, Z.
2566*
MUKAMEL, E.
5955
MUKARAMOV, A.M.
3838
MUKAWA, K.
5802*
MUKHERJEE, T.M.
7031
MUKHIN, A.S.
4318*, 4319*, 4325*, 6369, 8059
MUKHIN, I.V.
6580*
MUKHOPADHYAY, A.K.
931, 1846, 4520*, 4528*
MULDER, G.J.
1074
MULDOON, J.P.
490
MULE, A.
2926, 4618*
MULLARD, K.S.
303
MULLEN, J.T.
7233, 7277, 7672
MULLENS, J.E.
3049*, 3275*
MULLER-BERGHAUS, G.
7431*
MULLER, D.P.R.
5340, 6010
MULLER, E.
3311
MULLER-EBERHARD, U.
3796
MULLER, F.
2725
MULLER, G.
2755, 3020, 3690, 6168
MULLER, H.P.
7620
MULLER, J.H.
7960*
MULLER, J.M.
3297
MULLER, M.
6883
MULLER, O.K.
598
MULLER, P.
5926*
MULLER, R.
745
MULLER-SCHOOF, J.
5870*
MULLER, W.
3551, 3572
MULLER-WIELAND, K.
5655*, 7067
MULLINK, J.W.M.A.
7464
MULLINS, G.C.
7683
MULLINS, M.
4244
MULLOCK, B.M.
7407*
MUNCK, A.
1050, 2019
MUNCK, O.
2209, 6609, 6989
MUNDA, R.
1267
MUNDAY, K.A.
143, 1791, 7303*, 7932
MUNDELL, D.H.
4422
MUNDON, F.K.
7146*
MUNEHISA, T.
675, 6434
MUNIZAGA, J.
1304
MUNJIAPPAN, M.
4541
MUNK, J.F.
7034
MUNKA, V.
7365
MUNRO, A.
6352*
MUNRO, H.N.
5341
MUNSTER, W.
6873
MUNTEFERING, H.
5162*
MUNTHE-KAAS, J.
5629
MUNZEL, M.
7958
MURAI, S.
6177
MURAKAMI, E.
1283*, 6777*
MURAKAMI, K.
280
MURAKAMI, N.
7416*
MURAKAMI, T.
6142*, 7294
MURAKI, T.
8095
MURALIDHARA, K.S.
5280*
MURANISHI, S.
5300, 7438*
MURAT, J.
363, 1187
MURATA, T.
2789*, 5336
MURDOCH, R.W.G.
5684
MURER, H.
887
MURILLO, A.
4594*
MURLEY, C.
1791
MURO, J.
4747*
MUROTA, S.I.
6794
MUROYA, H.
2444
MURPHY, A.
4392*
MURPHY, A.M.
791
MURPHY, B.L.
1538

MURPHY, B.P.
6401*
MURPHY, D.
8273*
MURPHY, G.M.
3497*
MURPHY, J.
1637
MURPHY, P.J.
2907
MURRAY, G.F.
4022*
MURRAY-LYON, I.M.
575, 676, 2454*, 2476,
3364*, 3379, 5824*, 6451*,
7099*
MURRAY, P.
7956*
MURRAY, T.M.
1124
MURRAY, W.R.
4787
MURRELL, K.D.
5968
MURTHY, S.N.S.
78*
MURTY, C.N.
2946, 8010*
MURY, B.
7070
MURZINA, N.B.
8497
MUSABAEVA, L.I.
7564
MUSALATOV, K.A.
4376
MUSCAT, J.L.
368
MUSCH, K.
1058
MUSCHART, J.M.
5213
MUSCHMOV, D.
8499
MUSELES, M.
1492
MUSELLA, S.
1914
MUSEY, P.
2551
MUSGRAVE, J.
5957*
MUSHA, H.
1484, 2176*, 4246*, 5811*,
6538*
MUSHNIKOVA, V.N.
3243
MUSSINI-MONTPELLIER, J.
4137*, 7693
MUSSO, A.
447
MUSTAJOKI, P.
5821*
MUSUMECI, S.
5857*
MUTALIK, G.S.
834
MUTCHNICK, M.G.
1550, 7808*
MUTING, D.
5121*
MUTO, N.
6732
MUTO, T.
2260, 6057
MUTSENIEKS, P.P.
4382, 5928
MUTT, V.
3858
MUZZARELLI, C.
4511
MYASNIKOVA, A.G.
4078
MYERS, C.E.
2145, 5328
MYERS, R.T.
4157*, 6559*
MYERSON, D.
6386
MYERSON, P.J.
6386, 7130
MYHRE-JENSEN, O.
3144*, 3992
MYREN, J.
598, 964, 1202, 1949, 2272,
2797, 2843, 3117, 3671*,
4018, 4068*, 5382, 5383,
5606, 6060*, 6226*, 6390
MYRHOL, K.
5629
MYSHKIN, K.I.
8199
MYSIK, M.
610
MYSNIK, G.G.
6580*
N'DIAYE, P.D.
1560
N'GUYEN, R.
7040
NABIZADEH, I.
2400
NACCARATO, R.
1595, 2554, 3173, 3412,
3446, 3520
NACCHIERO, M.
983*, 989, 2427, 2836*,
7736*
NACIAZEK-WIENIAWSKA, A.
1132
NADAL, A.
6933
NADELL, J.
8299*
NADING, A.
35
NADIR, N.S.
7919*
NADJ, G.
3315
NADJAFI, A.S.
5597*
NADLER, H.L.
7855*
NADRIGNY, M.
5880*
NAFRADI, J.
2773*
NAGAHORI, H.
3007
NAGAKI, K.
4331*
NAGAMACHI, Y.
5373
NAGANT DE DEUXCHAISNES, C.
7896*
NAGANUMA, T.
1497, 2270
NAGAO, F.
6251
NAGAO, K.
6639
NAGARAJ, H.S.
4426
NAGASAKI, T.
6850*
NAGASAKI, Y.
5811*, 7747*
NAGASE, M.
2444
NAGASHIMA, H.
1207
NAGASU, T.
6251
NAGASUE, N.
574, 6403*
NAGATA, A.
686, 3369*
NAGATA, K.
1207, 5798*, 6177, 6525*,
7790*
NAGATOMO, T.
1283*
NAGAYO, T.
6875*
NAGCHAUDHURI, J.
6686*
NAGENDRAN, T.
5611
NAGESH, K.G.
6666
NAGI, N.A.
6634
NAGINGTON, J.
3421*
NAGLER, J.
6997*
NAGY, G.
2532*
NAGY, G.S.
1297, 2399, 6878*
NAGYLUCSKAY, S.
2496*, 5081*
NAHMIAS, A.J.
2640
NAHNSEN, L.
8265
NAHRWOLD, D.L.
1769*, 2572*, 2709*, 4504*
NAHUM, H.
6973, 8315
NAHUM, M.
582
NAHUM, P.
6973

NAIDICH, J.B.
  5708*
NAIK, K.G.
  2666
NAIK, S.R.
  2649
NAIMAN, J.L.
  2254
NAIR, C.N.
  6652
NAIR, P.
  5723*
NAIRN, R.C.
  2102*
NAITO, J.
  6639
NAITO, K.
  7762, 7955
NAITO, M.
  7461
NAITO, Y.
  6797
NAJARIAN, J.S.
  1130, 1162, 1974*, 3803,
  5434*
NAJJAR, T.A.
  5610
NAKAE, H.
  7438*
NAKAGAWA, K.
  3913
NAKAGAWA, S.
  1207, 6567*
NAKAGAWA, T.
  4171
NAKAGAWA, W.S.
  4257*
NAKAGAWARA, G.
  4171, 8235*
NAKAHATA, N.
  7950
NAKAJIMA, H.
  7949, 7951
NAKAJIMA, M.
  280, 3115
NAKAJIMA, S.
  3348
NAKAJIMA, T.
  4848
NAKAJIMA, Y.
  2176*
NAKAJO, S.
  6162
NAKAMURA, M.
  309, 7528*
NAKAMURA, N.
  808, 6251
NAKAMURA, R.
  7525*
NAKAMURA, S.
  3242
NAKAMURA, T.
  3129, 3168, 4634*
NAKANE, P.K.
  1776*, 8357*
NAKANISHI, H.
  7950
NAKANISHI, K.
  2989*
NAKANO, H.
  3035, 3348, 3913
NAKANO, S.
  5687
NAKAO, K.
  6955
NAKAO, T.
  7161
NAKASE, A.
  174*, 7225
NAKASHIMA, J.
  4146
NAKASHIMA, T.
  1484, 5812*, 7612
NAKASHIMA, Y.
  4588*
NAKATANI, K.
  3913
NAKAYA, N.
  6125
NAKAYAMA, C.
  6148, 7235
NAKAYAMA, F.
  5139*
NAKAYAMA, M.
  3033
NAKAZAWA, O.
  3014
NAKAZAWA, S.
  5630, 6797
NAKOS, A.
  560
NALBONE, G.
  6775*
NALIN, D.R.
  778
NAMBA, T.
  5810*
NAMBARA, T.
  7463
NAMBU, H.
  8298*
NAMBU, K.
  1983
NAMIHISA, T.
  1506*
NANA, M.
  1746*
NANBA, K.
  5036*
NANDI MAJUMDAR, A.P.
  2011
NANO, M.
  934
NANSON, E.M.
  1273
NAPALKOV, P.N.
  8436
NAPOLITANO, L.M.
  4620*
NARASAKA, T.
  458, 2181
NARASINGA RAO, B.S.
  6692*
NARDI, C.
  536
NARDIELLO, S.
  2522
NARENDERAN, K.
  7315, 7333, 7334
NARET, C.
  5868*
NARISAWA, T.
  2379
NARNE, S.
  8161
NARS, P.
  8128
NARUNSKY, L.
  2429*
NARUSE, A.
  7993*
NARUSUE, M.
  7849
NARVAEZ, R.
  7006
NASAREVSKY, N.G.
  8170
NASH, A.G.
  5749
NASH, A.H.
  5499
NASIO, J.
  1687
NASONOV, E.L.
  4332*, 6500*
NASR, K.
  442, 2400
NASSET, E.S.
  2964*, 5433*
NASSI, P.
  683
NATAF, C.
  4774
NATANGELO, R.
  333
NATH, N.
  8364
NATH, R.
  1921
NATHANSON, L.
  473
NAUDY, B.
  5189
NAUER, E.
  7563
NAUGHTON, B.A.
  6073*
NAULTY, J.S.
  8348*
NAUMOV, S.P.
  8322
NAUS, P.J.
  3933*
NAVARRO, J.
  4905*, 7618
NAVERT, H.
  96
NAVIA, E.
  3740
NAWATA, K.
  679
NAYAK, N.C.
  1967*, 2541*

NAYLOR, E.W.
7053
NAZARIAN, I.
5248
NAZAROV, V.G.
6307
NAZIR, D.J.
3787
NAZRUL ISLAM, K.M.
1594
NEAL, M.W.
7451
NEAL, R.A.
3818
NEALE, G.
1103*, 5060*, 7403*
NEATHERY, M.W.
2703*, 2957
NEBEL, O.T.
2261
NECHIPORUK, V.M.
8185
NEDBAILO, E.P.
8342
NEEF, L.
5009*
NEELON, V.J.
7400*
NEERHOUT, R.C.
7086*
NEFEDOV, N.E.
4196
NEFEDOVA, V.O.
8143
NEGISHI, I.
163
NEGREL, R.
4680*, 6817*
NEGRIN-FRAGOAS, M.
4039*
NEGRONE, G.
5710*
NEHER, M.
3175, 3351, 3354, 4046*,
5793*
NEI, H.
329
NEIDHARDT, B.
5626*, 8188
NEIGER, M.
4830
NEIKO, E.M.
4082
NEIMAN, H.L.
1249, 6677*, 7839
NEKLYUDOVA, E.A.
8322
NEKRASOV, L.P.
8504
NELDNER, K.H.
4412
NELL, G.
3608*, 4506*
NELLANS, H.N.
4505*, 6001*
NELSON, D.L.
1569
NELSON, E.R.
6862*
NELSON, E.W., JR.
788, 7923
NELSON, J.
1661
NELSON, J.A.
131, 523, 1965*, 3092
NELSON, J.D.
803
NELSON, L.
1485, 2141, 4564*
NELSON, M.
2505
NELSON, R.A.
1437
NELSON, R.M.
2609
NELSON, R.S.
1234, 1460*
NELSON, S.D.
2103*
NELSON, T.S.
302
NEMCHAUSKY, B.
570
NEMEC, H.W.
3936*
NEMER, F.D.
7018
NEMETH, E.P.
2738*
NEMETH, M.
8042*
NEMETH, P.R.
3652
NEMIALKOVSKII, I.B.
4365*
NEPOKROEFF, C.M.
2032
NEPOMNYASCHIKH, G.I.
8058
NEPPI MODONA, M.
447
NEPTUNE, W.B.
1271
NEPVEUX, P.
5395*
NERI, B.
6526*, 7575
NERSON, G.
766
NESTERENKO, A.P.
3986
NESTEROV, S.S.
6383
NESTEROVA, A.P.
3174
NESTEROVICH, I.M.
8078
NESTROVSKI, M.
2460*
NESTRUCK, A.C.
8046
NETAKHATA, Z.N.
6268
NETER, E.
1681
NETO, M.C.
5195
NETO, U.F.
1353, 4274*, 5169*
NETO, V.A.
5966
NEU, C.O.
2369*
NEU, H.C.
2369*, 8474
NEUDEL, G.
4819
NEUMANN, E.
1746*, 8492
NEUMANN, G.
1193
NEUMANN, H.
1512*
NEUMANN, I.
285
NEUMEIER, M.
5270
NEUPERT, V.
6560*
NEUSTEIN, C.L.
5572
NEUSTEIN, H.B.
8301*
NEUTRA, M.R.
8090*
NEUVONEN, P.J.
6687*
NEVALAINEN, T.J.
2676*, 5481*, 6682*
NEVILLE, A.M.
4169, 5713*
NEWBERNE, P.M.
1663, 2150, 2901
NEWCOMBE, R.G.
975, 6834*
NEWCOMER, A.D.
2348*, 5510*
NEWMAN, A.J.
443
NEWMAN, B.M.
2713
NEWMAN, L.E.
2685*
NEWMAN, S.B.
48*
NEWPORT, G.R.
8048
NEWSTEAD, G.
6852*
NEWTON, N.A.
2398
NEYRA, P.
5393
NEZAMIS, J.E.
4089
NEZELOFF, C.
454*, 5015*
NEZHDANOVA, G.A.
7599
NG, P.L.
1533
NG, P.Y.
1795, 7924
NICHOLAS, N.K.
7782*

NICHOLAS, W.L.
6145*, 6656
NICHOLLS, P.J.
1786
NICHOLS, B.L.
1467, 1979, 2085, 3799, 4424, 5937*
NICHOLS, R.L.
7662*
NICHOLS, S.
893
NICHOLS, W.K.
2728
NICHOLSON, J.A.
74, 1085*, 1778*, 4691
NICKEL, W.O.
6373
NICKELS, J.S.
7460
NICCARA, A.
8311
NICOLADZE, D.
7618
NICCLAESCU, T.
4310*
NICOLAIDES, N.J.
5957*
NICCLAOU, A.
2736*
NICCLAS, R.
1936, 2440
NICCLAU, G.
550*
NICOLESCU, P.
2815
NICOLO, R.
7584
NICOLOPCULOS, D.
7134
NICCT, H.
5940*
NIEBAUER, G.
2861
NIEDERLAND, T.R.
1523*, 2534, 8064, 8141
NIEDOBITEK, F.
4488*
NIELBO, N.
3047*, 5155*
NIELSEN, H.
5768
NIELSEN, H.H.
1879*
NIELSEN, I.J.
4030
NIELSEN, I.L.
6958
NIELSEN, J.O.
3371*, 3439, 3452*
NIELSEN, J.O.D.
2120
NIELSEN, O.V.
5482*
NIEMANN, W.H.
1582
NIEMEGEERS, C.J.E.
2405
NIEMIRO, A.
695
NIER, H.
319, 5162*
NIERMEIJER, P.
659, 2513, 2518, 2519
NIERMEYER, P.
3440
NIES, A.S.
2933, 7432*
NIESCHLAG, E.
5135
NIESSEN, K.H.
8220
NIEUWKOOP, J.
2347*
NIGHTINGALE, C.H.
875
NIGMATULINA, A.V.
8074
NIHEI, T.
3597
NIHOUL-FEKETE, C.
5029*
NIINAKA, T.
563
NIINOBE, S.
2881*
NIKI, K.
7970
NIKITIN, A.M.
3243
NIKITIN, D.P.
817
NIKITINSKAYA, N.I.
6194
NIKOLAEVA, A.A.
6503
NILIUS, R.
1163
NILOFF, P.H.
8431*
NILSSON, A.
3758*, 3760
NILSSON-EHLE, P.
7805*
NILSSON, F.
2730*, 2764, 2769, 7324
NILSSON, G.
2285*
NILSSON, L.H.
6379*
NILSSON, S.
8428*
NILSSON, T.
2209
NIMBKAR, Y.S.
777
NIME, F.A.
773
NIMITKITPAISAN, Y.
970
NIMMO, I.A.
1057
NINANE, G.
4275*
NINGER, E.
1575*
NINOMIYA, I.
921
NIRMEL, K.
623
NIRMUL, D.
7132
NIS, G.
6842
NISENBAUM, H.L.
5731
NISEVICH, N.I.
668
NISHCHIY, V.A.
4143
NISHI, S.
7096*
NISHI, Y.
7492*
NISHIDA, T.
6777*
NISHIGAKI, I.
6239
NISHIKAI, M.
5566*
NISHIKAWA, H.
5665
NISHIKAWA, M.
1227
NISHIMOTO, E.
1227
NISHIMURA, H.
679
NISHIMURA, M.
5144*
NISHINO, C.
6657
NISHINO, H.
6121
NISHIOKA, K.
6999*
NISHIZAWA, Y.
373
NITSCHE, J.
7066
NITTA, H.
6057
NITTER, L., JR.
5629
NITZSCHKE, U.
7900
NIUBO, R.
5068*
NIWA, H.
4209
NIZOV, A.A.
5047, 6430
NIZZE, H.
194*, 195*, 7991
NOBLETT, H.R.
6215
NOBRE LEITAC, C.
4602
NOCHOMOVITZ, L.E.
6468
NOCZYNSKI, L.
1466
NODA, A.
5778

NODA, K.
4633*, 6665
NODA, S.I.
373
NOEL, M.
126
NOELPP, U.
5320*
NOER, G.H.
598
NOGALLER, A.M.
6430
NOGUCHI, T.
7482
NOGUEIRA, F.
2536*
NOGUERA, G.
1445*
NOGUES, C.
3230
NOGUES, F.
5068*
NOLAN, C.M.
8475
NOLAN, D.J.
2389
NOLAN, J.P.
2708*
NOLLEY, G.
3258*
NOMBALLAIS, M.F.
4360*
NOMURA, A.
6324*
NOMURA, N.
3093
NONNIG, R.
3918
NOONE, P.
5719*
NOPANITAYA, W.
2538*, 3032
NOPHAKOON, J.
4572*
NORBACK, D.H.
1984
NORBERG, R.
5099*
NORBERTO, L.
5463*
NORD, C.E.
5354
NORDBERG, G.F.
6066
NORDBERG, R.E.
5644
NORDBLOM, G.D.
1025
NORDEN, A.
6308*
NORDENFELT, E.
4222*
NORDGARD, K.
7063*
NORDGREN, B.
5647
NORDMANN, J.
3927, 7433*
NORDMANN, R.
3927, 7433*
NOREIKA, L L.
6233
NORFRAY, J.
301
NORHEIM, G.
7434*
NORONHA, M.
1229, 2441, 7730
NORONHA, O.P.D.
7386*
NORREDAM, K.
7101*
NORRIS, A.
5900
NORTHFIELD, T.C.
4621*, 6353
NORTON, L.W.
2404
NORTON, R.A.
2171*
NORUM, K.R.
5461, 8013*
NOSE, Y.
5589*
NOSOVA, A.A.
6488
NOTHIGER, F.
7620
NOTO, N.
5777
NOUEL, O.
436*, 4281
NOUSIA-ARVANITAKIS, S.
7127
NOVAK, B.
6858
NOVAK, M.D.
2537*, 4015
NOVAKOVA, M.
1544*
NOVAL, J.J.
559
NOVARINI, A.
4335*
NOVELLINE, R.A.
1222, 7549
NOVIKOFF, A.B.
2886*
NOVIKOFF, P.M.
6082*
NOVIKOVA, I.K.
6294
NOVIKOVA, L.L.
6265
NOVIS, B.H.
1351*, 2429*, 3072, 4437
NOVITSKY, I.N.
3574
NOVOKSHONOV, A.A.
668
NOVY, S.B.
7045
NOWAK, A.
7813*
NOWAK, S.
662
NOWOSIWSKY, T.
7781*
NOWOSLAWSKI, A.
672
NOWOTNY, C.
4749*
NOZAKI, K.
373
NUDELMAN, E.
6677*
NUESCH, H.J.
4817, 4820, 4940, 6887, 8256
NUGENT, F.W.
845, 1741, 5980*, 5988
NUKAGA, A.
6177
NUMAGUCHI, Y.N.
7235
NUMATA, M.
3803, 5434*
NUNDY, S.
1748*, 1749*
NUNES, V.
4686*
NUNNERLEY, H.
4024*
NURKS, E.E.
3849
NURY, B.
6181
NUSBAUM, M.
6518*
NUSINOVICI, V.
1516*
NUSS, D.
6364*
NUSS, G.W.
2902
NUSSLE, D.
2583
NUTZENADEL, W.
5674
NYE, F.J.
1700
NYE, J.A.
2319
NYFORS, A.
7139*
NYGAARD, K.
6672*
NYGREN, C.O.
3248*
NYHUS, L.M.
2838*, 2853, 4397, 7350*
NYLANDER, B.
100, 6745*
NYST, M.
3594, 3720
O'BRIEN, J.S.
133
O'BRIEN, M.J.
7112*
O'BRIEN, P.
1875*, 2799, 2818, 3588*
O'CONNELL, A.P.
5863*
O'CONNELL, D.J.
4745*

O'CONNELL, M.J.
7051, 8233*
O'CONNOR, F.A.
4140
O'CONNOR, J.J.
7675
O'CONNOR, P.
4388*
O'DONNEL, M.D.
1955
O'DONNELL, W.W.
7045
O'DONOGHUE, D.P.
4479, 4921, 7276*, 7287
O'DORISIO, T.M.
947, 969, 1872*, 4836*,
7885
O'DUFFY, J.D.
5985
O'FARRELL, S.
6589*
O'HARA, V.S.
7039
O'HI, R.
4156*
O'HTOMO, S.
4156*
O'LEARY, J.F.
2763
O'LEARY, J.P.
2335, 6965
O'MAILLE, E.R.L.
6784
O'NEIL, F.S.
2279
O'NEIL, M.B.
7022
O'NEILL, J.A., JR.
6211, 6374
O'ONOFRIO, F.
6497*
O'SULLIVAN, G.
5238
O'SULLIVAN, G.C.
1156
OAKENFULL, D.
7479
OAKLEY, G.P.
4098*
OATES, J.A.
965, 1924, 2140, 5361*
OBANDO, M.
559
OBATA, H.
5812*, 7747*
OBERDISSE, E.
1022*, 1160, 5414*
OBERTOP, H.
1748*, 1749*
OBI, S.
373
OBRADOVIC, M.
1554*
OCCHIATO, V.
3134
OCHI, S.
7662*
OCHOA, J.B.
3157
OCHS, H.
5615
OCHSNER, S.F.
5137*
OCKNER, R.K.
2677*, 2931, 2932, 4648,
5419*, 7417*
OCKNER, S.A.
1473
ODA, M.
3369*
ODA, T.
604, 4209, 6137
ODAR-CEDERLOF, I.
6611, 7648
ODDSSON, E.
1794, 4499*, 6689*
ODES, H.S.
5390*
ODIEVRE, M.
581, 8229
ODOULAMI, H.
8253
OEHLERT, W.
1112
OELZ, O.
1924
OESCH, I.
7620
OFFERIJNS, F.G.J.
3750*
OFFORD, R.E.
4917, 4918
OGA, S.
1675
OGATA, K.
309
OGATA, T.
8385*
OGATA, Y.
3242
OGAWA, H.
6033
OGAWA, K.
1353
OGAWA, Y.
309, 574
OGBURN, R.M.
3066
OGILVIE, B.M.
4739
OGISO, A.
3007
OGISO, T.
1080, 1081
OGLE, C.W.
105, 978, 7517
OGLE, S.J.
3379, 6451*
OGNEV, Y.V.
3733
OGNEVA, N.S.
805
OGNJANOVA, M.
3324
OGUMA, T.
5500
OGURA, J.H.
2632
OGURO, Y.
5602
OH, K.S.
7113*
OH, S.Y.
7395*
OH, W.
2592*, 6435*
OH-YA, H.
5665
OHAN, A.H.
3067
OHARA, H.
806
OHASHI, H.
5182, 5212, 7955
OHASHI, Y.
6142*
OHATA, M.
5453
OHBA, M.
68
OHBE, Y.
5146*
OHIRA, S.
3971
OHKAWA, H.
56, 7843
OHKUBO, H.
4246*
OHKURA, H.
1889
OHLEN, J.
650
OHLSSON, K.
1929*, 7378
OHMAN, U.
4707*, 4726, 4728
OHMORI, K.
5167*
OHNO, K.
7510*
OHNO, T.
5813*
OHORI, H.
1540
OHRADKA, B.
6897
OHRN, P.G.
2730*, 2764, 2769
OHSHIMA, M.
242
OHSHIMA, Y.
5291*
OHSHITA, M.
1016*, 8298*
OHTA, G.
5861*
OHTA, W.
689
OHTA, Y.
1539, 5810*
OHTO, M.
5165

OHTSUKI, N.
137
OI, I.
3329
OIGAARD, A.
2737*, 2740*, 5314*
OISHI, H.
6196
OJIMA, T.
4171
OKA, M.
686
OKA, T.
679
OKA, Y.
6955
OKABE, S.
1497, 2144, 2270, 2789*, 2820, 3009, 3713, 6046, 6050
OKABE, Y.
69
OKADA, M.
4634*
OKADA, S.
2239
OKADA, T.
7955
OKADA, Y.
2694*, 2695*, 5798*
OKAJIMA, K.
7849
OKAMOTO, Y.
3130
OKAMURA, K.
4322*
OKANO, K.
5453
OKASAKI, S.
7762
OKAZAKI, N.
5020*, 5813*, 7097*
OKIMURA, T.
6222
OKINAGA, K.
1157
OKITA, C.
3645
OKMIAN, L.
3874
OKOCHI, T.
563
OKOLICSANYI, L.
1595, 3412, 3520, 7773*
OKON, E.
7518
OKSMAN, F.
5880*
OKUDA, H.
1239
OKUDA, J.
2165*
OKUDA, K.
1484, 2176*, 3103, 4246*, 5020*, 5811*, 5812*, 6538*, 7747*
OKUDA, S.
1350, 3670*
OKUDAIRA, Y.
3129
OKUKUBO, F.
5319*, 7364
OKUMURA, M.
4257*
OKUYAMA, S.
76, 6453*
OKUYAMA, Y.
1275, 2260
OLAFSON, R.P.
1641
OLANS, R.N.
3415*
OLARTE, J.
5226, 8458
OLASSON, S.
1235
OLAZABAL, A.
2730*
OLBE, L.
956, 1892, 2285*, 2830, 3673*, 5369*, 5624*, 6048
OLDAG, D.
6873
OLEGARD, R.
3248*
OLEN, L.E.
5959
OLER, A.
7451
OLESCH, K.
7562
OLESEN, H.
2782*
OLESEN, H.P.
1879*, 2827, 3663*
OLESKE, J.
2640
OLIARO, A.
3568, 7072
OLIVA, L.
1479
OLIVE, G.
4116
OLIVECRONA, T.
903
OLIVER, J.M.
5445*
OLIVIERI, P.J.
1009*
OLIVOS, P.
2462*
OLLIVIER, J.M.
8252
OLMO-PUCHALT, J.A.
8401*
OLMSTED, W.W.
2338, 4868*
OLSEN, A.M.
3124*
OLSEN, B.R.
3199*
OLSEN, C.
1045, 4637
OLSEN, T.
2209
OLSEN, W.A.
1685, 8086*
OLSON, D.F.
3503*
OLSSON, R.
6556*
OLSZEWSKI, S.
531
OLSZEWSKI, W.
3884
OLU MABAYOJE, J.
7162
OLUMIDE, F.
6076*
OMATA, M.
4300
OMER, A.
5964
OMER, M.I.A.
787
OMICHI, T.
6222
OMINSKY, S.
5616
OMORI, A.
686
ONDERDONK, A.B.
1436
ONG, G.B.
295, 5164, 5752, 7185*
ONGARO, G.
8337*
ONICA, D.
7291*
ONISHI, N.
6732
ONO, A.
8264*
ONO, T.
5165
ONO, Y.
6370
ONSTAD, A.
7076*
ONUIGBO, W.I.B.
2456*, 7237
OPARIN, A.G.
389
OPELZ, G.
3453*
OPITZ, K.
6974
OPOLON, P.
1048, 1516*, 2896, 3903, 4665
OPPERMAN, H.C.
5911*
OPPITZ, K.H.
7749*, 8268*
ORAZGALIEV, B.D.
6629
ORCALLI, F.
3153
ORCHARD, R.
6726*
ORCI, L.
109, 862
ORDA, R.
2993*

ORDA, S.
2993*
ORECCHIA, C.
6280
ORENGO, A.
8462
ORIMO, H.
4559*
ORIOL, R.
2063
ORIOZABALA, M.A.
1107
ORITSU, S.
6888
ORLANDI, F.
2587, 3378, 3514
ORLANDO, R.
3412, 3520, 7773*
ORLANDO, R.C.
6703
ORLIKOV, G.A.
4831, 6266
ORLOFF, J.
3911
ORLOFF, M.J.
1129, 4984
ORLOV, V.A.
4241, 5794
ORLOVA, I.N.
8139
ORLOVA, Z.N.
786
ORLOWSKI, K.
531
ORMSBEE, H.S., III
6698*
ORNHAGEN, H.
1688
ORNSHOLT, J.
2802, 6743
ORONSKY, A.L.
8023*
ORR, A.H.
2454*
ORR, J.M.
6884
ORR, W.C.
358*
ORSKOV, F.
3475*
ORSTAVIK, I.
790
ORSTAVIK, T.B.
5350
ORTIZ, J.
7878
ORTIZ, R.A.
2228
ORTLEP, F.M.
4330*
ORTOLANI, C.
3412, 3520, 7773*
ORTT, E.M.
2095
OSADA, Y.
414
OSAKA, M.
200, 1762
OSBORNE, D.H.
929, 3625*
OSBORNE, J.W.
2100*, 4675*, 7501*
OSCARSON, J.
2693
OSCARSON, J.E.A.
4685*
OSHIBA, S.
2618
OSHIBE, M.
6248
OSHITA, H.
6732
OSHIUMI, Y.
6148, 7235
OSIPOV, L.N.
8319
OSKOLKOVA, M.K.
708
OSMAN, C.G.
2520, 8354*
OSNES, M.
1202, 2447, 2843, 3117,
3980, 4018, 5606, 6226*
OSOBA, A.O.
649
OSORIO, A.
2212
OSSART, J.L.
1596
OSSINO, C.
6935
OSSOINIG, K.C.
6635
OSTBERG, H.
2253
OSTEAUX, M.
161
OSTERLAND, C.K.
5650*
OSTLING, H.
6078*
OSTRIN, P.I.
269
OSTROVERKHOV, G.E.
8074
OSTROVSKAIA, A.I.
5095
OSTROVSKAYA, A.A.
5878
OSTROW, J.D.
1009*, 2164*, 2575*
OSTROWER, V.S.
1793, 2720, 2721
OSTROWSKI, L.
8243
OSUGA, T.
3088, 7743*
OSUMI, Y.
7342*
OSWALD, B.
3351
OTERO, M.A.
4677*
OTERO PORTELA, J.L.
8195
OTIS, R.
4065
OTRIDGE, B.W.
2245
OTSUKI, M.
6744*
OTT, B.
3499*
OTT, D.
2194, 5649*
OTT, D.G.
5510*
OTT, S.
3527
OTTE, J.B.
3908, 7737
OTTE, M.
288, 1348, 2846
OTTENJANN, R.
402, 3676, 4813*
OTTESEN, B.V.
6110
OTTINGER, L.H.
1288*
OTTO, G.
167
OTTO, H.F.
3891, 4960*, 5655*, 6349*,
7067, 7523
OTTO, L
3958
OTTO, U.
4260*
OTTOLENGHI, A.
2981, 3836, 8098
OUCHI, A.
1414
OUCHI, E.
3093
OUDCA, P.
1051
OUDEA, M.C.
3759*
OUDEA, P.
1077
OUTTERS, B.
4722
OVADIA, J.
11
OVERBY, L.R.
2498*
OVERTURF, G.D.
7248
OVIEDO, M.A.
7388*
OWEN, C.A., JR.
2056, 7384*
OWEN, D.E.
143
OWEN, J.P.
1241, 6546*
OWEN, R.L.
1807, 2698*, 5271
OWENS, D.
8399*
OWMAN, T.
6362*
OYASU, R.
3503*

OYE, I.
  6814*
OYESIKU, J.E.J.
  6010
OZAKI, T.
  4525*, 4526*
OZAWA, K.
  1016*, 1021*, 8298*
OZHEREL'EVA, N.I.
  7570, 8497
OZHIGANOV, E.L.
  6339
OZMENT, E.D., JR.
  7220*
OZOLS, J.
  1026
P. CASTILHO, V.L.
  1720
PAAKKONEN, M.
  6263*
PAALZOW, L.K.
  1985
PACCALIN, J.
  544*
PACE-ASCIAK, C.
  101
PACE, G.
  7806*
PACE, J.L.
  487
PACHECO PEREZ, C.A.
  1705
PACHKOWSKI, T.
  4566*, 7969*
PACKMAN, C.H.
  2464*
PACSOO, C.
  1188, 2998
PADONOU, N.
  435
PADOVAN, W.
  8162*
PAES ALVES, C.A.
  1709*
PAEZ, A.
  2212
PAGE, C.R., III
  8048
PAGE, D.L.
  5718*
PAGEAUT, G.
  8210
PAGES, C.
  7895
PAGIS DE MICCO, C.
  1499
PAGLIARO, L.
  7151*
PAHLIN, P.E.
  64
PAICLICK, A.
  3910
PAIGE, D.M.
  440, 7645
PAILLOT, B.
  8515
PAIN, R.H.
  1752*
PAINE, T.F., JR.
  2665
PAINO-BLANCO, L.
  332
PAINTER, N.S.
  4404
PAINVIN, G.A.
  8404
PAIS, M.J.
  6943
PAJARES GARCIA, J.M.
  4968
PAK, S.G.
  8377
PAKHOMOVA, G.V.
  349
PALACIOS, G.
  67
PALACIOS, L.
  884
PALADINI, A.
  651
PALASCAK, J.E.
  7744*
PALASCIANO, G.
  1017*, 1931*
PALAYODAN, A.
  4165
PALAZZO, J.
  1479
PALBOL, J.
  7759
PALESTRO, G.
  3555
PALEY, O.S.
  3544
PALFI, I.
  1632
PALIARD, P.
  4629*
PALITZSCH, D.
  4002
PALL, H.
  3768
PALLONE, F.
  2784*
PALMA, F.
  4176
PALMAS, F.
  5206
PALMER, E.D.
  2615, 5227
PALMER, J.R.
  2113
PALMER, R.O.
  7159
PALMER, W.M.
  1437
PALOHEIMO, M.
  2016
PALOMBO, D.
  5917*
PALOSCHI, G.B.
  2255
PALOYAN, D.
  2430*, 4947, 5779, 6376
PALOYAN, E.
  5734
PALYNYCZYKO, Z.
  275
PANAITESCU, G.
  5888
PANCHENKOV, R.T.
  265, 5829
PANCOE, W.L.
  2743*
PANDOLFO, N.
  1302, 3121
PANFILI, E.
  7930
PANI, P.
  641, 1165
PANICHENKO, V.
  2726
PANICHI, S.
  4898
PANNONE, M.K.
  6066
PANOV, A.A.
  7597
PANOVA, T.N.
  7597
PANSINI, F.
  5927*
PANSU, D.
  3622, 3679
PANTOJA, J.L.
  7329
PAOLAGGI, J.A.
  3054
PAP, A.
  5001
PAPACHRISTOU, D.
  2982*
PAPADAKIS, L.
  3185
PAPILLON, J.
  4152*
PAPLINSKI, Z.
  551
PAPP, J.
  2177*, 4982, 6899
PAPP, J.P.
  2280*
PAPP, M.
  2738*
PAPPAIOANOU, M.
  6643*
PAPPAS, P.W.
  5487
PAPPO, R.
  951*, 2113, 6727*
PAPSDORF, S.
  5076*
PAQUET, K.J.
  3137, 8157
PAR, A.
  2524*
PARADA HERRERO, F.
  5244*
PARADINAS, F.J.
  6451*
PARADIS, D.
  2837*
PARAF, A.
  3508*, 4270, 5657*

PARDASANI, G.M.
1642
PARDO, H.A.
1445*
PARDO-RUEDA, J.
1551*
PARDRIDGE, W.M.
7387*
PARE, W.P.
1149, 5501, 6052
PARENTI, A.
1595
PARFENOVA, N.S.
6107
PARFENTIEVA, A.Y.
8370
PARHAD, N.M.
1673
PARIJS, J.
2186, 3089
PARINI, U.
5917*
PARIS, J.C.
584, 3357
PARISIO, C.
1763
PARK, H.J.
198
PARK-HAH, J.O.
7780
PARK, J.
4544*, 7122
PARK, R.
1137
PARK, S.K.
5980*
PARKE, D.V.
3790, 6286
PARKER, E.F.
1274
PARKER, F.L.
1041
PARKER, J.
1491
PARKER, R.H.
2449*
PARKER, T.H.
5572
PARKIN, W.E.
5079*
PARKINS, R.A.
6726*
PARKKI, M.G.
1030, 1034
PARKS, A.G.
491, 4204, 4949, 5736, 7033
PARKS, N.M.
1756, 1953
PARKS, T.G.
375, 2754, 3886, 3887, 5475*, 5476*
PARMEGGIANI, U.
1128
PARMENTIER, G.
2577*
PARMENTIER, J.
3314
PARMENTIER, R.
2368
PARNAUD, E.
3587*, 4189
PARONETTO, F.
3442, 4334*, 5865*
PARRA, O.M.
2179*
PARRINO, T.A.
5173*
PARRISH, R.A.
5742
PARRISH, R.M.
7128
PARROTT, D.M.V.
4464
PARRY, J.V.
4931*
PARSHIN, A.N.
1324
PARSONS, B.
2756
PARSONS, B.J.
1791, 7303*
PARSONS, D.S.
7913*
PARSONS, M.E.
7962*
PARSONS, R.L.
4138
PARTENSKY, C.
355, 6905, 6931, 7102*
PARTHASARATHY, K.L.
7667
PARTIN, J.C.
4910*, 5026*, 5681
PARTIN, J.S.
3403
PARTINGTON, P.F.
7838
PARTOVI, P.
6414*
PARTYKA, M.
662
PASCAL, J.P.
639*, 1649, 1947, 3547, 3730, 4586*, 4587*, 5394
PASCAU, C.
4315
PASKIN, D.L.
938
PASQUAL, J.
1209
PASQUALE, G.
2509, 6475*
PASQUALI-RONCHETTI, I.
1063
PASQUIER, P.
6937, 6938, 7626
PASQUIS, P.
3537, 4423
PASSARO, E., JR.
361, 3141*, 3222*, 4080, 8193*
PASSI, R.B.
4149*
PASSOUANT, P.
7182*
PASSWELL, J.
5041*
PASTA, I.
1479
PASTA, P.
214
PASTERNACK, B.S.
6377*
PASTERNAK, G.
3325*
PASTORINO, G.
409
PATAKFALVI, A.
2524*
PATOU, R.
5582
PATE, J.W.
310
PATEK, A.J.
5111*
PATEL, B.G.
6653
PATEL, C.C.
7265
PATEL, H.
7229
PATEL, J.C.
717, 4023*, 4254*, 5181, 6697*, 8224, 8417
PATERAS, C.
8260
PATERAS, H.
3628*
PATERSON, G.
65
PATERSON, J.W.
509*
PATHE, H.
6560*
PATIL, J.
672
PATIN, C.S.
464
PATON, A.
1511, 5185, 7846
PATRIARCA, P.L.
795, 8336*
PATRICIA, A.H.
837
PATRICIO, F.R.
4274*
PATRICIO, J.
3805, 4272, 4656, 7585
PATRICK, J.
5947
PATRICK, R.S.
557
PATRICOT, L.M.
4102*
PATTERSON, W.B.
1371
PATTI, J.
8419*
PATTISON, C.P.
673, 1524, 1525
PATY, J.
3626*
PATZOLD, K.
4957
PAUER, H.D.
1163

PAUL, R.
7398*
PAUL, R.E., JR.
2171*, 5640
PAUL, T.
6650
PAULET, G.
8067
PAULET, P.
2582
PAULI, W.
7633*
PAULIN, C.
814, 3744, 4489*
PAULK, H.T.
3840
PAULSEN, G.
1878*, 1916
PAUMGARTNER, G.
609, 761, 908, 2045, 2048, 3775, 5007*, 5427*, 7105*, 8062
PAUN, R.
3204
PAUPE, J.
3254*
PAUSCH, J.
8028*
PAUWELS, E.K.J.
1454*, 7455
PAVELKA, M.
6695
PAVLOV, G.G.
3084
PAVLOV, K.A.
3084
PAVLOVA, N.S.
322
PAWAR, S.S.
1062
PAWLACZYK, B.
249
PAWLOWSKI, S.
8221
PAYET, M.
3445
PAYNE, N.A.
5361*
PAYNE, W.S.
5985
PAZEN, H.
8030*
PEACOCK, E.E., JR.
4724
PEARCE, E.A.
3651, 3654
PEARL, J.
4044*
PEARSE, A.G.E.
203, 398, 1236, 3335, 4701*, 5272, 5273
PEARSON, F.G.
925, 1265*
PEARSON, J.R.
1389*
PEARSON, K.W.
2163, 2839*
PEAT, G.
185
PECK, B.
6598
PECKER, F.
1987
PECTOR, J.C.
2944, 3738
PEDEIRA, J.D.
2506
PEDERSEN, E.B.
6165, 6676*
PEDERSEN, H.
6927
PEDERSEN, L.
1214, 1579*, 2788*, 3250*
PEDERSEN, L.R.
5922*
PEDERSEN, N.D.
1806
PEDERSEN, P.V.
4185
PEDERSEN, S.A.
914*
PEDERSEN, T
6722*
PEDERZOLI, P.
3349
PEDRAZZINI, A.
4879*
PEDRAZZOLI, S.
4604
PEDREIRA, J.D.
3438
PEDROSA, J.A.
6
PEETERS, J.P.
4359*, 4755
PEIGNOUX, M.
1070, 3794, 3814, 4647
PEIKIN, S.R.
1938
PEIXOTO MENEZES, A.
2480*
PELEMANS, W.
769*
PELIKAN, L.
8215
PELISSIER, E.
7895
PELKONEN, R.O.
7746*, 7803*
PELLEGRINI, R.
4083
PELLEGRINO, J.
6150, 6790
PELLERIN, D.
502
PELLETIER, G.
3459*, 6093
PELLETIER, M.J.
4240
PELLIGRINI, C.
6030
PELLING, D.
5281*
PELLONI, S.
6253, 7560, 7561
PELOV, E.Y.
7597
PELUCHETTI, D.
73
PENA, A.S.
2347*, 4144, 4869*, 4919
PENA-AGUILAR, M.T.
7263
PENA, F.
5738
PENA, H.G.
7421*
PENA, M.
394, 395, 396, 397, 5288*
PENA, V.A.
3589*
PENCHARZ, P.
7853*
PENEDA, J.
2536*
PENENKOV, B.L.
8179
PENISTON, R.L.
7672
PENKA, W.E.
8148*
PENNELL, M.D.
2112
PENNER, E.
2468
PENNER, J.A.
5769
PENNER, J.W.
7396*
PENNINGTON, C.R.
4926*, 7391*
PENNINO, P.
5222
PENNY, E.
123*
PENTIKAINEN, P.J.
6687*
PENTO, J.T.
5299
PENTTILA. O.
5759*
PEPYS, M.B.
215
PEQUIGNOT, H.
3230, 4136*
PERA, A.
3263, 4496
PERACCHIA, A.
5585, 8161
PERAINO, C.
5417*, 7425*
PERCOCO, M.
994
PERCY-ROBB, I.W.
1057
PEREDA, T.
5109*, 7804*
PEREIRA, A.S.
1252
PEREIRA, L.H.
6790
PEREIRA-LIMA, L.
2460*

PEREIRA, S.M.
7871
PEREIRAS, R.
3949*, 5541, 5568*, 8402*
PERERA, D.R.
393*
PERERA, H.
6983
PERERA, M.V.F.
634
PERES-GLIKMANAS, G.
3076
PERESLEGIN, I.A.
4409
PEREVALOV, A.Y.
6630
PEREZ, C.A.
2632
PEREZ-CARNERO, A.
4747*
PEREZ CUADRADO, S.
4968
PEREZ-ELIZALDE, R.
7149*
PEREZ, G.O.
4047*
PEREZ-JIMENEZ, F.
4747*
PEREZ MARTIN, M.A.
1705
PEREZ-MOTA, A.
4375, 5621
PEREZ MUNOZ, C.
4375
PEREZ-OLIVARES JAEN, J.
8175
PERGOLA, F.
8184
PERIMOND, H.
1499
PERINI, M.
4864
PERISIC, V.
1159, 1507
PERISSAT, J.
3626*, 5562*
PERIYASAMY, S.M.
3807
PERLBERG, H.J., JR.
983*
PERLBERGER, R.R.
7120
PERLMUTT, J.H.
5410*
PERLOW, W.
1385
PERMAN, J.A.
5556
PEROV, I.L.
2687
PEROVA, S.D.
3751*
PERREAULT, C.
6261*, 6274
PERRELET, A.
862
PERRELLI, L.
1372
PERRET, G.
3858, 7344*
PERRET, J.P.
2772*
PERRET, V.
5473*
PERRI, G.
5544
PERRILLO, R.P.
1330, 2410*
PERRIN, D.
5588*
PERRIN, J.
7490*
PERROT, E.
6869
PERROTTO, J.L.
1731*
PERSIGEHL, M.
7197*
PERT, J.H.
672
PERTEJO PASTOR, V.
8439
PERTSCHUK, L.P.
7877, 7891
PERUCCA, E.
913*, 918, 919, 923, 7321*
PERUZZOTTI, G.P.
5328
PERY, P.
227
PERZIN, K.H.
6594
PESANT, P.
4142
PESARESI, M.A.
5843*
PESAVENTO, G.
8161
PESCE, G.
4293*
PESCHLE, C.
1155
PESENDORFER, F.X.
8492
PESKAR, B.M.
4561*
PESKIN, G.W.
723*, 1334*, 3692, 3722,
4044*, 4856, 5574, 6278
PESSAYRE, D.
4281, 8340*
PESTANA, C.
4126
PETEK, W.
3346, 3947*
PETER, P.
2749
PETER, S.
2841, 7987*
PETERA, V.
4313
PETERLIK, M.
909
PETERS, C.J.
5856*
PETERS, J.E.
5009*
PETERS, N.D.
1214
PETERS, R.
4300
PETERS, R.L.
3360*, 4876*
PETERS, T.J.
3252*, 4691, 4710*, 5060*,
7404*
PETERSEN, H.
1944, 2287*, 3671*
PETERSEN, O.H.
75, 1869, 1937, 3037
PETERSEN, P.
1541, 5553, 6504*, 6512*
PETERSON, C.
2246
PETERSON, C., JR.
3105
PETERSON, R.
5233
PETERSON, R.F.
1739
PETERSON, W.L.
6914*
PETIT, D.
1059, 1060, 2945
PETIT, J.
4255*
PETITCLERC, C.
3099
PETITE, J.P.
3811, 4649
PETITH, M.M.
220, 1770*, 1788, 5495,
6016
PETREKOS, P.
4671
PETRELLI, G.P.
8336*
PETRENKO, V.F.
3209, 8497
PETRI, M.
5482*
PETRIC, M.
7872
PETRICHENKO, A.I.
8435
PETRICK, P.A.
2092
PETRIDIS, G.C.
972
PETRILLI, F.L.
7786*
PETRILLO, M.
2808, 3714
PETRINOVIC, R.
1459*
PETRO, J.
541
PETRO, S.P.
8114
PETROKUBI, R.J.
2340, 6290*
PETROV, V.P.
8240
PETROVICH, Y.A.
6106

PETROWICZ, D.
4764
PETRUNKA, C.N.
1978*
PETSCHNER, A.
3681
PETTAVEL, J.
452*, 556, 3389
PETTERSSON, H.
1621
PETTIT, J.E.
2051
PETZEL, H.
3932*
PETZOLD, H.
7177*
PETZOLDT, R.
266, 4814*
PEYROL, S.
4629*, 6759*
PEYSER, M.R.
8305*
PEYTEL, J.
4105*
PEZZINI, F.
8344
PFAFF, E.
1774*, 4613*, 6007*
PFAU, A.A.
8268*
PFAU, R.G.
6088*
PFEFFER, R.B.
1624
PFEIFER, Y.
2116
PFEIFFER, C.J.
1946, 3021, 7935*
PFEIFFER, E.F.
5445*
PFEIFFER, I.
2177*
PFISTERER, W.F.
2568*, 4783
PHAN, A.
5657*
PHAN, T.
1066
PHANEUF, D.
7157*
PHANG, J.M.
2092
PHARES, C.K.
5436
PHELAN, J.J.
448, 2354
PHELAN, P.D.
6215
PHELPS, C.F.
5344
PHILIPPE, O.
8254
PHILIPPIDIS, P.
2254
PHILIPPON, C.
596
PHILIPS, R.L.
5608
PHILLIP, J.
3659, 4943, 4995
PHILLIPS, B.M.
2145
PHILLIPS, C.A.
6673*, 7279
PHILLIPS, E.
1295
PHILLIPS, J.C.
1032, 2918
PHILLIPS, L.S.
2942
PHILLIPS, M.M.
7808*
PHILLIPS, R.A.
20, 1792
PHILLIPS, S.F.
1750*, 2643, 3611*, 4865*,
5276*, 5277*, 5302, 7483*,
7484*
PI-SUNYER, F.X.
2330
PIACENZA, G.
5153*
PIAGGI, V.
3946*
PIAGGI, W.
5838
PIANTE, M.
1201
PIASECKI, G.J.
5425*
PIATTELLI, L.
3518
PIAZZA, M.
1537
PICATOSTE, R.
6894
PICAUD, R.
5189
PICCARDI, M.P.
5381
PICCININI, C.
3411
PICCININO, F.
568, 2509, 4304, 6475*,
8384*
PICCIOTTO, L.
1537
PICHLER, M.
3768
PICHLMAIER, H.
8321
PICHLMAYR, R.
7740
PICK, A.I.
8126
PICKARD, R.
5724*
PICKERING, L.K.
5226, 8458
PICKERING, R.W.
1041, 3029, 7419*
PICKLEMAN, J.R.
433, 2570*
PIDZHAKOVA, S.S.
5878
PIECK, C.G., JR.
1591
PIEGARI, V.
1128
PIEGZA, S.
8223
PIERA, C.
2558
PIERAGNOLI, E.
258, 3509
PIERCE, D.M.
5335
PIERCEY, J.
2281*, 5478*
PIERON, R.
3573
PIERONI, P.L.
983*, 989
PIETON, R.
6402*
PIETRI, H.
2214, 2215, 3969
PIETRUSZKO, R.
5435
PIETTE, F.
3567
PIETTE, J.C.
3076
PIGMAN, W.
5473*
PIHKO, H.
3058
PILASZANOVICH, I.
8505
PILIERO, J.A.
6073*
PILIERO, S.J.
6073*
PILKINGTON, T.R.E.
6293*
PILLAY, C.V.
7345*
PILLAY, K.
5634
PILLAY, S.P.
1407
PIMBLETT, K.A.
4542, 6710
PIN, G.
3931*
PINDER, R.M.
1345
PINKETT, M.C.
2090
PINKHAM, J.
1130
PINKUS, L.M.
7491*
PINNA, G.
3296
PINON, J.M.
3562, 6640*
PINOTTI, H.W.
6205
PINSKY, S.M.
3044*
PINTER, A.
8505

PINTERA, J.
665
PINTO-CORREIA, J.
6520*
PINTO, M.
1131
PION, R.
6712*, 6713*
PIOTROWSKI, Z.
408
PIOVESAN, A.L.
8337*
PIPER, D.W.
5596*, 6042*, 6880
PIQUET, J.J.
292*
PIRES, I.R.
6520*
PIRIS, J.
4917, 4918
PIRISINO, R.
7814*
PIROLA, R.C.
4411
PIROS, J.
5176*
PIROTTE, J.
643*, 4342
PIROZYNSKI, W.J.
7560, 7561
PIRSON, Y.
6759*
PIRTTIAHO, H.
7803*
PISANI, G.
233, 238
PISANOVA, A.A.
5892
PISAREVSKY, A.A.
8322
PISI, E.
5860*
PISTOLESI, G.F.
4101*
PITCHUMONI, C.S.
3172
PITHA, F.
3950, 4004
PITKEVICH, E.S.
730
PITT, M.A.
2040
PITTMAN, R.P.
2972
PITZLER, K.
4946
PIUBELLO, W.
2439, 3349
PIYACHON, C.
2175*, 2190
PIZZETTI, P.
6166
PLAA, G.L.
3034
PLACCHI, M.
2842
PLADSON, T.R.
7128
PLAGNOL, P.
343
PLAISIER, H.M.
2100*, 3868*, 5472*
PLANIOL, T.
3968, 5050
PLANTE, G.E.
4501*
PLANTIN, L.O.
6611, 7648
PLATANIA, P.
3134
PLATKAYA, E.K.
243, 3234
PLATT, D.
155
PLATT, N.
5257*, 5761*
PLATTEBORSE, R.
2368
PLATZER, R.
2478
PLETNEV, V.M.
671
PLETNYOV, V.M.
4301
PLEVY, D.J.
1367
PLOIER, R.
4003
PLOMTEUX, G.
548*, 554
PLONK, J.W.
4100*
PLOTZ, P.H.
5028*
PLUM, F.
1568
PLUMB, J.A.
6804
PLUGT, M.
1219
POAT, J.A.
1791
POCAS, L.
8164*
POCHACZEVSKY, R.
3185
POCHEVILLE, M.
4162
POCOCK, S.J.
7060
PODDA, M.
224, 8433*
PODDAR, M.K.
6127
PODDAR, P.K.
434
PODDUBNYI, B.K.
4054
PODESTA, M.T.
487
PODESTA, R.B.
5485, 6002*
PODKOWICZ, K.
6750
PODOBEDOV, G.M.
718, 3471*, 3484, 8414
PODYMOVA, S.D.
4332*, 6428, 6500*
POE, N.D.
4746*
POELMAN, J.R.
429
POGNAT, J.F.
2601
POGROMOV, A.I.
6265
POGSON, C.I.
7383*
POHL, J.
5831
POHLKE, R.
5960
POHORECKY, L.A.
2817
POINTER, R.H.
2940
POINTNER, H.
3038, 3225, 3987
POIRIER, R.
802
POISSON, J.
507
POKA, B.
410
POKIESER, H.
3966, 4749*
POKRAJCIC, G.
1554*
POKROVSKY, A.A.
2798, 3917, 7411*
POKROVSKY, G.A.
4162
POLAK, A.
2756
POLAK, J.M.
72, 203, 398, 1236, 1927*,
2784*, 2804, 3335, 4693,
4701*, 5272, 5273, 5274
POLAK, L.L.
364, 741, 6936
POLETTI, T.
7820
POLEY, J.R.
2351, 3409*
POLEY, R.
4770
POLEYNARD, G.D.
6862*
POLIAK, N.R.
8261
POLIDORI, G.
5843*
POLIKARPOV, M.Y.
6344
POLISHCHUK, F.A.
6338
POLITOWSKI, M.
7604
POLK, H.C., JR.
6544*, 8434*
POLLACK, R.
7032
POLLAK, E.W.
1349

POLLARD, E.
6737
POLLARD, E.J.
2319
POLLARD, R.A.
789
POLLER, L.
614, 616, 709, 1183*
POLLET, J.
7685
POLLOCK, J.G.
6391
POLONOVSKI, C.
4905*, 6167, 6319, 7618
POLONOVSKI, J.
1059
POLOSATOV, M.V.
85, 320, 6845
POLOUS, Y.M.
7592
POLSKY, H.S.
1399
POLTER, D.E.
1254
POLTERAUER, P.
5070*
POLTORAK, J.L.
742, 6861
POLTORANINA, V.S.
3751*
POLUBKOV, V.A.
3647
POLYAK, R.I.
366
POMARE, E.W.
8461
POMEROY, J.S.
7811*
POMIER-LAYRARGUES, G.
4010, 6187
PONETTE, E.
2313*, 2388, 4177, 4985, 6382, 7083
PONGPAEW, P.
7856*
PONIATOWSKI, L.
2722
PONKA, J.L.
5740
PONT, A.
5907*
PONTES, J.F.
1527
PONZ DE LEON, M.
5838
PONZETTO, C.
4546
POOLE, A.
3817
POOLE, C.A.
2394
POORT, C.
894
POPA, G.
3401
POPANDOPULO, G.P.
6580*
POPE, C.E., II
302, 4029, 4881*
POPESCU, A.
2009, 8015*
POPIELA, T.
384, 1343*, 6156, 6860, 8180*
POPJAK, G.
2953
POPLACK, W.E.
2171*, 5640
POPLAVSKY, K.E.
7555
POPOV, C.S.
6836*
POPOV, D.T.
8327
POPOV, S.
225
POPOV, T.A.
6439*
POPOV, V.A.
4121, 8218
POPOV, V.M.
6628
POPOVA, I.A.
580
POPOVA, L.A.
4307*
POPOVA, Z.P.
3490*, 4409
POPOVIC, E.
6499*
POPOVIC, O.
3315
POPOVICI, Z.
6681*
POPP, J.A.
1589
POPPE, L.
3771
POPPE, S.
6826
POPPER, H.
2104*, 2510, 2882*, 5901*
POPPERS, P.J.
2912
POPS, M.A.
1657
PORCEDDU, M.L.
5381
PORCELLINI, M.
8080
PORCIATTI, F.
258
POROKHNIA, N.P.
7068
PORRO, G.B.
2808, 3714
PORTA, R.
1008*, 4627*
PORTELA-GOMES, G.
6520*
PORTEOUS, J.W.
7300*
PORTER, J.W.
2032
PORTER, K.A.
2889*, 3360*, 5803*
PORTER, P.
6818*
PORTI, A.
1189
PORTMANN, B.
590, 666, 2105*, 3461*, 7802*, 8307*
PORTNOI, L.M.
3165
PORTNOY, B.L.
674
PORTNOY, L.M.
8143
POSHYACHINDA, M.
2175*
POSNER, D.
5900
POSO, A.R.
4626*, 6831*
POSPELOVA, L.N.
6086*
POSPELOVA, V.V.
7720
POST, C.A.
5486
POSTLETHWAIT, R.W.
4790*
POSTOLOV, P.M.
6909
POSTON, L.
3366*, 4345
POSTOVIT, V.A.
6468*, 8319
POSTUMA, R.
1429
POTASHOV, L.V.
82
POTEKAEVA, M.A.
6462*
POTET, F.
314*, 3312, 4153*, 4289*, 4955
POTICHA, S.
7631
POTRUSIL, B.
232
POTTAGE, A.
7122
POTTEN, C.S.
7904*
POTTER, B.J.
6350*
POTTER, D.E.
8365
POTTER, J.J.
2872*, 4625*
POTVIN, M.
3792
POTVLIEGE, P.
987
POTZI, R.
8492
POUGOURAS, P.
560
POULAIN, J.
227
POULOSE, K.P.
573, 6666

POULSEN, H.
1541, 2557, 3475*
POULSEN, J.H.
867, 1109, 2120, 7370*
POULSEN, P.E.
6045
POULSEN, S.S.
6742
POUND, A.W.
152
POUNDER, R.E.
4073*
POUPON, R.
40, 4615*, 5133, 5420*,
5903*
POURCELOT, L.
3968
POURET, J.P.
8255
POURQUIER, H.
3294
POURRIAT, J.L.
6697*, 8417
POURTAGHVA, M.
6473*
POUSSE, A.
933, 1777*, 2753, 3883,
7489*
POWANDA, M.C.
8040*
POWELL, D.W.
1086*, 1784, 6703
POWELL, G.K.
2327
POWELL, G.M.
5403*
POWELL, L.W.
545*, 608, 1533, 2187,
6445*, 6446*, 7779
POWELL-TUCK, J.
509*, 2387
POWERS, S.R.
5942
POWERS, S.R., JR.
6365*
POWERS, W.E.
2632
POWIS, D.A.
1121
POXON, V.
5632
POZEFSKY, T.
7637*
POZNANSKI, A.K.
5211
POZO, F.
2890*
POZZESSERE, C.
4539
PRADAL, G.
3*, 7693
PRADAYROL, L.
1092, 3687
PRADEL, E.
5981*
PRADELLES, P.
5447
PRADERI, R.C.
5153*
PRADHAN, S.N.
970
PRAISSMAN, M.
1970*
PRAJAPAT, D.K.
6276
PRAKASH, A.
434
PRAKASH, P.
2111
PRAKASH, V.
4187
PRANDI, D.
1566
PRASAD, G.C.
4187
PRASAD, I.
7877
PRATA, A.
6645*
PRATT, J.J.
4532*
PRATT, T.H.
3795
PRAZIC, B.
3361*
PRE, J.
694
PREAUX, A.M.
5148*, 5845
PRECCHIA, A.
8374
PRECCHIA, E.
8374
PRECCHIA, G.
8374
PREEDY, J.R.K.
2551
PREEL, J.L.
4482, 5045, 8516
PREISICH, P.
1632
PREISIG, R.
1248, 2478, 3376*
PREISS, U.
5105*
PRENTICE, R.S.A.
2255
PRESCOTT, L.F.
601, 7084*
PRESCOTT, R.J.
4845
PRESKORN, S.H.
8148*
PRESS, H.C., JR.
5258*
PRESSER, D.H.
7145*
PRESTON, F.E.
7050
PRETEJX, F.
2956, 3820
PREUD'HOMME, J.L.
4181
PREUSSER, K.P.
3183
PREVOT, J.
5014*
PREZYNA, A.P.
7285
PRIARIO, J.C.
5153*
PRICE, A.B.
3276*, 4931*, 7959*
PRICE, C.D.
6447*
PRICE, C.P.
4249*
PRICE, H.L.
6311*
PRICE, L.M.
1838
PRICE, M.R.
6800
PRIDGEN, J.E., JR.
7207*
PRIESSNITZ, E.
3623
PRIESTLY, B.G.
2003, 3034
PRIESTMAN, T.J.
771
PRIKAZCHIKOV, Y.A.
7597
PRINCE, A.
2369*
PRINCE, A.M.
4297*, 5872*
PRINGOT, J.
4985, 5763*, 6382, 7083
PRINTEN, K.J.
403, 2393
PRIOR, A.L.
5656*
PRITCHARD, H.
8455*
PRITCHARD, J.L.
1392*
PRITCHARD, P.J.
7300*
PRITZKER, K.
2718
PROBST, H.J.
4213*
PROBST, M.
7724*
PROBST, P.
6400*
PROBSTHAIN, A.R.
7166*
PROCHAZKA, J.
232
PROCTOR, E.M.
824, 6659
PROFFITT, J.H.
2027, 5423*, 7424*
PROKOP, O.
602
PROKOPOWICZ, J.
533, 710, 2995
PROKSOVA, E.G.
1*
PROSHINA, P.P.
4207
PROSMUSHKINA, E.M.
605

PROSSER, C.L.
5306*
PROST, A.
4137*
PROTASEVICH, A.A.
3243
PROTASEVITSCH, N.N.
7026
PROTCHENKO, N.V.
6345, 8241
PROTELL, R.L.
2281*, 5478*, 5784, 6733
PROUT, B.J.
7534, 7536
PROVAN, J.L.
5902*
PROVOST, P.J.
4298*, 6117, 7472
PROYAVKINA, A.M.
5878
PROYE, C.
7888
PROZESKY, O.W.
2508
PRUCKOV, I.D.
6295
PRUGLO, Y.V.
3994
PRUGNAUD, J.
6712*
PRUITT, B.A., JR.
415, 818, 3142*
PRUNA, D.C.
6202
PRYOR, A.C.
7126
PRYTZ, H.
3475*, 4337*
PRZERWA, M.
1071
PRZEZDZIAK, J.
696, 8391
PRZYJEMSKI, J.
6466*
PSACHAROPOULOS, H.T.
627, 1639
PSALMON, F.
717, 8417
PTAK, T.
1496
PUCHELLE, J.C.
3265
PUCHER, A.
99, 117
PUERTO, A.
873
PUEYO, J.
6187
PUGH, R.N.H.
1700
PUGH, S.F.
7286
PUIG LA CALLE, J.
4602
PUJARI, B.D.
2227
PUJOL, H.
3294
PUJOL-SOLER, R.
732
PULATOV, A.S.
6822
PULLAN, B.R.
3892
PULLAN, C.R.
5202
PULMANO, C.M.
7734*
PUNTO, L.
726, 5309*, 6031
PUOLAKKA, J.C.
1020*
PUPPEL, H.
3245
PUPPULA, A.R.
1444
PURCELL, R.
7764
PURCELL, R.H.
1521*, 2104*, 2485*, 2486*,
2494*, 2882*, 3432*, 5856*,
5859*, 5872*, 5874*, 5875*,
6456*, 6484*, 8360*
PURCHASE, I.F.H.
123*
PUROW, E.
5002
PURRI, P.
8080
PUSCAS, I.
3204, 7573*
PUSTOVIT, S.S.
620
PUTALOVA, T.V.
4323*
PUTNAK, J.R.
6472*
PUTNAM, C.W.
1461*, 2889*, 3360*, 5803*,
5804*, 6398*, 7116*
PUTNAM, T.C.
6406*
PUTNEY, J.
940
PUTNEY, J.W., JR.
4547, 5269
PUTZ, F.J.
3706
PUTZ, P.
3515
PUTZKE, H.P.
4238
PUURUNEN, J.
2282*, 3664*
PUYEO, J.
4010
PUZIEWICZ, I.
3347
PYATNITSKY, N.N.
6110
PYLTSOV, I.M.
6294
PYNADATH, T.I.
8003*
PYNTIA, V.E.
5093
PYRAH, R.D.
4812*
PYROZHKOV, M.A.
6115
PYTIEVA, G.P.
7668
PYTKOWSKI, B.
3011, 7297*
QIZILBASH, A.H.
547*, 2380, 2432*, 3275*,
4198
QUADRI DUQUE, A.
2101*
QUANDALLE, P.
1707
QUARANTA, C.
3411
QUARANTA, S.
4826
QUARONI, A.
5270
QUASDORF, G.
6189
QUASDORF, M.
6189
QUAST, M.
4839
QUASTEL, M.
3697
QUEISSER, W.
3472*
QUERTERMUS, J.
98
QUILICI, M.
7895
QUINN, J.P.
5503
QUINTIN, J.
5184
QUINTINA, N.
4248*
QUINTON, A.
287
QUIRING, J.N.
2145
QUISSELL, D.C.
2777
RAAB, D.E.
3124*
RABELO ALVES, A.
1709*
RABES, H.M.
4733
RABIN, A.
740, 3239
RABIN, B.S.
4718, 4998
RABIN, H.R.
3523*
RABIN, M.S.
5608
RABINOVICI, N.
4628*
RABINOVITCH, S.
888
RABINOWITZ, J.G.
2192

RABISCHONG, P.
3940*, 6192
RABKIN, I.K.
277
RABON, E.
904, 1768*
RABCN, E.C.
7343*
RACARDI, R.
3438
RACHMILEWITZ, D.
3825*, 3856
RACUSEN, L.
6015
RADBIL', O.S.
7957
RADECKER, C.E.
567
RADECKI, T.
99, 117, 3696
RADER, V.
6432
RADHAKRISHNAN, A.N.
5301
RADICI, J.V.
5103*
RADINA, F.
631
RADUGINA, G.S.
8387
RADWAN, M.
1799
RAE, S.
925
RAEL, A.A.
4748*
RAETHER, W.
5973
RAFES, I.I.
4057
RAFFENSPERGER, E.C.
4201*
RAFFENSPERGER, J.G.
4441
RAFIDZHANOVA, S.
4380
RAFLA, A.
7249
RAGINS, H.
5712*
RAGLAND, J.B.
1042, 3464*, 4669, 6083*,
7173*
RAGLAND, W.L.
7477
RAGNAUD, J.M.
546*
RAGUSE, T.
7466
RAH HALI, A.
287
RAHAL, J.J.
8474
RAHAL, J.J., JR.
4421
RAHBAR, F.
5220
RAHBEK, I.
5595*, 6917*
RAHEJA, K.L.
176
RAHIER, J.
5225
RAHILLY, P.M.
4431
RAHLFS, V.W.
3308
RAHMAN, M.A.
1061
RAI, K.
1318
RAIA, A.A.
1482, 3333, 6205, 6934,
8120
RAIA, S.
1527
RAIBAUD, P.
1671, 4714*
RAICHT, R.F.
2952, 3762*
RAIMER, M.
531
RAIN, B.
4290*
RAINFORD, E.A.
7891
RAINSFORD, K.D.
979, 2143, 2146, 2812, 5371,
7250
RAISER, M.
3771, 4582
RAISONNIER, A.
1059, 1060, 2945
RAIZMAN, A.
160
RAIZMAN, R.E.
2664
RAJAH, S.M.
1378*, 4311*
RAJALAKSHMI, S.
8047
RAJAN, K.S.
7448*
RAJENDRA, G.
305
RAJENDRA, G.R.
2059*
RAJOTTE, D.
997
RAJU, G.C.
1471
RAJYALAKSHMI, K.
1676
RAKELA, J.
3429*, 5873*
RAKHIMOV, K.R.
6824, 8097
RAKHIMOVA, N.G.
7720
RAKOWSKA, M.
6696
RALOVETS, N.I.
421
RALPHS, D.N.
66
RAM, M.D.
5140*
RAMACHANDAR, K.
3321*
RAMACHANDRAN, K.
2521
RAMACHANDRAN, S.
634
RAMALINGASWAMI, V.
3414*
RAMAN, T.
1362
RAMANDANIS, G.
3628*
RAMASWAMY, K.
5246
RAMBAUD, J.C.
450, 782, 4104*, 5174*,
5196, 6902
RAMBO, W.M.
5230
RAMELLA, M.
5058
RAMELLINI, G.
1173
RAMENOFSKY, M.L.
7255
RAMIREZ, B.
2452*
RAMIREZ MACIAS, M.
8245
RAMIREZ-MATA, M.
2224*
RAMM, P.J.
1786, 3027, 3028
RAMMING, K.P.
5949
RAMON Y CAJAL, S., JR.
8173
RAMOS, F.
2425
RAMPAL, M.
5051
RAMPAL, P.
3075, 3853, 3996, 5978*
RAMSAY, L.
7091*
RAMSAY, L.E.
6417*
RAMSBOTTOM, N.
7953
RAMSOE, K.
1552*
RAMUNDO, N.
5080*
RANA, S.V.S.
5402*, 6087*
RANADIVE, P.S.
777
RANCE, M.J.
2973, 8093
RANCHOD, M.
4416
RANDALL, D.H.
7781*
RANDALL, H.T.
2333
RANDELL, J.B.
3379, 6451*

RANDLE, P.J.
2774
RANDOLPH, J.G.
807
RANDOLPH, M.F.
7000*
RANEK, L.
3365*, 5848*, 6457*
RANERI, A.J.
6336*
RANGEL, D.M.
5575
RANKIN, B.
3267
RANKIN, R.N.
3056
RANSHAW, J.
6014
RANSOM, J.M.
4791*
RANSOME-KUTI, O.
6990
RANSON, J.H.C.
4992*, 6377*
RAO, A.
5560*
RAO, D.D.
5754
RAO, G.A.
7458
RAO, G.M.
6666
RAO, G.S.
6024
RAO, M.L.
6024
RAO, M.S.
2920
RAO, N.R.
2083
RAO, N.S.
559
RAO, N.U.
1673
RAO, P.V.R.
1676
RAO, S.S.
2339
RAO, U.P.
837
RAPAPORT, M.
5253*
RAPIN, J.R.
4665
RAPIN, M.
8488
RAPP, H.J.
2028
RAPP, W.
7568*
RAPPAPORT, A.M.
2690, 7293
RAPTIS, S.
4067*, 5445*, 7936*
RAS, M.R.
566, 3516, 5797*
RASBOINIKOV, S.
8499
RASHCHINSKAIA, N.T.
6557*
RASK-MADSEN, J.
412, 776, 883, 1794, 2696*,
4499*, 6689*, 6917*
RASMUSSEN, P.A.
6609, 6989
RASMUSSEN, S.N.
1552*, 1553*
RASPER, J.
2112
RASTOGI, B.L.
4329*
RASUKAS, V.A.
6233
RATELLE, S.
7750*
RATH, E.A.
2033
RATH, F.W.
5105*
RATHE, J.
7986*
RATHI, G.L.
453*
RATHMELL, T.K.
503
RATKOVIC, M.
1507
RATNER, M.H.
1565
RATTAN, S.
1843, 2734*, 4524*, 6707
RATTI, L.
3179
RAU, J.E.
1509*
RAUBER, G.
2159, 3265
RAUEN, H.M.
1064
RAUGSTAD, T.S.
7063*
RAUHS, R.
2861
RAUL, F.
3844, 3845, 4678*, 7489*
RAULT, R.M.J.
4465*
RAVAZZOLA, M.
109
RAVID, M.
8043*
RAVITCH, M.M.
2315*
RAWAT, A.K.
2905, 3807, 7442*
RAWAT, R.
5634
RAWLINGS, W.
3325*
RAWLINS, M.D.
6080*
RAY, J.E.
2385
RAY, M.B.
1520*, 2516
RAY, R.N.
1247
RAY, T.K.
1894, 3684, 6017
RAYFORD, P.L.
207, 2082, 4683*, 5358*,
5387*, 7967*
RAYNAUD, A.
4010, 6187
RAYNAUD, G.
2810
RAYNAUD, P.
181
RAZU, A.A.
4241
RAZZAK, I.A.
1373
READ, A.E.
704, 1382, 1468, 4744*,
4981
READ, G.
3337*
READ, L.
7004
READ, N.W.
91, 4129*, 5210
READ, R.C.
1320, 3086
REAGIN, D.E.
4868*
REALDI, G.
685, 4309*
REBECCHI, F.
8446
REBER, E.
3500*
REBER, H.A.
1926*, 3748, 4591*
REBOA, G.
337, 1302
REBOIRAS, J.J.
4408
REBULLA, E.
4969
RECKNAGEL, R.O.
2155, 5416*
RECORD, C.O.
575, 676, 2552
REDD, W.L.
1993
REDDY, B.S.
2379, 7260, 7659*, 7717*,
7998*, 8103*
REDDY, C.M.
7368
REDDY, D.B.
1471
REDDY, J.K.
2920, 7454, 8052
REDEKER, A.
4300
REDEKER, A.G.
2494*, 3360*, 5859*
REDINGER, R.N.
2584, 3087, 3777
REDSHAW, M.
5520*
REDTENBACHER, M.
5722*

REED, G.B.
5399*
REED, J.D.
3197*
REED, P.I.
3196*
REED, W.D.
8354*
REEDER, M.M.
820
REES, B.I.
496
REES, P.J.
5847*
REES, R.J.W.
8507*
REES, W.D.W.
975
REEVE, J.
4503*
REEVES, W.C.
5856*
REFSUM, H.E.
598
REGAZI, J.
2629
REGELSON, W.
1323
REGENT, D.
1708, 3080, 3081, 4012,
4471*
REGEZI, J.A.
7240, 7241, 8487
REGIMBAU, V.
8150
REGLI, P.J.
5078*
REGNOUARD, F.
3399
REGULA, M.
1611
REGUSCI, A.
6638
REHFELD, J.
2693
REHFELD, J.F.
2936, 3592, 5518*
REHLINGHAUS, U.
237
REHM, W.S.
7343*, 7348*
REHNER, M.
1321, 7733
REHNQVIST, N.
4086
REICH, H.
6974
REICH, M.
6076*
REICHARDT, J.
4158
REICHEN, J.
609, 908, 2045, 2048, 3775,
5427*
REICHLE, F.A.
193*, 559
REICHLE, R.M.
559
REICHMANN, J.
7707
REICHWALD, I.
8092
REID, H.A.S.
5803*
REID, I.R.
5503
REID, L.
2474
REID, M.
2974, 8010*
REIDEL, P.P.
243
REIF, A.
6334*
REILLY, J.
5764
REILLY, R.R.
6862*
REILLY, R.W.
3871*
REIMAN, R.E.
1568
REIMANN, H.J.
6736
REIN, R.
1832*
REINA CAMPOS, F.
8318
REINA, J.A.
8318
REINES, H.D.
2398
REINHARD, M.
5007*
REINHARDT, G.F.
1117, 6531*, 7180*
REINHARDT, J.D.
3143*
REINHARDT, M.
699
REISENAUER, A.
1383
REISINGER, W.
4767, 4768, 7695
REISIS, A.R.
8380
REISMAN, T.N.
4047*
REISNER, S.H.
8469
REISSIGL, H.
4803*
REITAMO, J.J.
7062*
REITAMO, S.
7062*
REITEMEIER, R.J.
8233*
REITSMA, W.O.
578
REITZENSTEIN, M.
2832
REITZIG, C.
3646
RELLAHAN, W.
7567*
REMESY, C.
7339*
REMIGNON, M.
485
REMINE, W.H.
507
REMINGTON, J.S.
3521*
REMY-HEINTZ, N.
3935*
RENAUD, G.
2052
RENAUD, R.
8269
RENDA, F.
5710*
RENDALL, M.
7533
RENGEL, M.A.
8044*
RENGER, F.
7165*
RENKIELSKI, K.
528
RENNEKAMP, H.
7752*
RENNER, I.G.
2840
RENNERT, O.M.
4425
RENNIE, J.R.
5737
RENOUX, G.
7275*
RENTON, K.W.
2900
RENTON, P.
7663*
RENTSCH, I.
5926*
RENTSCHLER, R.
8452*
RERAT, A.
7933
RESHEF, L.
2030
RESIGA, C.
7573*
RESPAUD, G.
1209
RESS, W.D.W.
6834*
RETNASABAPATHY, A.
6662
RETTINGER, W.
4896
RETTMANN, R.C.
4567*
REUSE, J.
5316*, 7939*, 7952
REUT, A.A.
3213
REUTER, A.
6928
REUTER, S.R.
1455*, 7734*
REUTTER, W.G.
1040, 1997

REVANKAR, G.R.
1176
REVES, J.G.
8348*
REVSIS, M.G.
6345
REY, A.
7595
REY, G.
4679*
REY, J.F.
3650, 4981, 6179
REYES, C.N.
7467
REYNAUD, B.
5833
REYNES, C.I.
3043*
REYNES, C.J.
1626
REYNIER, J.
4103*
REYNIER, M.D.
2926, 4618*
REYNOLDS, B.
7229
REYNOLDS, D.C.
2119
REYNOLDS, D.G.
980, 1142, 1175, 3864*,
6006*, 6143*, 8006*
REYNOLDS, E.S.
97, 2828, 2922, 4088, 6811
REYNOLDS, K.
2476, 6726*
REYS, M.
5698
REZNIK, G.
3918
RHATIGAN, R.M.
7052
RHODE, H.
3194*
RHODES, A.J.
7785*
RHODES, J.
975, 4385, 6834*
RHODES, J.B.
1184*, 2373
RHODES, M.B.
6149
RHYS-DAVIES, E.
1225
RIBACOV, A.
660
RIBAS, J.
4736
RIBAS, Y.D.
4736
RIBERA, M.T.
4602, 5392
RIBET, A.
639*, 1092, 1947, 2980,
3687, 3726*, 4586*, 4587*,
5385*, 5394, 5880*, 6178,
6754
RIBOLI, E.B.
337
RICCI, C.
4028
RICCIARDI, I.
568
RICCO, J.B.
2453*, 3402
RICE, G.C.
6755*, 7475
RICE, P.L.
1637
RICE, R.P.
3147*, 7735*
RICH, J.D.
5664
RICH, M.
7059
RICHARD, J.P.
4461
RICHARD, L.
1254
RICHARDS, V.
4873*
RICHARDSON, A.K.
2028
RICHARDSON, A.L.
2877*
RICHARDSON, C.T.
960, 2301, 2779, 6914*,
7968*
RICHARDSON, J.D.
4126, 5609
RICHARDSON, K.E.Y.
5266*
RICHARDSON, P.D.I.
208, 1121
RICHER, G.
7157*
RICHEY, J.
6495*
RICHLIN, D.M.
7138*
RICHMAN, A.
6244
RICHMAN, L.S.
1189
RICHMAN, R.
4783
RICHMOND, M.
5980*
RICHON, C.A.
432
RICHTER, E.
617, 1172, 2047, 3813,
5088*, 5418*, 6411*, 7415*
RICHTER, H.
2126, 5310*
RICHTER, J.
650
RICHTER, K.
4767, 4768, 7695
RICHTER, R.M.
344
RICK, W.
4560*
RICKARD, M.D.
5509
RICKERT, R.R.
5533
RICKETTS, R.R.
1509*
RICKHAM, P.P.
6961
RICOUR, C.
3224, 3231
RIDDELL, R.H.
5950, 7682
RIDER, J.A.
1858
RIDING, M.D.
5004*
RIDLEY, D.S.
7892*
RIDLEY, P.T.
6058
RIDOLFO, A.S.
801
RIECHEN, J.
1821
RIECKEN, E.O.
1133, 3010, 6310*
RIEDE, U.N.
170
RIEDL, A.
7698
RIEDL, P.
3960
RIEDLER, L.
3210, 4942, 5837
RIEGEL, K.
2457*
RIEGLER, G.
3448
RIELY, C.A.
4645
RIEMANN, J.F.
4070*, 5255*
RIEMER, J.
2759, 2760
RIETBROCK, N.
617
RIETH, K.G.
5659
RIETHMULLER, G.
3690
RIGAS, A.
2201
RIGAUD, D.
4956
RIGGS, C.E., JR.
5825*
RIGGS, W.A.
4448
RIGHTSELL, W.A.
6477*
RIGO, G.P.
4864
RIGOLI, A.M.
685
RIIS, P.
1718, 4202*
RIISOM, K.
8356*
RIJKE, R.P.C.
2100*, 3868*, 5472*
RIKIMARU, S.
6222

RILEY, A.K.
   5284*, 6013
RIM, E.
   7314
RIMARCHUK, G.V.
   8205
RIMBAUT, C.
   5012*
RIME, F.
   1716
RIMLAND, D.
   5079*
RIMM, A.A.
   1633
RIMCIN, D.L.
   2301, 2303, 4085, 6911*, 7578
RINALDI, A.
   4969
RINAUDO, M.T.
   4546
RIND, J.
   6292*
RINDERKNECHT, H.
   2840
RINDI, G.
   1814, 2706*, 8089*
RINELLA, P.
   6935
RING, E.J.
   6756*
RING-LARSEN, H.
   2543*, 5126*
RINGHEIM, F.
   7063*
RIO, M.E.
   1107
RIOLI, G.
   630
RIOTTOT, M.
   3606*, 3755*, 4714*, 6005*, 6693*, 7440*
RIPANI, R.
   2848
RIPLEY, D.
   5622
RISHANI, K.K.
   3557*
RISPOLI, G.
   5710*
RITCHIE, H.D.
   2761
RITCHIE, J.D.
   1426
RITCHIE, J.K.
   472, 1742, 2387, 4204, 7055
RITCHIE, W.P., JR.
   35, 4066, 6041*, 6054
RITLAND, S.
   595, 812, 1598, 2466*
RITLING, K.
   230
RITSCHEL, W.A.
   3634*, 5330
RITTER, F.
   1280
RITTER, U.
   54, 4356*, 7827*
RITTMANN, K.
   6848
RIVA, F.T.
   5994
RIVASI, F.
   4864
RIVER, E.
   7159
RIVERA-CALIMLIM, L.
   5297
RIVERA, F.
   715
RIXCN, R.H.
   8038*
RIZZETTO, M.
   631, 2517, 3296, 5104*, 7049, 7156*
RIZZO, A.
   1595
RIZZO, C.
   5222, 7701
RIZZO, F.
   670
RO, J.O.
   1444
ROATTA, L.
   3568
ROBBERECHT, P.
   109, 118, 1758, 2834*, 2849, 4600
ROBBINS, A.H.
   2203, 5561*
ROBBINS, J.
   5409*
ROBBINS, P.J.
   7381
ROBBS, J.V.
   8122
ROBEIN, M.J.
   3705
ROBERMAN, N.A.
   7593
ROBERSTON, R.
   5285*
ROBERT, A.
   98, 4089, 4127, 8102*
ROBERT, A.M.
   89, 3662*
ROBERT, D.
   6842
ROBERT, J.C.
   88
ROBERT, K.H.
   6066
ROBERT, L.
   89, 3662*
ROBERTS, C.J.C.
   4757
ROBERTS, E.
   4717*
ROBERTS, E.E.
   6731, 6829*, 8118
ROBERTS, G.M.
   6731, 6829*, 8118
ROBERTS, G.S.
   51, 1260*, 2229, 4111
ROBERTS, G.W.
   3067
ROBERTS, J.
   6413*
ROBERTS, R.C.
   1745, 5548
ROBERTS, R.K.
   635, 2319
ROBERTS-THOMSON, I.C.
   226, 2988*, 4462
ROBERTSON, A.
   2207, 4884
ROBERTSON, J.
   3610*
ROBERTSON, K.
   6979*, 6996
ROBERTSON, K.A.
   2148
ROBERTSON, M.B.
   4932*
ROBERTSON, R.
   36
ROBERTSON, W.S., II
   2546
ROBILOTTI, J.G., JR.
   5732
ROBINETTE, C.D.
   7188*
ROBINS-BROWNE, R.M.
   6612, 7875
ROBINS, R.E.
   6613
ROBINS, R.K.
   1176
ROBINSON, B.H.
   3373*
ROBINSON, C.P.
   5299
ROBINSON, D.C.
   3340*
ROBINSON, J.W.L.
   1123, 2123, 3227, 3517, 3837, 3866*, 4119, 5990*, 6012, 6134
ROBINSON, R.G.
   7145*
ROBINSON, S.H.
   7229
ROBINSON, T.J.
   2359
ROBINSON, W.S.
   5480*, 5862*
ROBSON, T.R.
   1752*
ROCA, M.
   2558
ROCCA, M.
   3189
ROCCHETTI, P.G.
   618
ROCHA, H.
   1049, 7453
ROCHANT, H.
   3476*
ROCHE, J.
   5098
ROCHE, J.K.
   2406*
ROCHE, J.Y.
   4023*

ROCHE-SICOT, J.
1566, 2465*
ROCHESTER, D.
6240
ROCHWARGER, A.M.
6997*
RODA, A.
1607, 2549, 4670
RODA, E.
1607, 2549, 4670
RODDY, H.
1461*
RODES, J.
698*, 715, 1213, 2558, 2562, 3436, 4809*, 6532*
RODESCH, P.
3257*, 4287*, 4755
RODEWALD, R.
48*
RODGERS, B.M.
4425
RODGERS, J.B.
892, 5119*, 7927
RODICIO, J.L.
8044*
RODIER, B.
5981*
RODIMIN, V.V.
6534*
RODNING, C.B.
216
RODRIGO GOMEZ, J.M.
8401*
RODRIGO, J.
6
RODRIGO, L.F.
2890*
RODRIGUES, J.G.
6205
RODRIGUES, L.D.
2487*
RODRIGUES, L.E.A.
1049, 7453
RODRIGUEZ-ARAGONES, A.
4298*
RODRIGUEZ CUARTERO, A.
4271
RODRIGUEZ, J.T.
4424
RODRIGUEZ, L.V.
4748*
RODRIGUEZ, W.J.
5935*, 8456*, 8481
ROESCH, W.
2732*
ROESEL, R.W.
1584
ROESSNER, A.
2691, 6847
ROESSNER, K.D.
6673*
ROGERS, A.E.
1663
ROGERS, A.I.
4047*, 6204
ROGERS, C.A.
3106
ROGERS, I.M.
2193
ROGERS, J.
6460*, 6486*
ROGERS, L.F.
6677*
ROGERS, L.W.
4664
ROGERS, N.
5258*
ROGERS, Q.R.
8009*
ROGERS, S.J.
4718, 6495*
ROGOTSKAYA, L.T.
6489
ROGOWSKI, W.
1164
ROGULJIC, A.
1459*
ROHDE, H.
351, 973, 3193*, 4756, 4855
ROHDE, J.E.
2644
ROHNER, H.G.
3039*, 6161
ROHR, H.P.
2880*
ROHRMANN, C.A.
3114
ROHRMANN, C.A., JR.
1177*, 1572*, 2178*, 5784
ROIZIN, L.
573
ROJAS-BUENO, A.
5072*
ROKICKI, M.
3123
ROKICKI, W.
3123
ROLAND, M.
1332, 2287*, 3199*, 5183, 5382, 6262*
ROLHY, P.
2357
ROLL, P.L.
873
ROLLER, R.J.
4909*, 4991*
ROLLES, C.J.
2191
ROLLS, B.A.
4719, 6140
ROLOVIC, Z.
1159
ROLSHCHIKOV, I.M.
6648
ROMACK, F.E.
2111
ROMAGIN, V.I.
3965
ROMAGNOLI, C.
5843*
ROMANET, P.
3133, 7557
ROMANIV, N.B.
4082
ROMANKIEWICZ, J.A.
3615
ROMANOV, V.A.
4005
ROMEDER, J.M.
4501*
ROMEJKO, M.
3292
ROMEN, W.
6798
ROMERO, E.
3569
ROMERO, J.
1383
ROMERO, R.
5797*
ROMMEL, K.
177, 6138
ROMMELSHEIM, K.
3035
ROMSDAHL, M.M.
6999*
ROMSOS, D.R.
2010, 5412*, 7441*
RONA, A.
1305
RONCAIA, R.
3946*
RONCHETTI, P.G.
3582
RONCHI, G.
4638, 8383*
RONCIN, G.
8067
RONGONE, E.L.
4729
RONSKY, R.
3950, 4004
RONVEAUX, M.F.
5400*
RONZHEIMER, M.
973, 3193*
RONZIO, R.A.
1961, 4583*
RONZONI, L.
8317
ROOS, K.A.
3888
ROOT, M.
2008
ROOTS, I.
1031
ROPARS, C.
1516*
ROPARTZ, C.
2063
ROQUEL, L.
5103*
ROSA, B.
2438
ROSAHL, W.
4986*
ROSALKI, S.B.
7172*
ROSARIO, E.
5502
ROSATO, E.F.
1054, 2928
ROSCH, E.
3962

ROSCH, J.
260, 1453*, 4038*, 7086*, 7529*
ROSCH, W.
842, 986, 1573*, 1950, 2219 2288*, 2735*, 3534, 4813*, 4995, 4997, 5000, 5154*, 5388*
ROSCHLAU, G.
7166*, 8407, 8412
ROSCIN, M.
3204
ROSE, E.
5650*
ROSE, G.E.
2920
ROSE, J.
5375
ROSE, M.L.
4464
ROSE, R.C.
18*, 1769*, 2572*, 2709*, 4504*
ROSEKRANS, P.C.M.
1714
ROSELL, S.
1836, 5323*
ROSELLO, R.
2214, 3969
ROSEMOND, A.
4020*
ROSEN, D.R.
3419*
ROSEN, H.
1564
ROSEN, S.
3588*
ROSEN, Y.
7192
ROSENAK, B.D.
4535
ROSENBERG, D.
4105*
ROSENBERG, I.
1809, 2194
ROSENBERG, I.H.
3871*, 5649*, 6987, 7642
ROSENBERG, M.
495
ROSENBERG, M.L.
4418, 4419, 5170*, 6619
ROSENBERG, R.N.
209
ROSENBERT, H.K.
6529*
ROSENBOJN, J.
4257*
ROSENFELD, A.T.
8330
ROSENFELD, G.C.
1908, 3666*, 5379
ROSENFELD, J.
8475
ROSENFIELD, A.T.
3045*, 6574*
ROSENFIELD, P.L.
5967
ROSENGREN, J.E.
1253, 3291
ROSENKRANZ, H.S.
8117
ROSENMANN, E.
5348, 7518
ROSENMUND, H.
6063, 6064
ROSENOER, V.M.
2546
ROSENQUIST, C.J.
1180*
ROSENSWEIG, N.S.
1096, 2089
ROSENTAL, E.
5666
ROSENTHAL, A.
3142*
ROSENTHAL, J.D.
478
ROSENTHAL, M.W.
2921
ROSENTHAL, W.S.
7764
ROSENTHALL, L.
4753
ROSENTJL, E.B.
6194
ROSIC, D.
1554*
ROSIC, J.
1554*
ROSIN, R.D.
1291, 1293
ROSLER, H.
5320*
ROSNER, W.
7481
ROSS, F.G.M.
7538
ROSS, I.N.
4913
ROSS, J.S.
4685*, 4708*
ROSS, P.E.
7391*
ROSS, S.A.
1144
ROSSANDER, L.
6691*
ROSSBACH, G.
5788*
ROSSELAND, A.
5682
ROSSELIN, G.
5468*, 6820*
ROSSEN, R.D.
4875*
ROSSETTI, M.
7728
ROSSI, I.
2547, 7189*
ROSSI, R.
744, 3344*
ROSSIER, A.
3229, 4116
ROSSIGNOL, B.
2999
ROSSINI, F.P.
512, 3288, 5715*, 7527*
ROSSIPAL, E.
2197
ROSSITER, M.
7640
ROSSITER, S.B.
2459*
ROSSNER, J.A.
7633*
ROSSOUW, J.E.
3374*, 4351, 8295*
ROSSSINI, F.P.
1416
ROSTENBERG, I.
7263
ROSZKOWSKI, I.
1581*
ROTEM, Y.
4906*
ROTENBERG, V.I.
8241
ROTH, B.
5061*
ROTH, H.J.
6159
ROTH, J.L.A.
3841
ROTH, S.
6310*
ROTHENBERG, S.P.
1125, 2062*, 2419
ROTHMAN, D.
5199
ROTHMAN, S.S.
7984*
ROTHMAN, U.
8045*
ROTHMUND, M.
3175
ROTHWELL, T.L.W.
8119
ROTTENBERG, V.I.
4054
ROTTER, J.I.
2301, 2303, 4085, 6911*, 7578
ROTTERDAM, H.
5982*
ROTTHAUWE, H.W.
6985
ROTTINI, G.D.
795
ROTTLER, H.
4200*
ROTY, A.R., JR.
5694
ROUANET, J.P.
427
ROUCAYROL, R.
3889
ROUDNEW, B.
2099*, 4709*
ROUFFY, J.
4104*
ROUGER, P.
4766, 7590, 8242
ROUGIER, P.
3581, 3677, 8495

ROULEAU, P.
1187
ROULIER, J.P.
339
ROUNTHWAITE, F.J.
6632
ROUSSEL, J.
3080, 3081
ROUSSELET, F.
4774, 5395*
ROUSSOUW, J.E.
7190
ROUT, W.R.
7921*
ROUTENBERG, J.A.
5085*
ROUX, G.
6781*
ROUZIOUX, J.M.
8065
ROVAGNATI, P.
3808
ROVIARO, G.C.
3553
ROWE, J.W.
7815*
ROWE, M.I.
2394
ROWLAND, M.G.M.
7244
ROWLEY, G.R.
130
ROWNTREE, T.
8424*
ROY, C.C.
1483, 2583, 5700*, 7750*,
7756, 8228
ROY, L.P.
5867*
ROY, M.
6073*
ROY, S.
2541*
ROY, S.A.
5486
ROYSTON, C.M.S.
4796
ROZE, C.
1957, 2805, 2856, 3135,
3727*, 3742, 3862*, 5391*,
7940*
ROZEN, P.
346, 1646, 1647, 6674*
ROZENBAUM, I.M.
1397
ROZENBAUM, I.Y.
1363
ROZENFELD, E.L.
580
ROZENTAL, R.L.
4373, 8060
ROZIN, D.G.
6751
RUA, S.
5223
RUBALTELLI, F.F.
8337*
RUBAY, J.
3314
RUBEN, A.T.
7831
RUBENSTEIN, A.H.
5404*
RUBERG, R.L.
1734
RUBIDGE, C.J.
824
RUBIES-PRAT, J.
566, 3516, 5797*
RUBIN, B.E.
5819*
RUBIN, C.E.
393*, 2281*, 3825*, 4148*,
5478*, 7316
RUBIN, E.
1036
RUBIN, J.
7051
RUBIN, M.H.
6413*
RUBIN, M.R.
3395
RUBINOFF, M.
1810
RUBINSTEIN, A.
8237*
RUBINSTEIN, M.F.
5683
RUBINSTEIN, Z.J.
5660
RUBIO, H.H.
5253*
RUBIO NACHER, M.
3747
RUBLE, P.E.
7314
RUBULIS, A.
6942*
RUCKEBUSCH, M.
1825*
RUCKERT, K.
7218*
RUCKERT, R.
7217*
RUDDELL, W.S.J.
3085, 8508*
RUDENSKAYA, M.V.
3019
RUDICK, J.
983*, 989, 2137, 2138,
2836*
RUDINSKAYA, T.D.
6846
RUDLER, J.
653
RUDLOFT, J.
8202
RUDMAN, D.
6522*
RUDOBIELSKA, M.
3358
RUDOLF, H.
259
RUDOLPH, A.J.
4432
RUDOWSKI, W.
901, 7558
RUDZKI, C.
1462*
RUEBNER, B.H.
1638, 2564
RUEFF, B.
1566, 2533, 4281, 4776,
5117, 8395
RUF, W.
2831
RUFENER, C.
2684*
RUFFNER, B.W.
1393*
RUFINI, S.
2352
RUFINO, F.
6881
RUGE, W.
4268*, 6586*
RUGGERI, R.A.
3589*
RUGGIERO, G.
2041, 8384*
RUGTIV, G.M.
489
RUHENSTROTH-BAUER, G.
14
RUITER, D.J.
1454*, 7455
RUIZ-ALONSO, J.
4352
RUIZ, R.
2246
RUMEAU, J.L.
639*
RUMMEL, W.
3608*, 4506*
RUMPELT, H.J.
6513*
RUMPF, K.D.
7740
RUMPF, P.
319, 7603
RUMYANTSEV, V.V.
8149
RUNE, S.J.
1874*, 5224, 5595*, 8272*
RUOFF, H.J.
90, 1883*, 6723*
RUOFF, M.
1624
RUOSLAHTI, E.
3058
RUPP, H.
4262*
RUPP, N.
286, 3119
RUPPIN, H.
944, 2759, 2760, 2761,
4070*, 4242
RUPPRECHT, E.
1014*
RUPPRECHT, H.
4946
RUSAKOV, V.M.
7668
RUSELER, C.H.
7615

RUSH, B.D.
2933
RUSCVA, T.V.
684, 7468
RUSSELL, A.S.
5748
RUSSELL, E.
2202, 5541, 5568*, 8402*
RUSSELL, R.C.G.
1928*
RUSSELL, R.G.G.
5498
RUSSELL, R.I.
1485, 2141, 2591*, 4564*
RUSSELL, R.L.
8000*
RUSSELL, R.M.
5900, 6309*
RUSSELL, S.W.
5483
RUSSELL, T.R.
5730
RUSSIN, L.D.
4763
RUSSO, A.
4857
RUSSO, M.
2522
RUSSO, M.A.
4632*
RUSSO, S.
2825
RUSSO SPENA, A.
3448
RUSTAMOV, I.R.
5828
RUSZKOWSKA, J.
4895, 7625
RUTGAIZER, Y.M.
6321
RUTGEERTS, L.
4160
RUTISHAUSER, I.
7245
RUTKOWSKA, U.
6696
RUTTAS, M.
3177
RUTTEN, M.
1907
RUTTER, K.
2634
RUTTHAUWE, H.W.
6038*
RUVINSKY, R.O.
4408
RUWART, M.J.
1597, 2947
RUYTERS, L.
8517
RUZYLLO, E.
703, 722, 7719
RYAN, C.J.
6755*, 7475, 8035*
RYAN, F.P.
4975, 7050
RYAN, J.
930, 1828*, 1844, 4516*,
5764
RYBAK, B.J.
983*
RYBERG, B.
6048
RYCHAGOV, G.P.
6344
RYCHNEV, V.E.
3424*
RYDER, R.W.
7272
RYERSON, T.W.
7687
RYKOV, V.A.
8222
RYMER, R.
6315
RYSAVY, J.
1141
RYSS, E.S.
325, 4266, 6922, 7909
RYZHANOV, V.I.
6321
RYZHKOV, A.I.
8218
RYZHKOVA, L.A.
691, 6163, 6431
RZECZYCKI, W.
1164
RZYMSKI, K.
1211
SAAD, W.A.
2179*
SAAKYAN, A.G.
4093, 8183
SAALFELD, K.
5681
SAALFRANK, V.
5534
SAAVEDRA, T.
3569
SABA, G.P.
5762*
SABATH, L.D.
8474
SABEL, J.
5157*
SABESIN, S.M.
579, 1042, 1972*, 3464*,
3827*, 4669, 5439*, 6083*,
7173*
SABIN, E.
6061
SABOURAULT, D.
7433*
SACCOMANI, G.
904, 1768*, 1910, 4575
SACHAR, D.B.
1438, 1732*, 3321*, 4469*,
4477*
SACHDEV, A.J.
5488, 5751
SACHS, G.
904, 1768*, 1871*, 1910,
4575, 7343*, 7354
SACHS, I.L.
8262
SACK, D.A.
5170*
SACK, H.J.
5100*
SACK, R.B.
1682
SACQUET, E.
3606*, 3755*, 4714*, 6005*,
6693*, 7440*
SADEGHI, D.
2147
SADEGHI, H.
3132
SADJIMIN, T.
7865
SADLER, T.E.
7465
SADO, T.
6771*
SADRI, S.
2400
SADRIEH, M.
5248
SADYKOV, B.A.
6824
SAEGESSER, F.
432, 3227, 4119
SAEKI, S.
6744*
SAENGER, E.L.
1244
SAEZ-ALQUEZAR, A.
137
SAFAIE-SHIRAZI, S.
1154, 2697*
SAFFOS, R.O.
7052
SAFRA, M.J.
4098*
SAFRANY, L.
4043*, 4883, 6899
SAFWENBERG, J.
1744
SAGAIDAK, V.N.
4822
SAGAR, P.
3550
SAGARA, K.
1207
SAGARO, E.
6658
SAGARO GONZALEZ, E.
438, 446, 451, 1381
SAGEL, S.S.
6855*, 8124*
SAGLIOCCO, M.
6930
SAGNELLI, E.
568, 2509, 6475*
SAGOR, G.R.
5719*
SAGUA, H.
253
SAHA, S.P.
7230
SAHA, T.K.
3559*
SAHARA, H.
571

SAHARA, T.
3369*
SAHARIA, P.C.
3502*, 4596*
SAHBA, G.H.
5250
SAHEL, J.
1936, 2215, 2443, 3329,
3979, 4221*, 4371*, 5442*
SAHI, T.
5701*
SAID, M.N.
3560*
SAID, S.I.
209, 4524*, 5358*
SAIGOT, T.
1508, 3076
SAIK, R.P.
723*, 1334*, 3692, 3722,
4044*, 4856, 5574, 6278
SAILER, D.
5513*
SAILER, R.
5162*
SAINT-PIERRE, A.
4165
SAISHO, H.
5165
SAITO, G.
3597
SAITO, M.
6777*
SAITO, T.
5777
SAITO, Y.
5777
SAITOH, K.
6590*
SAJNAR, J.
4245*
SAKAE, K.
7342*
SAKAGAMI, M.
4545*
SAKAKIBARA, A.
6815*
SAKAKIBARA, N.
6579*
SAKAMOTO, A.
3156
SAKAMOTO, K.
1484
SAKAMOTO, N.
2239
SAKAMOTO, T.
5182, 5212
SAKAMOTO, Y.
68, 1975*, 7993*
SAKAROVA, V.
3959
SAKATA, K.
3306, 5182, 5212
SAKHAROV, M.I.
4078
SAKHAROVA, E.G.
4306
SAKKI, S.
726
SAKO, M.
5516*
SAKSEN, E.F.
6625
SAKU, M.
574, 6403*
SAKUDA, D.H.
7123
SAKURADA, H.
1923
SAKURADA, T.
4559*
SAKURAI, M.
5858*
SAKURAI, T.
1039, 6251
SALA, B.M.
3385
SALA FELIS, T.
8439
SALA, T.
1723
SALAH, H.H.
3543
SALAND, L.C.
4620*
SALANDER, J.M.
1368
SALARD, J.L.
5557*
SALAS-COLL, C.A.
29, 7918*
SALAS, M.
1982, 7457
SALASPURO, M.P.
1488, 1489, 2539*, 2540*,
5075*, 5759*
SALATI, R.
630, 3385
SALAZAR DE SOUSA, J.
4686*
SALDAVA, L.A.
583, 1545
SALDUCCI, J.
5189
SALE, J.K.
7982*
SALELKAR, A.V.
5698
SALEM, M.R.
1296
SALEMBIER, Y.
4384, 7204*, 7847
SALEN, G.
550*, 1994, 4640
SALEPCIOGLU, A.
6203
SALERA, M.
3593
SALERNO, F.
2548
SALGANIK, R.I.
5437, 6119
SALIEV, F.S.
8316
SALIK, J.O.
7219*
SALKIN, L.
1765
SALL, I.
5452
SALMAN, M.M.
3989
SALMAN, S.
2817
SALMON, P.R.
1225, 7539, 7577
SALMON, R.
3701, 3705
SALOMATIN, V.V.
3450
SALOMON, F.
6779*
SALONEN, E.M.
7495*
SALSER, J.S.
1423
SALT, W.B., II
2182
SALTER, R.H.
6257
SALTMAN, P.
1494
SALTZMAN, D.B.
7138*
SALVADORI, B.
6600
SALVADORI, G.
690
SALVAGNINI, M.
3382
SALVIN, L.G.
6375
SALVIOLI, G.F.
630, 3385
SALVO, A.F.
2200
SALZER, G.M.
5337
SAMA, C.
1607, 2549, 4670
SAMA, S.K.
2521, 7169
SAMARDZIC, R.
60, 2741*
SAMARDZIEV, D.
234
SAMBERGER, N.M.
2832
SAMCHUK, E.C.
5850
SAMLOFF, I.M.
2301, 3141*, 3686, 4085,
5267, 6741
SAMMARTANO, R.
4935*, 5537
SAMMONS, H.G.
4249*, 4913
SAMOILOVA, V.Y.
3201
SAMOURIAN, S.
2556, 3469*
SAMPLE, W.F.
4746*, 6548*
SAMPLINER, J.
1366

SAMPLINER, R.
2523*
SAMSIOE, G.
2451*
SAMSON, R.
460
SAMUEL, E.
1311
SAMUEL, I.
656
SAMUEL, M.R.
836
SANAHUJA, J.C.
1107
SANBORN, W.R.
7865
SANCHEZ-CUENCA, J.M.
8379
SANCHEZ, D.
7149*
SANCHEZ DE LA CUESTA Y ALARCON,
F. 7976
SANCHEZ, H.M.
1054, 2928
SANCHEZ-TAPAIS, J.
628, 688, 1542*, 6496*
SANDBLOM, P.
2893
SANDBORN, E.B.
2122
SANDER, E.G.
871*
SANDERS, D.E.
7526*
SANDERS, D.J.
976, 3197*
SANDERS, E.J.
5345
SANDERS, G.B.
5669
SANDERS, G.T.B.
4877*
SANDERS, K.M.
1853
SANDERSON, I.
6293*
SANDERSON, J.
7060
SANDILANDS, G.P.
2528
SANDLER, S.G.
3431*, 8364
SANDMANN, W.
3919
SANDOCK, K.L.
3101
SANDOR, J.
8107*
SANDOR, V.
5374
SANDRI, R.
7819, 7821
SANDSMARK, M.
6277
SANE, S.M.
4797
SANER, H.
6203
SANESI, A.
4256*
SANFILIPPO, G.
4857
SANFILIPPO, J.A.
1310
SANFORD, P.A.
1813
SANKALE, M.
1205
SANKARAN, S.
6366*
SANNA, A.
641
SANO, M.
5262*, 5263*
SANOKHO, A.
1560
SANSING, G.A.
1503
SANSONE, F.
5927*
SANT, M.V.
779
SANTANGELO, A.
6600
SANTELLA, R.M.
8117
SANTESSON, B.
5612
SANTIAGO DE WEIL, S.
5504
SANTIAGO, S.M., JR.
7175
SANTINI, B.
447
SANTINI, D.
3593
SANTINI, R.
2729*
SANTORO, B.T.
5774*
SANTORO, F.
5866*
SANTORO, G.
2859
SANTORO, J.R.
4512
SANTOS, A.M.C.
175
SANTOS, G.H.
5644
SANTOS, M.T.L.
330
SANY, J.
7697
SANYAL, A.K.
4565*
SANYAL, S.C.
8464
SANZ, M.A.
8379
SANZ, M.I.
330
SAPIN, C.
134
SAPOZHNIKOV, V.M.
8405
SAPPERSTEIN, R.L.
3704
SAPUNAR, J.
3575
SARACENO, G.
7806*
SARAU, H.M.
7343*
SARAYA, A.K.
827
SARD, D.M.
6643*
SARFEH, I.J.
5038*
SARFY, E.
1377
SARGENT, E.N.
2203
SARIC, J.
2887*, 3626*
SARIC, O.
5184
SARIN, G.S.
5690
SARIYANNIS, C.
303
SARKANDER, H.I.
5826*
SARKISOVA, O.I.
3901
SARKISYAN, E.L.
7979
SARKISYAN, N.M.
1204
SARLES, H.
112, 1017*, 1931*, 1936,
1942, 1954, 2440, 2443,
2809, 2852, 2855, 2862,
3329, 3743, 3745, 3979,
3999, 4221*, 4229, 4371*,
4601, 5442*, 6385, 6752,
7367*,
7368*, 7376, 8068
SARLES, J.C.
2745*, 2747, 3637*, 3649,
7040
SARMA, A.V.S.
667
SARMA, D.S.R.
8010*, 8047
SARNA, S.K.
1833*, 4541, 6706
SARNA, T.
638
SARPOTDAR, V.G.
2227
SARRAZIN, A.
3076, 5123*
SARRION, J.V.
4352
SARTORIO, G.C.
3140*
SASAHARA, M.
3597, 5777
SASAKI, T.
5523, 5524
SASAME, H.A.
2103*

SASANO, N.
1414
SASCHENKOVA, T.P.
746
SASHIN, D.
1189
SASLAW, M.S.
789
SASS-KORTSAK, A.
594
SASSA, S.
586, 2012
SASSE, D.
170, 2891
SASSER, L.B.
1797, 7299*
SASSIER, P.
1114, 6813*
SATCHELL, D.G.
46*
SATEGNA GUIDETTI, C.
3263
SATHIAMOORTHY, S.S.
3008
SATIR, A.A.
5964
SATO, E.
1414
SATO, H.
4545*
SATO, J.
3093
SATO, K.
829, 2618
SATO, S.
571, 912*, 6065
SATO, T.
4049
SATOH, T.
4636
SATPATHY, B.K.
5242*
SATTERWHITE, T.K.
2590*
SATTLER, E.L.
7431*
SATWIK, A.
5690
SATZINGER, G.
6100
SAUBERLI, H.
81, 1335*, 4687, 4820, 4940,
8256
SAUBERLI, H.A.
4556*
SAUBERLI, R.
6887
SAUBIER, E.
355
SAUBIER, E.C.
6905, 7102*
SAUDEK, C.D.
6478*
SAULS, J.L.
1613
SAUMA, A.
5918*
SAUNDERS, D.R.
1775*, 3825*, 3856, 4148*,
7316
SAUNDERS, J.H.B.
2415*, 3198*, 5168*, 6915*
SAUNDERS, S.J.
151
SAUTTER, T.
712
SAUVAGE, M.
88, 3709
SAVAGE, A.
2342
SAVAGE, D.C.
2132
SAVCHENKO, N.F.
6295
SAVERYMUTTU, S.H.
1820, 2930
SAVICH, V.I.
8071
SAVIN, M.A.
31
SAVION, N.
111
SAVISAAR, E.
3177
SAVOLAINEN, M.J.
4622*
SAVTSCHENKO, A.P.
7187*
SAWA, A.
551
SAWADA, T.
829
SAWADA, Y.
8181*
SAWARYN, T.
6494*
SAWIN, L.L.
5286*
SAWYER, M.B.
3860*
SAWYER, P.R.
1345
SAWYERS, J.L.
5750, 6918*
SAXTON, H.M.
7832
SAYENKO, V.F.
3655
SAYERS, H.J.
1129, 4984
SAZ, H.J.
5496
SAZONOV, A.M.
6534*
SAZONOV, S.P.
3211
SBLENDORIO, L.
5917*
SCAIFE, J.R.
138
SCALA, G.
2529
SCALISE, G.
2864*
SCALLEN, T.J.
1993
SCANNI, A.
5613
SCARANO, V.R.
7037
SCARPELLO, J.H.B.
4161, 4911*
SCASSO, A.
651
SCAWEN, M.
107
SCHACHT, U.
7603
SCHACHTER, D.
1802
SCHACHTER, M.
5345
SCHACKMANN, R.
904, 1768*
SCHADE, S.
8036*
SCHAEFER, H.
3501*
SCHAEFER, J.A.
2142
SCHAEFER, J.W.
4991*
SCHAEFER, R.A.
7764
SCHAFER, A.
3824*
SCHAFER, D.E.
3711
SCHAFER, J.
8505
SCHAFER, S.J.
1651
SCHAFER, W.
3352
SCHAFFALITZKY DE MUCKADELL,
O.B. 6819*, 7374*
SCHAFFNER, F.
1513*, 2882*
SCHAFFNER, O.
1573*, 2219, 4995, 5154*
SCHAFMAYER, A.
3719
SCHALLERT, T.
2822
SCHALLY, A.V.
66
SCHALM, S.W.
3453*, 3454*, 4296*, 5426*
SCHANBACHER, L.M.
1940
SCHANG, J.C.
933, 1835, 2751, 3657, 5190
SCHANTZ, A.
2628
SCHANTZ, P.M.
4457*
SCHAPIRA, F.
1029
SCHAPIRO, H.
1870
SCHAPIRO, R.L.
2328
SCHARSCHMIDT, B.F.
576, 1218, 5028*

SCHAUB, J.
2910

SCHAUER, A.
8331

SCHEBALIN, M.
998, 4555*

SCHECHTER, D.
5348

SCHECHTER, G.P.
6606

SCHECHTER, L.S.
3218*

SCHECHTER, P.J.
3480*

SCHEDEL, R.
1150

SCHEDEWIE, H.
1358

SCHEDL, H.P.
220, 1770*, 1788, 5294,
5495, 6008, 6016, 7929

SCHEFFLER, G.
1106

SCHEIBLE, W.
7025

SCHEIBNER, K.
4214*

SCHEIN, P.S.
6606, 7242

SCHEINBERG, I.H.
7422*

SCHEINER, C.
4371*

SCHEINMANN, P.
3254*

SCHELLEKENS, P.T.
6312*

SCHELLERER, W.
2832

SCHELP, F.P.
7856*

SCHENK, E.A.
4695, 4799

SCHENK, R.
5498

SCHENKER, S.
893, 2182, 2448*, 2461*

SCHENKER, U.
5149*

SCHENKMAN, J.B.
1028

SCHENONE, H.
3569

SCHENOWITZ, G.
3485

SCHERER, E.
1478

SCHERER, Y.D.
2892

SCHERRER, A.
6973

SCHERRER, S.
3376*, 4451

SCHERSTEN, T.
404, 622, 1576*, 3872*,
6523*, 6541*, 8303*, 8425*,
8428*

SCHEUER, P.J.
1559, 2556, 3469*, 5024*,
6519*

SCHEURER, U.
3040*, 4072*, 4850, 7554*

SCHEY, W.L.
3044*

SCHIAFFINI, O.
2890*

SCHIAFFONATI, L.
124*

SCHIANO, G.
1536

SCHIAVI, J.
7878

SCHIEBLER, T.H.
5991*

SCHIEMANN, D.A.
3524*

SCHIER, J.
901, 7558

SCHIERHOLT, K.D.
8420*

SCHIFF, E.R.
647, 3949*

SCHIFF, G.M.
5080*

SCHIFF, L.
1243

SCHIFF, W.
4282*

SCHIFTER, P.
8505

SCHILLER, G.
8145

SCHILLER, K.F.R.
1223, 7534, 7536

SCHILLER, M.
7042

SCHILLING, K.
7733

SCHIMA, E.
5141*

SCHIMASSEK, H.
169

SCHIMETZEK, H.
288

SCHIMKE, R.N.
3540

SCHIMMEL, E.M.
5561*

SCHIMMELPFENNIG, W.
5074*, 6501*, 7095*

SCHINDLER, D.
4258*

SCHINELLA, R.
7688

SCHINELLA, R.A.
5728

SCHIODT, T.
6457*

SCHIPPER, H.L.
6884

SCHIPPERT, B.
5360*

SCHITTENHELM, W.
2732*

SCHIVO, M.L.
5206

SCHJONSBY, H.
1441*, 2783*, 3835*, 4107*,
4509*, 4510*, 7063*

SCHLAAK, M.
611

SCHLAEGER, R.
1047

SCHLAKE, W.
4042*

SCHLANGEN, J.T.
417

SCHLEBUSCH, H.
8343

SCHLEGEL, J.F.
1863

SCHLEGEL, W.
4067*, 5445*

SCHLESINGER, E.
1163

SCHLICHT, I.
3956

SCHLICHTING, P.
2557, 5922*

SCHLIENGER, J.L.
2026, 4734

SCHLOERB, P.R.
4407

SCHLOSSER, G.A.
4643

SCHLOSSER, J.H.
6058

SCHLOTE, W.
4317

SCHLUMPF, U.
7556

SCHMAL, A.
973, 6736

SCHMERIN, M.J.
6641*

SCHMERWITZ, W.
3953, 3962

SCHMID, A.
4995

SCHMID, C.
8389*

SCHMID, F.R.
4440

SCHMID, H.
3781

SCHMID, M.
4905*, 5016*, 7556

SCHMID, P.
81

SCHMID, R.
1012*

SCHMID-RUTER, E.
3112

SCHMIDT, A.
1099, 4227

SCHMIDT, D.S.
276

SCHMIDT, E.
2739*, 6443*, 8510

SCHMIDT, F.H.
2551

SCHMIDT, F.W.
3498

SCHMIDT, G.
276, 2652, 4203*, 6928
SCHMIDT, H.D.
7205*, 7216*, 7217*
SCHMIDT, J.
180, 1099
SCHMIDT, K.
1193, 2755, 3020
SCHMIDT, K.G.
7718*
SCHMIDT, M.
4882
SCHMIDT, P.
1654
SCHMIDT, R.
1455*, 5118*
SCHMIDT, U.
3781, 5087*
SCHMIDT, W.
2869*
SCHMINDA, R.
695
SCHMITT-BYLANDT, T.
4011
SCHMITT, J.C.
8260
SCHMITT, M.G., JR.
3602*
SCHMITT, R.
4253*
SCHMITT, W.
7699
SCHMITZ, E.
5124*
SCHMITZ, H.
5876*
SCHMITZ, J.
2360
SCHMITZ-MOORMANN, P.
7906
SCHMUCKER, D.L.
12, 2677*, 7382*
SCHNAARS, P.
7556
SCHNAUFER, L.
1428
SCHNEEMAN, B.O.
2964*
SCHNEIDER, A.
5154*
SCHNEIDER, A.B.
5954
SCHNEIDER, G.
5074*
SCHNEIDER, H.
758
SCHNEIDER, J.
8390*
SCHNEIDER, J.F.
7552
SCHNEIDER, L.E.
5294
SCHNEIDER, M.
7401*
SCHNEIDER, P.B.
2035
SCHNEIDER, R.E.
5770, 7642
SCHNEIDER, S.
6939*
SCHNELLBACHER, E.
5869*
SCHNOES, H.K.
5458
SCHNOSENBERG, I.
6138
SCHNYDER, P.
432
SCHOBER, A.
2526
SCHOELLER, D.
2194
SCHOELLER, D.A.
5510*, 5649*, 7552
SCHOENFIELD, L.J.
2060*, 2074, 2927, 3496*,
3778, 7829
SCHOENFIELD, M.L.
2927
SCHOENIG, G.P.
2919
SCHOFIELD, B.
3695
SCHOLLMEYER, P.
6795
SCHOLTENS, E.
42
SCHOLZ, F.J.
4374, 4800, 5914*
SCHOLZ, R.
2870*
SCHOMERUS, H.
2555, 4349
SCHONBORN, H.
3354
SCHONFELD, G.
2007, 3855, 4278
SCHONLEBEN, K.
4042*
SCHOR, I.
3283
SCHOUB, B.D.
7875
SCHOUN, J.
3480*
SCHRACK, W.D.
5079*
SCHRAMM, H.
1153, 3681
SCHRAMM, M.
7341
SCHREIBER, C.
1810
SCHREIBER, D.
4213*
SCHREIBER, D.R.
6151*
SCHREIBER, D.S.
5173*
SCHREIBER, H.
3159
SCHREIER, K.
3261
SCHREINER, G.E.
2452*
SCHREURS, W.H.P.
7856*
SCHRIEWER, H.
1064
SCHRIJVER, H.
2544*
SCHRODER, F.P.
632
SCHRODER, H.
8110
SCHRODER, J.
1197
SCHROEBLER, S.
7826*
SCHROEDER, J.J.M.
7960*
SCHROEDER, J.R.
5201
SCHROEDER, L.L.
5487
SCHRUMPF, E.
103, 964, 2797, 4068*, 5383,
6226*
SCHUBEL, B.
6873
SCHUBERT, W.K.
1501, 3403, 4910*, 5681
SCHUBOTZ, R.
8390*
SCHUFFLER, M.D.
1177*, 4881*, 5215, 5652*
SCHUIT, H.R.E.
2347*
SCHUUMAN, E.
6674*
SCHULE, A.
7560, 7561
SCHULER, B.
7611
SCHULER, J.J.
3784
SCHULLER, C.
1246
SCHULLER, D.E.
8485
SCHULTE, A.
6788
SCHULTE, W.J.
8274*
SCHULTZ, M.G.
4457*
SCHULTZ, S.G.
4505*, 6001*
SCHULTZ, S.S.
7667
SCHULTZ, W.W.
8348*
SCHULZ, D.
5118*
SCHULZ, I.
45, 7340
SCHULZ, J.
3646, 8444
SCHULZ, R.
5462
SCHULZ, R.A.
1028
SCHULZ, U.
4806*, 7568*

SCHULZE, D.
962
SCHULZE, E.
3646
SCHULZE, F.
8265
SCHULZE, H.G.
4731
SCHULZE, K.
1859, 5295, 6701
SCHULZE, P.J.
4658
SCHUMAN, B.M.
1400, 3116
SCHUMANN, Z.
3641, 6848
SCHUMER, W.
3784
SCHUMPELICK, V.
1152, 3599*, 3716, 8250
SCHUSTER, E.
3364*, 3519
SCHUSTER, G.
311
SCHUSTER, M.M.
305, 1373
SCHUSTER, R.
4223*
SCHUTT, A.J.
7051, 7884, 8233*
SCHUTT, C.
7991
SCHUTTE, A.G.
7020
SCHVAAB, E.
2496*, 5081*
SCHWABE, A.D.
1625, 1657
SCHWABE, C.W.
5243*, 6643*, 8500*
SCHWAGER, A.
3387, 8409
SCHWAMBERGER, K.
3210, 7353*
SCHWARTZ, A.M.
4124
SCHWARTZ, B.
3697
SCHWARTZ, C.C.
1992, 3359*
SCHWARTZ, D.N.
522
SCHWARTZ, G.F.
1399
SCHWARTZ, J.H.
1374, 5285*
SCHWARTZ, K.A.
5769
SCHWARTZ, L.A.
7876
SCHWARTZ, M.
949*, 1174, 5375
SCHWARTZ, M.K.
7861
SCHWARTZ, M.Z.
2455*, 3219*
SCHWARTZ, S.
5797*, 7118
SCHWARTZ, S.E.
6019, 6020, 7922
SCHWARTZ, T.W.
5518*
SCHWARZ, J.
570
SCHWARZ, K.B.
3842, 5946
SCHWARZ, L.R.
7443*, 8294*
SCHWARZER, R.
4260*
SCHWEDES, U.
7519
SCHWEISGUTH, O.
5019*
SCHWEITZER, I.L.
2492*
SCHWEITZER, P.
4901*
SCHWEIZER, P.
8219
SCHWENK, M.
1774*, 4613*, 6007*, 7443*,
8294*
SCHWICK, M.
378
SCHWILDEN, E.D.
8491
SCHWILLE, P.C.
2832, 3706, 3896
SCHWOB, D.
2500
SCIERL, E.A.
6507*
SCIORELLI, G.
8089*
SCLIROS, P.
4671
SCOBIE, B.A.
3188
SCOFIELD, A.M.
3882
SCOLLO, L.
4581
SCOLNICK, M.E.
2210
SCOPINARO, N.
3121
SCORNIK, O.A.
5406*
SCOTT, A.J.
1977*
SCOTT, B.B.
1378*, 2355, 3253*, 4311*,
4904*, 4920, 6133, 6978*,
7634*
SCOTT, D.
2163, 2839*
SCOTT, D.G.
4920, 7634*
SCOTT, G.
6964
SCOTT, G.B.D.
3022
SCOTT, G.W.
1849
SCOTT, H.W.
5672
SCOTT, J.
539, 3048*, 4989*
SCOTT, J.C.
7745*
SCOTT, R.B.
5220
SCOTT, V.
5258*
SCOTT, W.W., JR.
7267
SCOTTI, A.
1667
SCOTTI, D.M.
6943
SCOTTO, J.
4104*
SCOTTO, J.M.
4261*, 8421*
SCRAGG, J.N.
824, 6659
SCRATCHERD, T.
1933
SCRIBNER, B.H.
4465*
SCRIMSHAW, N.S.
5944
SCULLY, R.E.
1355
SCURO, L.A.
289, 2438, 2439
SCZERBAN, J.
1749*
SEALY, W.C.
4790*
SEAMAN, I.
7939*, 7952
SEAMAN, W.B.
5536, 6968
SEAMONDS, B.
6047
SEARLE, R.F.
2158, 2689
SECORD, D.C.
4566*, 7969*
SECRIST, D.
2283*
SECRIST, D.M.
3141*
SEDLACKOVA, M.
3002
SEDOV, V.M.
82
SEEFF, L.
5119*
SEEFF, L.B.
1522*, 5086*, 7167*
SEELIG, H.P.
530
SEELIG, L.L., JR.
5268
SEELIG, R.
530
SEETHALER, K.
1316, 7966*
SEETHARAM, B.
2064

SEFEROVSKY, L.E.
4228
SEGAL, A.
7704
SEGAL, A.W.
6671*, 7286
SEGAL, F.
3256*
SEGAL, H.G.
6472*
SEGAL, I.
3280*
SEGAL, S.
424, 7704
SEGARRA, M.S.
1258*
SEGATO, G.
7714
SEGAWA, K.
5630
SEGGIE, J.
7191, 7768
SEGOL, P.H.
4197, 8252
SEGOVIA, DE ARANA, J.M.
4315
SEGOVIA, J.M.
7189*
SEIBERT, J.J.
3108
SEIDEL, D.
7397*
SEIDELMANN, F.E.
6367*
SEIDENATH, H.
5973
SEIFERT, E.
4813*, 4980, 4996, 5551,
7201*
SEIFERT, G.
5100*, 5235
SEIFTER, S.
3823
SEIGE, K.
6168
SEIGNEURIC, C.
7183*
SEIJI, K.
3093
SEILER, P.
854
SEITANIDIS, B.
482
SEITZ, W.
3136, 7218*
SEKAR, A.S.C.
2248
SEKI, H.
6925
SEKINE, T.
1956, 3731
SEKIYA, S.
6123
SELA, J.
5348
SELANDER, S.
5612
SELBY, J.H., JR.
1390*
SELBY, L.A.
8115
SELDON, S.
1342*
SELHUB, J.
1809
SELIGMAN, J.W.
7776
SELIGMANN, M.
6351*
SELIGSOHN, U.
7774*
SELIGSON, U.
497
SELINDYEVA, M.S.
4325*
SELINGER, Z.
111
SELIVERSTOV, S.A.
3954
SELKE, A.C.
1196
SELL, S.
3030
SELLASSIE, M.G.
656
SELLENTIN, W.
1153
SELMAN-LAMA, M.
6655
SELTZER, A.O.
1054, 2928
SELTZER, M.H.
5533
SELTZER, R.A.
2459*
SELYE, H.
7457
SEMB, B.K.H.
306, 7680
SEMB, L.S.
103, 2797, 4068*, 7963*
SEMELLE, B.
2955, 5422*
SEMENDIAEVA, M.E.
5095, 6462*, 8406
SEMENOVA, L.A.
5437
SEMENOVA, L.P.
1670
SEMENZATO, G.
8337*
SEMENZATO, M.
5585
SEMIN, M.D.
282
SEMLER, P.
7973
SEN, H.G.
6650, 6652, 6663
SENAC, J.P.
725, 1209, 3940*, 3957,
3967, 6192
SENDRA SALILLAS, S.J.
5127*
SENEGAS, F.
1092, 2980, 3687
SENEWIRATNE, B.
5543, 6983
SENEWIRATNE, K.
5543
SENGUPTA, P.
2157
SENNING, A.
5594*
SENOO, A.
3597
SENSALE, P.
8308
SEPEHR, H.
4643
SEPPALA, I.J.
1406
SEPPANEN, E.J.
6242
SEPPELT, U.
4965*
SEPPI, E.J.
7531*
SEPTI, F.
6178
SEPULVEDA, F.V.
3617, 6012, 6134
SER, N.
5183
SERA, Y.
1975*
SERAFINO, X.
2214, 3969
SERBAN, D.
5931*
SERCK-HANSSEN, A.
5606, 6226*
SEREDIUK, N.N.
4082
SEREDKIN, V.V.
4009
SERGEEV, O.E.
1696
SERGEEVA, V.S.
3091
SERGIENKO, V.I.
4225
SERIO, G.
3349
SERNKA, T.J.
4568*, 4577, 5282*
SEROR, J.
8260
SEROT, J.M.
2159, 2216
SEROV, V.V.
4318*, 4319*
SERPAULT, P.
7077*
SERPICK, A.A.
5825*
SERRA, D.
2848
SERRA-DESFILIS, M.A.
8401*
SERRA, E.
4256*
SERRE, H.
7697

SERRERO, G.
4680*, 6817*
SERRES, J.J.
3996
SERTIE, J.A.
1675
SERVELLE, M.
3230
SERVETTI, E.
1445*
SERY, Z.
5151*, 8447
SESOKO, M.
69
SESTOFT, L.
2042, 5408*
SETAKIS, N.
2424
SETHBHAKDI, S.
3841
SETHI, G.K.
2609, 2616
SETTE, H., JR.
1527
SETTEMBRINI, P.G.
5463*
SETTREE, P.
1884*
SEUBERT, J.
5960
SEUFERT, R.M.
3721
SEVERINI, A.
1667, 8259
SEWATKAR, A.B.
7386*
SEWELL, C.W.
6522*
SEWELL, R.
4921
SEWELL, R.B.
7092*
SEWING, K.F.
90, 1881*, 1883*, 5360*
SEXTON, D.J.
6651
SEXTON, S.A.
1116
SEYER, J.M.
2409
SEYMOUR, C.A.
5060*, 7404*
SEZAKI, H.
1782, 5300
SHABANOV, A.N.
4376
SHABELNAYA, N.F.
3989
SHADCHEHR, A.
7330
SHAEIWITZ, J.A.
1609
SHAFF, M.I.
3111, 6410*
SHAFFER, E.A.
1583, 3495*
SHAFFER, R.D.
7335
SHAFIK, A.
861
SHAFIQ, M.
798
SHAH, A.N.
67
SHAH, B.
2599
SHAH, G.R.
1888
SHAH, P.M.
5209
SHAH, P.N.
6663
SHAH, R.S.
1476
SHAHANI, R.T.
2245
SHAKER, I.J.
2142
SHALAYEV, M.I.
8435
SHALIMOV, A.A.
282
SHALIMOV, S.A.
282, 5828
SHALIMOV, V.A.
4005
SHAMOV, I.A.
3545
SHAMSHEV, V.M.
718, 3471*
SHAMSUDDIN, M.
511
SHANBOUR, L.L.
1934, 3665*
SHAND, D.G.
965, 2140, 4664
SHANI, M.
4276*, 7774*
SHANKS, J.
5247
SHANKS, R.A.
2668
SHANNON, W.A., JR.
2684*
SHANYGINA, K.I.
6107
SHAPIRA, Z.
5660
SHAPIRO, R.
5671
SHAPKIN, V.S.
8328
SHARIF, J.
4767, 4768, 7695
SHARMA, A.
4344
SHARMA, H.L.
102
SHARMA, L.K.
434
SHARMA, M.P.
1440*
SHARMA, N.L.
1362
SHARMA, R.K.
6686*
SHARMA, R.P.
7478
SHARMA, V.N.
102
SHARMA, V.P.
453*
SHARONOVA, Z.V.
3417
SHAROVA, Y.A.
7596
SHARP, H.L.
3106, 6090*, 7236
SHARP, J.C.M.
2654
SHARP, J.G.
4675*, 7501*
SHARP, J.T.
2018
SHASTIN, N.N.
705
SHATALOVA, A.S.
4051
SHATZ, B.A.
2410*
SHAW, A.
478, 6029
SHAW, J.R.
6661
SHCHEGLOVA, S.A.
6468*
SHCHERBINA, A.P.
7592
SHEAHAN, D.G.
210, 4871*
SHEARBURN, E.W., III
35, 6041*
SHEARIN, N.L.
2743*, 7935*
SHEARMAN, D.J.C.
1882*
SHEEDY, P.F., II
5515*, 6363*, 6853*
SHEEHAN, B.A.
6756*
SHEEHAN, R.G.
869*
SHEEHY, T.W.
8302*
SHEERIN, J.E.
34
SHEETS, J.A.
4163
SHEFER, S.
1994
SHEFF, R.N.
1547
SHEFT, D.J.
6950
SHEIKH, N.E.L.
2520, 3437
SHEIKHOLESLAMI, M.H.
2400
SHEINBAUM, M.P.
6338
SHEINER, H.J.
3145*
SHEINFIL, A.
7998*

SHELBY, H.T.
1941
SHELIAPINA, V.V.
621, 691
SHELIM BHUIYAN, M.
1594
SHENKMAN, N.S.
6749
SHENOY, S.T.
5417*
SHEPHERD, R.
4431, 5936*
SHEPPARD, M.C.
6913*
SHER, A.
5507, 5745, 8112
SHERLOCK, P.
772, 4170, 4928*
SHERLOCK, S.
539, 625, 628, 633, 687,
688, 1542*, 1559, 2512,
2542*, 2556, 3048*, 3363*,
3375*, 3386, 3426*, 3458*,
3469*, 3942*, 4989*, 5008*,
5024*, 6496*, 6519*, 7170,
7171*
SHERMAN, C.D.
6942*
SHERMAN, F.E.
1427
SHERMAN, J.O.
1697
SHERMETA, D.W.
1690
SHERR, H.
3850
SHERSHEVSKY, M.G.
4143
SHERSTOBITOVA, L.V.
8442
SHETH, U.K.
832, 6650
SHEVCHENKO, B.F.
6892
SHEVCHENKO, L.T.
6270
SHIBANOVA, A.I.
7564
SHIBATA, A.
7480
SHIBATA, H.
623, 7612
SHIBATA, S.
613, 7758, 7947
SHIBATSUJI, H.
6196
SHIBUYA, K.
5589*
SHICHIRI, M.
1228
SHIDLOVSKII, V.A.
736
SHIELD, C.F., III
2594*
SHIELDS, H.M.
3839, 5617
SHIELDS, R.P.
1850
SHIGAREV, T.D.
6368
SHIGETA, Y.
1228
SHIKATA, J.I.
5688, 7482
SHIKATA, T.
8288*
SHIKHODIROV, V.V.
5999
SHILLINGFORD, J.S.
2973, 8093
SHILS, M.E.
5780, 6595
SHIM, B.S.
2114
SHIMA, K.
190
SHIMADA, A.
6324*
SHIMADA, T.
3809
SHIMADA, Y.
689, 7294
SHIMAMOTU, K.
280
SHIMAMURA, J.
2435, 2603, 7550
SHIMAZU, H.
5593*
SHIMIZU, T.
6057
SHIMOJO, H.
6104
SHIMOKAWA, Y.
7747*
SHIN, D.H.
2390
SHINDO, H.
7298*
SHINDO, K.
1728, 6325*
SHINER, M.
6288*
SHINKARENKO, N.I.
760
SHINNERS, J.
5596*, 6880
SHINO, A.
1018*
SHINOHARA, T.
7762
SHINTOMI, M.
1782
SHINYA, H.
1421, 2370*
SHIODA, R.
2444
SHIOMI, Y.
7438*
SHIOSAKA, S.
6815*
SHIOZAWA, Z.
5630
SHIRACHI, R.
8121
SHIRACHI, T.
6147
SHIRAHA, S.
3306
SHIRAHA, Y.
7198*
SHIRAISHI, H.
8121
SHIRAKABE, H.
6362*
SHIRAKI, K.
5858*
SHIRATORI, T.
3913, 4049
SHIRAZI, S.S.
5368*
SHIRLEY, I.M.
3504*, 4456*
SHIROMA, M.
4257*
SHKARENKOVA, L.V.
691
SHKOLNIK, A.
3043*, 7542
SHKURKINA, L.G.
8171
SHKURKO, V.A.
3084
SHLIMOVICH, P.B.
4377, 6503
SHLYGIN, G.K.
605, 2967, 3700, 7361
SHMERLING, D.H.
437
SHMIDT, D.
6432
SHMUNES, E.
2489*
SHNIGER, N.U.
4175
SHOEMAN, D.W.
120*
SHOENFELD, Y.
8126
SHONO, K.
8181*
SHOOK, D.F.
1872*
SHOOTER, R.A.
6589*
SHOR, A.L.
8442
SHOR, L.M.
8442
SHORE, J.M.
2205
SHORE, L.S.
982*, 7372*
SHORT, D.W.
557
SHORT, H.B.
4695, 5699*
SHORT, W.F.
1189
SHORTER, R.G.
2408
SHORVON, P.J.
4964*
SHOSHIEV, L.N.
6647

SHOSTAKOVSKAYA, I.V.
218
SHOVKUN, A.G.
5878
SHOWALTER, J.P.
1832*
SHPONTAK, A.S.
282
SHRIMALI, L.N.
838
SHRINIWAS
5242*
SHTELMAKH, D.I.
6489
SHUBICH, M.G.
513
SHUBINA, M.E.
8435
SHUCK, T.J.
1913, 2230
SHUGAILO, V.T.
6649
SHUKLA, H.S.
3164
SHUKURIAN, S.G.
4055
SHULIAKOVSKAIA, T.A.
8079
SHULL, S.D.
5143*
SHULTZEV, G.P.
2208
SHULUTKO, A.M.
6627
SHULUTKO, B.I.
4377
SHULZ, I.
4603
SHUM, H.Y.
3270
SHUPPE, N.G.
6839
SHUSTER, Y.Y.
379
SHUTE, A.M.
2619
SHUTE, K.
8101*
SHVARTS, V.Y.
4093
SIBAL, A.C.
7864
SIBERT, J.R.
6387
SIBIRKIN, N.V.
8189
SICARD, J.L.
413, 7595
SICONOLFI, E.P.
1627
SICOT, C.
1566
SIDDIQI, M.
6809
SIDDONS, R.C.
138
SIDIROPOULOS, D.
5007*
SIDORENKO, V.I.
3712
SIDOROV, J.J.
900
SIDOROV, V.S.
4162, 6346
SIDRANSKY, H.
2946, 8010*
SIDWELL, R.W.
1176, 5431*
SIEBENMANN, R.E.
6253
SIEBER, H.
7791*
SIEBER, D.F., JR.
3526*
SIEBER, P.
7369*
SIEBERT, G.
6798
SIEGEL, G.
5042*
SIEGEL, H.A.
1257
SIEGEL, I.A.
1800
SIEGEL, J.H.
6348*
SIEGEL, N.J.
8330
SIEGELMAN, S.S.
5214, 5762*, 6960, 7267
SIEGERSTETTER, J.
2846
SIEGLE, R.L.
2192
SIEHR, U.
235
SIERAKOWSKI, N.
50
SIEWERT, R.
915*, 2733*, 4518*, 4687,
5559*
SIFFERT, G., JR.
5194
SIGAL, Z.M.
6301
SIGEL, A.
3578*
SIGMAN, H.H.
8431*
SIGNER, E.
2343*, 8128
SIGSTAD, H.
6255
SIIM, J.C.
3026
SIKITA, T.
3148
SIKJAR, B.
4740*
SILAEV, I.S.
326
SILAS ORTIZ, F.
1679
SILBERSTEIN, E.B.
7381
SILEN, W.
1875*, 2645, 2818, 3588*,
3710
SILK, D.B.A.
24, 1085*, 1778*, 5816*,
6068*, 7751*, 7912*
SILLERY, J.
1775*, 3825*
SILTZBACH, L.E.
4477*
SILVA, J., JR.
3522*, 4730
SILVER, C.E.
1272
SILVERBERG, M.
7164
SILVERMAN, L.
7332
SILVERMAN, M.J.
6292*
SILVERSTEIN, F.E.
2281*, 5478*, 6733
SILVESTRE, G.
7710, 7894
SILVIS, S.
1622
SILVIS, S.E.
1572*, 1693, 2178*, 5622,
6734
SILZ, S.
14
SIMEK, L.
6897
SIMEON, B.
6903
SIMEONE, J.F.
4793*
SIMERT, G.
8400*
SIMKO, V.
6085*
SIMMONDS, R.J.
3598*, 6851*
SIMMONDS, W.J.
7302*, 7926
SIMMONS, J.T.
6756*
SIMMONS, R.L.
1162, 1974*, 3803, 5434*
SIMON, B.
5359*, 6283, 6735
SIMON, F.R.
2049, 2909
SIMON, L.
7697
SIMON, L.N.
1176
SIMON, M.
543*, 3399, 5056
SIMON, N.
7822
SIMON, P.
3845, 4678*
SIMOND-COTE, E.
7377
SIMONIAN, S.J.
1285*
SIMONNEAU, M.
6167
SIMONOV, N.N.
6623, 8177, 8178

SIMONOWITZ, D.
2430*, 4947, 5779, 6376
SIMONS, M.A.
1317, 1880*
SIMONY, K.
5707*
SIMOONS, F.J.
2363
SIMPKINS, K.C.
4925*, 7664*
SIMPSON, A.E.
3972
SIMPSON, J.S.
7832
SIMS, J.E.
3282*
SIMSO, L.A.
7830
SIMSON, J.A.V.
6717*
SIMSTEIN, L.
7277
SINAASAPPEL, M.
567
SINAR, D.
4590*
SINATRA, F.R.
4427, 7258
SINCLAIR, P.
2012
SINDELAR, W.F.
4151*
SINENSKY, M.
2049
SINGAYEVSKY, I.K.
7593
SINGER, J.A.
6537*
SINGER, M.
1954, 5533
SINGER, M.V.
2809, 2852, 2855, 3745
SINGERMAN, R.B.J.
932
SINGH, A.
7057
SINGH, D.
4455
SINGH, D.S.
1528, 2213, 7169
SINGH, G.
7169
SINGH, H.
4344
SINGH, M.
1756, 1952, 1953, 1958
SINGH, R.
7057
SINGH, R.K.
1362
SINGH, W.
477
SINGHELLAKIS, P.N.
2605
SINGSEN, B.H.
6442*
SINHA, V.N.
1528
SINTA
7865
SIPPONEN, P.
1488, 1489, 2286*, 2469, 2539*, 2540*, 4291*, 5075*, 6724*
SIQUEIRA, W.A.
2487*
SIRCUS, W.
299, 355*, 1340*, 4834*, 4845, 5641
SIRINEK, K.R.
7885
SIROL, J.
3571
SIROOSPOUR, D.
2246
SISKOS, P.A.
7997*
SIT, S.P.
3767
SITBON, C.
3241
SITENKOW, D.M.
8377
SITRIN, H.S.
3854
SIURALA, M.
1284*, 2286*, 3058, 4045*, 5620
SIVA PRASAD, J.
6692*
SIVAK, M.V., JR.
2217
SIVAKOV, A.E.
1725
SIVANESAN, S.
4455
SIVOKHINA, I.K.
3236
SIVULA, A.
561
SIX, P.
5112*
SIXL, W.
3310
SJOBLOM, M.
7409*
SJODAHL, R.
1578*, 3451*, 3757*
SJODIN, L.
2806
SJOERDSMA, A.
3480*
SJOGREN, H.O.
1136, 7003, 8045*
SJOLUND, K.
6308*
SJOSTRAND, S.E.
6048
SJOSTROM, L.
8303*
SJOVALL, J.
2924, 8004*
SKAARING, P.
1755*
SKACHKOVA, N.P.
7616
SKAGEN, D.W.
4107*
SKAKUN, L.N.
3930
SKALA, I.
3689
SKALHEGG, B.A.
607, 7393*
SKALIY, P.
6619
SKALKEAS, G.
2201
SKANDALAKIS, J.E.
1641
SKAPIK, M.
8498
SKARBEK-GALAMON, C.
7793
SKAREDNOV, N.I.
8504
SKARSTEIN, A.
1920, 2991*
SKAUG, W.
3396
SKENE-RAMANATHAN, T.
4455
SKENE-SMITH, H.
4455
SKIBA, Z.
268
SKIBBA, R.M.
2373, 4966*
SKIDMORE, S.J.
5090*
SKIELLO, G.
6767*
SKIENDZIELEWSKA, A.
5219
SKILLMAN, J.J.
2645
SKINHOJ, P.
3441
SKINNER, D.B.
1263*, 1266*, 2965*, 4523*, 5321*, 6030
SKINNER, J.M.
2389, 2623
SKINNER, R.K.
2542*, 3363*, 3386
SKIPETROV, V.P.
4372
SKJENNALD, A.
3980
SKJOLDBORG, H.
4976*
SKOPETS, M.D.
8199
SKORNETSKY, D.B.
8186
SKOVGAARD, S.
3073, 6920*
SKRAMPAKS, M.
110
SKREDE, S.
2466*
SKRIPNICHENKO, D.F.
1605

SKUDE, G.
  2411*, 4224*, 5110*, 6505*,
  7722*
SKUDRA, M.P.
  243
SKUYA, N.A.
  379
SKVORTSOV, M.B.
  4759
SLABY, J.
  3843, 5511*
SLADE, W.R., JR.
  573
SLADEN, G.E.
  350, 4161, 4911*
SLANEY, G.
  4386
SLAPAK, M.
  2050
SLATER, J.D.H.
  2553
SLAUGHTER, R.L.
  1192, 1502, 1648
SLAVIN, B.
  5598*
SLAVIN, G.
  6288*
SLAVIN, M.M.
  3419*
SLEDZINSKI, Z.
  1465
SLEGERS, J.F.G.
  1767*
SLEISENGER, M.H.
  2323, 5281*, 7643, 7644,
  7650, 7651, 7652, 7653,
  7654, 7655, 7656
SLEMROVA, J.
  5512*
SLEPUKHA, A.G.
  4078
SLEPYNIN, V.I.
  8186
SLINCHENKO, N.Z.
  8071
SLOAN, M.V.
  5292*
SLOBODIANIK, N.H.
  1107
SLOBODYAN, L.M.
  6425
SLOMIANY, A.
  1887, 2121, 3661*, 6725*,
  7351*, 7356
SLOMIANY, B.L.
  1887, 2121, 3661*, 6725*,
  7351*, 7356
SLONIM, J.M.
  2250
SLUITER, W.J.
  578
SLUSARCZYK, J.
  8359*
SLUSSER, R.J.
  2872*
SLYGIN, G.K.
  3689
SMAGIN, V.G.
  3236
SMAKOV, G.M.
  6220
SMALL, D.M.
  1069, 1583, 1634, 6573*
SMALL, E.W.
  7778
SMALLWOOD, L.A.
  5083*
SMALLWOOD, R.A.
  2250, 5425*, 7092*
SMALLWOOD, R.H.
  4129*
SMEESTERS, C.
  2887*
SMELYANSKAYA, G.N.
  3732
SMETANA, F.G.
  1529
SMETANA, H.F.
  1529
SMETS, P.
  3206
SMIRNOV, K.V.
  2022
SMIRNOV, V.V.
  6342
SMIRNOVA, L.M.
  3986
SMITH, A.
  138
SMITH, A.L.
  3525*, 6460*, 6486*, 7094*
SMITH, A.N.
  1392*, 5720*
SMITH, B.
  858, 4109*
SMITH, B.M.
  8108*
SMITH, C.L.
  4758
SMITH, D.
  3525*, 5726
SMITH, E.H.
  4741*
SMITH, E.L.
  5823*
SMITH, F.E.
  7748*
SMITH, G.
  2595, 4853
SMITH, G.W.
  871*
SMITH, I.
  2553
SMITH, J.
  3627*
SMITH, J.A.
  649
SMITH, J.C.
  5407*
SMITH, J.H.
  3067, 3560*
SMITH, J.L.
  1538
SMITH, J.N.
  6389, 7176
SMITH, J.R.
  2095
SMITH, J.S., JR.
  486
SMITH, J.W.
  1827*
SMITH, L.A.
  1185*
SMITH, L.E.
  2169*
SMITH, L.H., JR.
  5755
SMITH, M.A.P.
  823
SMITH, M.F.
  2397
SMITH, M.W.
  880, 1766*
SMITH, N.L.
  2723
SMITH, P.
  2818
SMITH, P.A.
  7572*
SMITH, P.L.
  1803
SMITH, P.M.
  350, 1206, 6145*
SMITH, R.
  529, 1668, 2445
SMITH, R.A.
  5967
SMITH, R.B.
  5735
SMITH, R.D.
  1500
SMITH, R.J.
  2092
SMITH, R.L.
  4692
SMITH, R.N.
  7005
SMITH, S.
  6450*
SMITH, S.J.
  6289*
SMITH, S.Z.
  6951
SMITH, T.
  4924
SMITH, T.C.
  2723
SMITH, T.M.
  8049
SMITH, W.
  4793*
SMITH, W.B.
  4385
SMITH, W.G.
  7048
SMITH, W.I., JR.
  4998
SMITH, W.L.
  1689
SMITHERS, S.R.
  5507
SMITHIES, A.
  8267*

SMITHSON, K.W.
1960, 2304, 4090, 7499*
SMIYAN, I.S.
6425
SMOK, G.
331
SMOLINSKA, K.
4894
SMORFA, A.
651
SMPORINA, A.P.
3477*
SMUCKLER, E.A.
2199
SMYTH, R.D.
2902, 5357*
SNAGOVSKAIA, E.A.
719
SNAPE, W.J., JR.
514, 930, 1828*, 1839,
2236, 2340, 2750, 3281*,
4516*, 6290*
SNG, E.H.
2244
SNIDERMAN, K.W.
7549
SNIGIREVSKAIA, E.S.
15
SNIJDER, J.A.M.
632, 2518, 2519
SNIPES, R.L.
4694
SNYDER, N.
4396*, 4449, 5177*
SNYDER, S.L.
8040*
SNYDER, S.T.
1956, 3731
SNYDMAN, D.R.
3420*, 6485*
SNYER, J.L.
1044
SO, K.
6530*
SOARES, F.C.
2979, 3831*
SOBAN, E.J.
5036*
SOBCHISHIN, I.V.
6555*
SOBIESKI, R.J.
7511*
SOBOCINSKI, P.Z.
8040*
SOBOLEV, V.R.
805
SOBOLEWSKA, M.
7586
SOBUE, K.
6797
SOCHA, J.
249
SODA, M.
3888
SODE, J.
7961*
SODER, P.O.
5354
SODERHALL, S.
3801
SODHI, J.S.
1247
SODOMANN, C.P.
6310*
SOEHENDRA, N.
1321, 2746, 6857, 7195*,
7733
SOEJIMA, K.
3168
SOENARTO, J.
2644
SOENO, T.
3597, 5777
SOERGEL, K.H.
26, 213, 3602*
SOETERBOEK, A.M.
646
SOETERS, P.B.
1564, 2473, 5207, 7956*
SOFIA, R.D.
8032*
SOGBETUN, A.O.
649
SOHAR, I.
4251*, 7822
SOHN, N.
5732
SOIFER, G.
3283
SOINOV, N.N.
6342
SOJKA, W.J.
8116
SOKHI, G.S.
2193
SOKOLEWICZ-BOBROWSKA, E.
5096, 5890
SOKOLOV, L.K.
7071
SOKOLOVA, G.M.
2208
SOKOLOVA, N.I.
277
SOKOLOVA-REVA, V.I.
8079
SOLANO, J.N.R.
3565
SOLASSOL, C.
3294
SOLC, P.
6318
SOLCH, O.
1153, 3681
SOLDATOV, B.S.
6584
SOLER-ARGILAGA, C.
8000*
SOLETO SAEZ, E.
5244*
SOLHAUG, J.H.
4106*, 4107*, 6272
SOLHEIM, B.G.
3267
SOLHEIM, K.
5682
SOLI, N.E.
7434*
SOLING, H.D.
1027, 1757
SOLIS-HERRUZO, J.A.
1551*
SOLITARE, G.B.
500
SOLITRO, A.
1546
SOLL, A.H.
3685, 3707
SOLNICA, J.
4389*
SOLODAR, I.M.
6345
SOLOMON, A.
3280*
SOLOMON, A.E.
6449*
SOLOMON, N.
1934
SOLOMON, T.
1934, 1944
SOLOMON, T.E.
3738
SOLOMONS, N.
7326
SOLOMONS, N.W.
2194, 4145, 5649*, 7552,
7642
SOLON, F.
441
SOLOVIEVA, G.I.
7989
SOLOVIEVA, N.A.
5997
SOLOWAY, R.D.
2021, 2575*, 5143*, 5617
SOLOWEY, A.C.
701
SOLOWIEJCZYK, M.
2116, 7835
SOLTANZEDEH, H.
5756
SOLTYS, W.
3347
SOLUYANOVA, I.P.
7588
SOM, P.M.
4442
SOMERS, S.
7345*
SOMIN, V.I.
3917
SOMMER, E.
4706*
SOMMER, G.
7684
SOMMER, P.
3186
SOMMER, R.
4003
SOMMERS, S.C.
5982*, 5983*
SOMMERVILLE, R.G.
3341*

SOMOVA, A.V.
6500*
SONDORE, V.I.
583
SONES, J.Q.
2301
SONNENBERG, A.
5615
SONSINO, E.
6972
SOONG, S.J.
7388*
SOPALA, E.
662
SOPER, R.T.
3108
SOPRANI, A.
4128
SOREIDE, O.
1920, 2991*
SORENSEN, F.H.
3073
SORENSEN, H.
607
SORENSEN, R.
5030*, 5831
SORENSEN, S.F.
3580*
SORENSEN, T.I.A.
1652, 4878*
SORIANO, H.A.
5937*
SORICE, G.
733
SORIMACHI, K.
5409*
SORINOV, A.N.
8216
SORINSON, S.N.
3425*, 4305
SORLAND, S.J.
2450*
SORLIE, D.
3266
SOROKIN, J.A.
4373
SOROKIN, J.J.
5578
SORRELL, M.F.
1019*, 2037, 7412*
SOSA, E.Z.
396, 1380
SOSCIA, A.
8080
SOSIN, L.D.
3983
SOSNIK, H.
8413
SOSULA, L.
4392*
SOTANIEMI, E.A.
7746*, 7803*
SOTER, C.S.
7036
SOTNIKOV, V.N.
269, 3997
SOTO, J.M.
2857, 3327*, 5963, 6067, 7670
SOTO, R.J.
3140*
SOTO, R.T.
7670
SOTTOCASA, G.L.
7930
SOUCHARD, M.
1957, 3727*, 3742, 5391*, 6095
SOULE, C.
450
SOULE, E.H.
1437
SOULE, J.C.
4827
SOULIE, J.
3231
SOULIER, J.P.
4286*
SOULLARD, J.
3312, 4153*
SOUMARMON, A.
1911
SOUMERAI, S.
2628
SOURKES, T.L.
572
SOUTHGATE, D.A.T.
2588*, 4403
SOUTHWORTH, L.E.
1627
SOVA, A.N.
282
SOW, M.L.
425
SOWA, J.
6402*, 6470*
SOWINSKI, J.
3478*
SPAANDER, P.J.
1454*
SPAGLIARDI, E.
5917*
SPANKNEBEL, H.
7694
SPANO, C.
7151*
SPARBERG, M.
6677*
SPARKS, F.C.
5949, 6615
SPARKS, J.W.
2939
SPARKS, R.E.
2714
SPARSO, B.H.
4158, 6169
SPATZ, G.
611
SPAY, G.
485
SPECHT, W.
4506*
SPECK, M.L.
3013
SPECK, U.
3915
SPECK, W.T.
8117
SPECTOR, D.
8363
SPECTOR, M.H.
2970, 3012
SPEER, M.E.
4432
SPEIGHT, T.M.
1345
SPEILHOFER, A.
3113
SPELLBERG, M.A.
6578*
SPENCE, J.T.
6791
SPENCE, L.
7785*
SPENCE, R.W.
1339*, 4405
SPENCER, E.F.A.
4077
SPENCER, E.M.
1801
SPENCER, F.C.
4992*
SPENCER, H.C.
3558*, 6651
SPENCER, R.
1345
SPENCER, R.J.
2408
SPENCER, R.P.
6386
SPENNEY, J.G.
1871*, 1909, 3698, 3753*, 5377, 6521*
SPERANSKY, A.I.
4332*, 6500*
SPERANSKY, M.D.
3924
SPERANZA, V.
953*, 994, 4079
SPERLING, M.A.
2332
SPEROTTO, G.
8453*
SPERSCHNEIDER, H.
5938*, 6587*, 8172
SPICER, S.S.
4491*, 4492*
SPIELER, U.
3240
SPIETH, W.
6171
SPINA, G.P.
4309*
SPINELLI, P.
6155
SPIRA, I.A.
4886, 4887, 8236*
SPIRICHEV, V.B.
6839
SPIRO, R.K.
2318
SPITAELS, J.M.
5634
SPIVAK, V.P.
3201, 3988, 6892

PIVEY, J.C., JR.
788
PONER, D.
4025*
POONER, B.S.
5266*
POTTI, D.
6868
PRAKE, W.
2281*
PRAY, G.F.
4592*
SPRAYREGEN, S.
3505*, 4935*
SPRECHER, H.
132
SPRUGEL, W.
952*, 5315*, 5388*, 7325
SPURNY, O.M.
5807*
SPYRIDAKIS, T.
4430
SREEBNY, L.
3596
SREENIVASAN, A.
963
SRIKANT, C.B.
2684*
SRIKANTAIAH, M.V.
1993
SRINIVASAN, K.
8003*
SRINIVASAN, R.
5346
SRIVASTAVA, H.C.
7295
SRIVASTAVA, J.
6765*
ST. CLAIR, L.E.
2111
ST. GEORGE-HYSLOP, P.H.
594
ST. JOHN, D.J.B.
1915
ST. LOUIS, E.
5902*
ST. LOUIS, P.
7522
STAAB, E.V.
4763
STAAL, G.E.J.
6415*
STABILE, B.E.
361, 4080
STACEY, R.
7450
STACHER, G.
962
STACHOW, A.
5219
STACHURA, J.
6402*
STACHURA, M.E.
5954
STADAAS, J.O.
911*, 6226*
STADALNIK, R.C.
3944*, 3945*
STADELMANN, C.
4994
STADIL, F.
2693, 2936, 4074*, 5224, 5518*
STADLER, J.
7835
STADNIK, J.
3216
STAFFELDT, E.
7425*
STAGE, J.G.
5224
STAGE, P.
5155*
STAHEL, E.
3563
STAHL, M.L.
358*
STAHLSCHMIDT, M.
4046*
STAIB, W.
3904
STAIGER, H.J.
5494
STAINFORTH, J.N.
1694
STAJGIS, P.
1088
STAJIC, M.
3408*
STAKEBERG, H.
404, 622
STALDER, G.A.
3527, 5854*
STALPORT, J.
7708
STAMATAKIS, J.D.
1300
STAMFORD, I.F.
5916*
STAMFORD, W.P.
5644
STANCIU, C.
4036, 5565*
STANDAERT, L.O.
7179*
STANDEN, J.R.
4435
STANDEN, O.D.
830
STANDKE, E.
1216
STANKEY, R.
1476
STANKO, R.T.
5116
STANLEY, M.M.
1561, 1562, 1637, 6531*, 7180*
STANLEY, P.
8290*
STANLEY, R.J.
6855*, 8124*
STANSEL, H.C.
3264
STAREK, P.J.K.
4022*
STARITA-GERIBALDI, M.
5261*
STARK, G.
1476
STARKER, H.
962
STARKLINT, H.
8297*
STARKOVA, E.S.
2686
STARLING, J.R.
2258
STARLINGER, M.
7600
STAROSTYUK, A.K.
218
STARZL, T.E.
2889*, 3360*, 5803*, 5804*, 6398*, 7116*
STASIEWICZ, J.
531
STASIK, J.J., JR.
4163
STATE, I.N.
5888
STATON, A.J.
6770*
STAUBESAND, J.
2891
STAUFFER, J.C.
2642, 6019, 6020, 8227*
STAVOROVSKY, M.
7835
STEEL, G.G.
221
STEELE, G., JR.
1136
STEELE, M.
7028
STEER, M.L.
315*, 1930*
STEF, J.J.
2184, 5308*
STEFANENKO, Y.F.
3084, 3289, 4095
STEFANI, D.V.
6430
STEFANOVICH, A.N.
7907
STEFENELLI, N.
3623
STEFF, J.J.
3602*
STEFFEN, C.
113
STEFFES, M.W.
1162, 1974*
STEGA, J.
5237
STEGINK, L.D.
5180*
STEIGER, E.
1734
STEIGER, M.
7728
STEIGMANN, F.
3394, 7155*

STEIN, D.
6380*
STEIN, G.
5938*, 6587*, 8172
STEIN, H.
506
STEIN, H.D.
5534
STEIN, H.L.
5708*
STEIN, L.A.
939, 1443
STEIN, O.
5429*
STEIN, T.
1307, 1360, 1361, 2334,
4732, 6783*
STEIN, T.A.
4108*
STEIN, Y.
5429*
STEINBACH, J.H.
55
STEINBERG, G.B.
7720
STEINBRECHER, W.
4630*
STEINER, G.M.
4034
STEINER, H.
5202, 7623
STEINER, N.
7787*
STEINER, W.
2832
STEINKE, D.L.
5296
STEINNES, E.
2466*
STEKKER, K.
8042*
STELLA, G.D.
5463*
STELLAMOR, K.
5722*
STELZNER, F.
1432, 3298, 3300, 4937
STEMMERMANN, G.
2297, 7567*
STEMPFLE, B.
1628
STENBERG, A.
129, 2950
STENDER, H.S.
4470*
STENDIG-LINDBERG, G.
6610
STENGER, R.J.
8285*
STENSTAM, M.
6308*
STEPAN, J.
3098
STEPANYAN, M.G.
8377
STEPHANT, E.
4750*
STEPHENS, D.H.
5515*, 6363*, 6853*
STEPHENS, F.D.
1434
STEPHENS, J.K.
7435*
STEPHENS, J.R.
941, 3631*
STEPHENSON, P.M.
5560*
STEPHENSON, S.E.
1185*
STERCHI, J.M.
6559*
STERLING, W.A.
1328
STERN, G.
7019
STERN, R.B.
4308*
STERNER, G.
5099*
STERNLIEB, I.
549*, 856, 4248*
STEUDLER, G.
5320*
STEUER, R.R.
3003
STEVENS, C.E.
2486*, 5872*, 6484*
STEVENS, D.
5705*
STEVENS, D.P.
226, 2988*, 4462, 4737
STEVENS, F.M.
2344*, 2354, 3251*, 4916
STEVENS, J.
5775
STEVENS, J.S.
7658*
STEVENS, N.C.
1848
STEVENS, R.W.
2211
STEVENS, W.
7514*
STEVENSON, D.
5864*
STEVENSON, G.W.
4757
STEVENSON, N.R.
2090, 3854
STEWART, C.P.
7932
STEWART, E.T.
2477, 3114, 5538, 7335
STEWART, H., III
4810*
STEWART, J.E.
1491
STEWART, J.J.
2129, 5312*, 5450
STEWART, T.A.
7460
STEWART, W.
460
STEWART, W.B.
5731
STEWART, W.K.
6444*
STIBITZ, G.R.
3819
STICKL, H.
4460
STICKLER, G.B.
3413*
STIEHL, A.
1611, 2776, 8432*
STIERLIN, W.
3246
STIGSBY, B.
2543*
STILLGER, E.
7197*
STILLMAN, A.E.
6450*
STILLMAN, D.
3030
STILWELL, C.A.
6374
STINCER, M.
1534
STINTZ, A.R.
3183
STINTZING, G.
7636*
STIRATI, G.
2606
STIREWALT, M.A.
5968
STIRLING, C.E.
5290*
STIRLING, G.A.
2894
STITNIMANKARN, T.
702
STOBO, J.D.
2408
STOCK, C.
987, 3739, 4599, 5389*
STOCK, P.
110
STOCKBRUGGER, R.
4804*, 4805*
STOCKER, H.
6158
STOCKERT, H.G.
1133
STOCKERT, R.J.
7422*
STOCKINGER, L.
6695
STOCKLEY, H.L.
5317*
STOCKS, J.
3375*
STODDARD, C.J.
3636*
STODDART, R.W.
4971
STOEBNER, P.
4288*, 5098
STOECKINGER, J.M.
7018
STOHR, M.
8063

TOICHITA, S.
3064
TOICULESCU, P.
4310*
TOKES, P.L.
4131*
TOKKERS, P.
5663
TOKSTAD, E.L.R.
7473
TOLARCZYK, J.
1543*
TOLBACH, L.L.
473, 5933*, 7486*
TOLTE, M.
4990*, 6551*, 8159
TONARO, M.
8026*
TONE, D.E.
6074*
TONE, J.
7031
TONE, L.B.
3102
TONE, R.
473, 5575
TONE, R.M.
6396*
TONE, S.S.
1111
TONE, W.J.
2448*
STOOPEN, M.
6642*
STOOPLER, M.
6619
STOPIK, D.
3991, 5130*
STOPPA, E.
1596
STOPPA, R.
7203*
STORCH, W.
7152*, 7177*, 7799
STORER, E.H.
4094
STORM, F.K.
6615
STORM, H.
5158*
STOTT, A.C.
3433*
STOTZNER, H.
7166*, 8412
STOUGHTON, J.A.
939
STRAATEN, G.
5721*
STRADNIEKS, S.
7394*, 7448*
STRAGAND, J.J.
2986*
STRAIN, W.H.
465
STRALIN, H.G.
4261*, 8421*
STRANDBERG, P.O.
6611, 7648
STRANGE, R.C.
1057, 6508*
STRASBERG, S.M.
1978*
STRAUS, F.H., II
6240
STRAUSS, E.W.
6003*
STRAUSS, R.
5257*
STRAUSS, S.
5660
STRAY, O.
7063*
STREETEN, D.H.P.
2642
STREETER, A.M.
3270
STREHBLOW, M.
5059
STREICHENBERGER, G.
2601
STREIFF, R.R.
7923
STREIFFLER, M.
5041*
STREIFLER, M.
1498, 8305*
STRELNIKOV, B.E.
6648
STRELNIKOVA, A.I.
4051
STREMETSKY, G.F.
4444
STREMMEL, W.
492, 1289*, 4842, 4843,
4844
STREMPLE, J.
1890
STREMPLE, J.F.
2183, 3474*
STRICKLAND, R.C.
2461*
STRICKLAND, R.G.
629, 1517*, 4210, 4211,
4962*
STRIFE, J.L.
7113*
STRITTMATTER, W.J.
7336*, 7337*
STROBER, W.
1569, 4144
STROEHLEIN, J.R.
1186*
STROEVAIA, L.N.
8079
STROHMEYER, G.
3299
STROLE, W.
5764
STROME, M.
7882
STROMME, J.H.
7409*
STRONG, J.P.
6334*
STROSBERG, J.M.
6598
STROTHER, J.T.
2933
STRUCHKOV, Y.V.
6223
STRUM, W.B.
2383
STRUNIN, L.
600, 6412*
STRUNZ, K.
4362*
STRUNZ, U.
952*
STRUNZ, U.T.
971, 1861, 1863, 1901, 1905,
3691, 4579, 7331
STRYKER, J.A.
5648*
STUBBING, D.G.
1386
STUBBS, D.F.
4531*
STUBY, K.
7073, 7727
STUDIER, A.L.
7944
STUDIER, E.H.
7944
STULOVA, V.N.
759, 760
STUMPF, A.
2420
STURDEVANT, R.A.L.
1342*, 2283*, 2303, 4810*,
6911*, 6914*
STURLESE, P.
3549
STURM, G.
6798
STURNIOLO, G.C.
2554, 3173, 3382
SUAREZ, K.A.
2038
SUAREZ, P.
7263
SUAREZ SAN PEDRO, F.
5244*
SUAREZ SAVIO, O.
4748*
SUBBIAH, M.T.R.
7396*
SUBBOTIN, V.M.
349
SUBBUSWAMY, S.G.
7607*
SUBIABRE, V.
253
SUBRAMANIAM, R.
837
SUBRAMANIAN, G.
5522, 7386*
SUBRAMANIAN, N.
667, 4069*
SUCIU, A.
1174, 3929, 5931*, 6102
SUDA, K.
2569*
SUDA, T.
8095

SUDAKA, P.
3075, 5261*
SUDUCA, P.
639*, 3547, 4164
SUEMATSU, T.
7093*
SUEUR, R.
3848
SUFFIN, S.C.
2525*
SUFIAN, S.
5616
SUGA, S.
6877*
SUGA, T.
2881*
SUGAHARA, K.
1157
SUGAR, I.
4723, 5470*
SUGAWA, C.
6366*
SUGAWARA, C.
184, 7507
SUGAWARA, N.
184, 2618, 7507
SUGAWARA, T.
242, 3065
SUGIMACHI, K.
3129
SUGIMOTO, T.
5861*
SUGIMURA, T.
6065
SUGIOKA, G.
5861*
SUGIURA, M.
312, 604, 3789, 4209, 6137
SUGONYAEVA, N.P.
6110
SUHARJONO
7873
SUHR-JESSEN, O.
4159
SUKOVATYCH, L.S.
3082
SULIMA, S.Y.
6418*
SULLIVAN, B.H., JR.
2217
SULLIVAN, D.
3045*
SULLIVAN, M.A.
2340, 6290*
SULLIVAN, P.
8458
SULLIVAN, S.N.
1261*, 4399, 4701*, 5274
SULMAN, F.G.
2116
SULSER, H.
4817, 6173, 7727
SULTANOV, G.V.
6469*
SUMI, S.M.
5215
SUMIKOSHI, T.
1484
SUMITHRAN, E.
7154*
SUMLYANINOVA, N.P.
3574
SUMMERFIELD, J.A.
539, 3362*, 3976, 4212*,
4989*
SUMMERS, J.
5863*
SUMMERS, R.
4417
SUMMERSKILL, W.H.J.
1636, 3453*, 3454*, 4296*,
5367*, 5844
SUMNER, H.W.
481
SUMTSOV, N.A.
6427
SUN, D.C.H.
6912*
SUNARWAN, I.
1714
SUNDARESAN, P.R.
5297
SUNDBERG, B.
2888*
SUNDGREN, C.
6394*
SUNDLER, F.
2693
SUNDLER, R.
3780
SUNDSTROM, C.
7047
SUNG, J.L.
1458*, 6404*, 6491, 6493
SUNG, J.P.
7039
SUNUTO
7873
SUNSHINE, P.
4427, 7258
SUPAWAN, V.
7856*
SUPRAPTO
2644
SURAMO, I.
726
SURIYACHAN, D.
8022*
SURRENTI, C.
690
SURUGA, K.
2569*
SUSTER, B.
5002
SUTARYO
2644
SUTCLIFFE, J.
4218
SUTHERLAND, D.E.R.
1162, 1974*, 3803, 5434*
SUTHERLAND, E.
2909
SUTHERLAND, L.R.
5071*
SUTOR, D.J.
1612, 3493*, 6543*, 8426*,
8427*
SUTOR, J.
1617
SUTRISNO, D.
2644
SUTTIE, J.W.
902
SUTTON, A.
1798, 5192
SUVARNKUMARI, G.
1471
SUYAMA, H.
309
SUYAMA, T.
6530*, 7941
SUZANGAR, M.
1567
SUZANNE, J.
5654*
SUZUKI, H.
604, 1157, 1703, 4156*,
4209, 4429, 5996, 6137,
6771*, 6875*
SUZUKI, K.
640, 2176*, 3103, 4300,
4634*, 6538*
SUZUKI, O.
1011*
SUZUKI, S.
3148, 6027
SUZUKI, T.
4704*, 7950
SUZUKI, Y.
1981, 2813, 2814, 2959,
7920*
SUZUOKI, Z.
150, 1018*
SVANES, K.
1314, 1920, 2991*, 8106*
SVARTS, V.Y.
8183
SVEHAG, S.E.
5768
SVEINSDOTTIR, S.
1235
SVENBERG, T.
3058
SVENDSEN, K.N.
1214
SVENDSEN, L.B.
6722*, 7661*
SVENNEVIG, J.L.
6255
SVENSSON, S.C.
3675*, 5365*
SVIRCHEVSKY, I.
3508*
SVIRIDIUK, V.Z.
755
SVIRIDOV, N.K.
3490*, 3954
SVOBODA, M.
4600
SWALE, J.
3379
SWAMIDASAN, G.
667
SWAMY, N.
1264*

SWAMY, S.K.
706
SWAN, C.H.J.
4973
SWAN, K.G.
1175, 2118, 3864*, 8006*
SWAN, R.W.
1354
SWANBECK, G.
8300*
SWARBRICK, E.T.
3576*
SWARM, R.
1582
SWARTZ, H.M.
638
SWARTZBERG, J.E.
3521*
SWASH, M.
4949
SWEENEY, G.D.
6785
SWEET, D.
6421*
SWEET, K.
6207
SWELL, L.
910, 1992, 2006, 3359*
SWENSEN, T.
1202
SWENSON, R.M.
7253
SWIDERSKA-BLONSKA, T.
380
SWIDERSKA, H.
8359*
SWIERCZEK, J.S.
4683*, 5358*
SWITZ, D.M.
3053
SYKES, B.I.
123*
SYLVEST, J.
5922*
SYLVESTRE, J.
1305
SYME, G.
2699*
SYMONS, A.M.
4650
SYNORADZKA, K.
1449*
SYNOVETS, A.S.
3331
SYRBU, I.F.
3899
SYSOEV, Y.A.
3712
SZABO, A.C.
4515*, 6704
SZABO, G.
2054, 2913, 4723, 5470*,
8107*
SZABO, S.
97, 2828, 2922, 4088, 4860,
6742, 7519
SZABO, T.
2137, 2138
SZAFRAN, H.
384, 1343*, 7594, 8180*
SZAFRAN, Z.
384, 8180*
SZALAJ, W.
710, 2995
SZALAY, F.
2496*, 5081*
SZANTAY, I.
1174
SZANTO, P.S.
3097
SZAUER, J.S.
6246
SZAWDYN, J.
8196
SZCZEKLIK, A.
6402*
SZCZEPANIAK, A.
7558
SZCZEPANIK, P.A.
2875*
SZCZUDRAWA, J.
610, 6402*
SZEKELY, A.M.
2453*, 3905
SZEKELY, M.
410
SZEKELY, R.
3575
SZELAG, E.
534, 728, 735, 1618
SZENDE, B.
8027*
SZENTIRMAI, A.
2054
SZEWCZYK, Z.
268
SZILAGYI, H.
1174
SZINICZ, G.
5837
SZKILLADZIOWA, W.
6696
SZKLANNY, J.
535
SZKLARZ, E.
6936
SZMUNESS, W.
2486*, 5872*, 6484*
SZONTAGH, E.
7614
SZPAK, E.
7604
SZPAKOWICZ, T.
5890
SZUCS, L.
410
SZURSZEWSKI, J.H.
935, 5318*
SZYMANSKI, M.T.
7872
SZYMANSKI, Z.
7559
SZYMENDERA, J.
1799
SZYMONSKI, K.
6494*
SZYSZKA, K.
532
TABAQCHALI, S.
8454*
TABER, L.H.
4432
TABOR, E.
5874*
TABOURY, J.
284
TABRISKY, J.
1574*, 2568*, 4783
TABRIZIAN, M.
432
TABUCHI, K.
7104*, 7849
TACHIKAWA, H.
3065
TACHON, J.
6044
TACONIS, W.K.
1454*
TACORIAN, S.
5888
TADA, M.
5528
TADAIION, A.
501
TADDEO, A.E.
5774*
TADESSE, K.
8136
TAENZER, V.
3915, 5831
TAFT, D.A.
4415
TAFT, F.
5942
TAGE-JENSEN, U.
3371*
TAGESSON, C.
1578*, 3491*, 3757*
TAGIROV, K.K.
1405
TAGUCHI, F.
1166, 7469
TAGUCHI, Y.
808
TAGUE, L.L.
2139, 3665*, 6017
TAHARA, E.
1298
TAHMASEBI, A.
1567
TAI, Y.H.
32, 1086*, 6009
TAIEB, A.
4039*
TAJIKA, S.
6057
TAKADA, T.
6579*
TAKADA, Y.
4235
TAKAGI, K.
1497, 2144, 2270, 2789*,
2820, 2996, 3009, 3167,
6046, 6050, 7289*, 7494*

TAKAHASHI, H.
7843
TAKAHASHI, M.
1474, 6248
TAKAHASHI, S.
3823, 5827*
TAKAHASHI, T.
686, 1738, 3167
TAKAHASHI, Y.
563, 603
TAKAI, T.
603
TAKAKI, K.
1971*
TAKANO, M.
5167*
TAKANO, T.
1207
TAKAOKA, T.
1239
TAKASAN, H.
1016*
TAKASHIMA, S.
4171
TAKASU, S.
806
TAKASUGI, Y.
6433
TAKATA, Y.
2270, 6046
TAKAYAMA, M.
6850*
TAKAYAMA, S.
2043, 2044
TAKAYAMA, T.
5778
TAKAYANAGI, I.
2996
TAKEBAYASHI, J.
1207
TAKEDA, H.
8298*
TAKEDA, I.
5687
TAKEGUCHI, N.
86, 4502*
TAKEI, K.
829
TAKEMURA, T.
6888
TAKENAKA, M.
2444, 5687, 7080
TAKENAKA, S.
679
TAKESHIMA, T.
989, 2836*
TAKESUE, A.
2603, 6104
TAKESUE, Y.
7492*
TAKETA, K.
2154, 2603, 5810*, 6120
TAKETOMI, S.
150
TAKEUCHI, A.
228, 229, 1660
TAKEUCHI, K.
1497, 2144, 2270, 2789*,
2820, 3009, 6046, 6050
TAKEUCHI, S.
3648
TAKEUCHI, T.
6065
TAKEWAKI, T.
7955
TAKI, T.
1394*
TAKOLANDER, R.J.
7676
TAKSIN, J.
1706
TALAFANTOVA, M.
3830*
TALAVDEKAR, R.V.
8292*
TALKE, H.
682, 4316
TALLETT, S.
7251
TALLEY, R.W.
1393*
TALMAGE, R.V.
3001
TALWAR, B.L.
1247
TAMADA, T.
3713
TAMAKUMA, S.
1157
TAMER, M.A.
1699
TAMM, A.
3177, 5620
TAMURA, H.
3670*
TAMURA, K.
5587*
TAMURA, M.
8296*
TAMURA, R.
7492*
TAMURA, T.
1166
TAMURA, Z.
2996, 6877*
TAN, E.G.C.
5591*
TAN, G.
2612
TAN, K.L.
3405*
TANABE, H.
3306
TANAKA, A.
2603, 6104
TANAKA, H.
2813
TANAKA, I.
6888
TANAKA, J.
5523, 5524, 6732
TANAKA, K.
3156
TANAKA, M.
1971*
TANAKA, N.
8480
TANAKA, R.
1787
TANAKA, T.
3658
TANAKA, Y.
5810*
TANAYAMA, S.
7449
TANDLER, B.
867, 2013, 7269
TANDON, A.K.
4187
TANDON, B.N.
827, 3414*, 5040*, 5242*,
6654
TANDON, H.D.
3414*, 5040*
TANDON, R.K.
5040*, 5242*
TANG, C.K.
1733*
TANGEDAHL, T.N.
4621*
TANGHE, W.
4160
TANGRI, K.K.
1921
TANGUAY, S.
4339*
TANI, M.
5593*
TANI, N.
3148
TANI, R.
6027
TANI, S.
231
TANIKAWA, K.
4246*
TANIMIZU, I.
6850*
TANIMURA, A.
5336, 7612
TANIMURA, H.
2444
TANIYAMA, K.
7954
TANNENBAUM, C.
6009, 6011
TANNENBAUM, V.
6011
TANNER, M.S.
4109*
TANNER, N.C.
2289
TANNOCK, G.W.
2132
TANPHAICHITR, V.
1995
TANSY, M.F.
1765, 1866, 5331, 5332
TANTENGCO, V.O.
441
TAPLEY, N.DUV.
5236
TAPP, E.
661, 3443

ARANTINO, G.
4969
TARAO, K.
6530*
TARASOV, D.I.
7588
TARENZI, L.
1493
TARKOWSKI, J.
724
TARNAWSKI, A.
1862, 1864, 1895, 2269,
4536
TAROCCO, R.P.
8367
TARPILA, S.
5178*
TARQUINI, B.
6526*, 7178*, 7575
TARUGI, P.
4652
TASMAN-JONES, C.
1976*
TASSI, G.C.
644, 7049
TASWELL, H.F.
7153*
TATARZYNSKA-NOWAKOWSKA, A.
3347
TATE, E.L.
13
TATEISHI, N.
7993*
TATEVOSYAN, A.S.
4376
TATEYAMA, T.
1969*
TATINI, S.R.
804
TATSUTA, M.
1350, 3670*
TATTERSALL, M.H.N.
5824*
TAUB, H.
2948
TAUB, M.
2060*
TAUB, R.N.
1438, 1732*, 3321*, 4477*
TAUBIN, H.L.
5727
TAUNTON, O.D.
6125
TAURIS, P.
5924*
TAUSCHEL, H.D.
3725*, 6096, 6753
TAVARES, C.A.P.
6150
TAVERNIER, C.
8150
TAVILL, A.S.
2004, 7994*
TAVORMINA, V.
4546
TAWES, J.W., III
8105*
TAWIL, T.
860, 4688, 5443*
TAYLOR, A.E.
863, 1773*, 3584*, 7498*
TAYLOR, A.T., JR.
1101
TAYLOR, A.T., JR
1475
TAYLOR, C.B.
7388*
TAYLOR, C.R.
2623
TAYLOR, D.M.
6852*
TAYLOR, E.
4099*
TAYLOR, I.L.
372, 5733
TAYLOR, J.B.
1786, 3027, 3028
TAYLOR, K.B.
4835*
TAYLOR, K.J.W.
1206, 3045*, 6574*, 8330
TAYLOR, R.L.
7757
TAYLOR, R.S.
8137
TAYLOR, S.A.
7056
TAYLOR, S.C.
3779
TAYLOR, T.G.
143
TAYLOR, T.V.
1236, 3892
TAYLOR, W.
6080*, 7582
TAYLOR, W.C.
2511
TAYLOR, W.H.
4092
TECK, H.S.
2284*
TEDESCHI, M.V.
6810
TEDESCO, F.J.
481, 1330, 4179, 6204
TEDESCO MARCHESE, L.
6176
TEELE, R.
7113*
TEELE, R.L.
4741*
TEGELAERS, W.H.F.
567
TEGGIA, M.
913*, 918, 919, 923, 7321*
TEGZESS, A.
2513
TEHRANZADEH, J.
4194
TEICHER, I.
4880*
TEICHMANN, R.K.
4683*
TEICHMANN, W.
8409
TEILLET, F.
4482
TEITELBAUM, S.L.
3223*
TEIXEIRA, A.S.
1017*
TELANDER, R.L.
3718, 4573*
TELISCHI, M.
7155*
TEMKINA, T.Y.
6296
TEMPLETON, A.
153
TEMPLETON, F.E.
1177*
TEMPLIN, B.U.
7991
TENENHOUSE, A.
4585*, 4595*, 6034
TENIERE, P.
3295, 5841
TENNANT, L.
133
TENTONI, M.
5905*
TEOH-CHAN, C.H.
8454*
TEOTIA, M.
1362
TEOTIA, S.P.S.
1362
TEPLOVA, L.L.
8082
TEPLY, V.K.
8276
TEPPERMAN, H.M.
176
TEPPERMAN, J.
176, 4642
TERA, H.
4450
TERADA, M.
6252
TERASAKI, P.
2303, 6911*
TERASAKI, P.I.
3453*
TERAWAKI, Y.
2996
TERBLANCHE, J.
2106*, 3907, 3912, 8050
TEREKHOV, N.T.
736
TERENTIEVA, L.A.
3574
TERENZI, P.
8336*
TERES, J.
1213, 2562
TERESCHTSCHENKO, W.P.
6748
TERHO, T.
3273*
TERME, R.
3239
TERNBERG, J.L.
480, 3158, 5946

TERRET, M.
154
TERRIS, G.
6926
TERRY, B.
2324
TERSIGNI, R.
1130
TESCHKE, R.
7428*
TESSARI, R.
2848
TESTART, J.
5841, 8209, 8445
TESTAS, P.
3906
TETA, G.
233, 238
TEUBER, J.
6420*
TEUFEL, H.
110
THADEPALLI, H.
7834
THAL, E.R.
2243
THALER, H.
577, 5895*, 7137*
THALER, M.M.
588, 1761, 4277*, 5666
THAMBIPILLAI, S.
6983
THAMER, G.
4303
THAMMIG, R.
4011
THANE-TOE
886
THANGAPREGASSAM, M.J.
6779*
THANIK, K.D.
2371*, 4522*
THANNER, F.
8232
THAYER, W.R., JR.
1735
THAYSEN, E.H.
1214, 2788*, 3250*
THEIN-THAN
886
THEISINGER, W.
3186
THELEN, M.
5118*
THEMANN, H.
6847
THEODOROPOULOS, G.
482, 6284
THEORET, G.
6765*
THERMANN, M.
2126, 5310*
THEROUX, P.
4142
THERY, J.P.
4288*, 5098
THEVENIN, M.
6787
THIBAULT, P.
4461
THIBAUT, G.
3265
THIEDEN, H.I.D.
7429*
THIERBACH, V.
4267
THIRUVENGADAM, K.V.
667
THIRY, L.
4781
THISTLE, J.L.
3499*, 5985
THITHAPANDHA, A.
4572*, 8022*
THJODLEIFSSON, B.
1337*, 3616
THOENI, R.F.
7002*
THOMA, R.
6903
THOMAS, A.J.
6761*
THOMAS, A.N.
5571
THOMAS, C.
6739
THOMAS, E.
7194
THOMAS, E.D.
5875*
THOMAS, F.B.
1771*, 1872*, 4590*, 6025,
8147*
THOMAS, G.E.
347, 4134*, 4135*, 5656*,
7191, 7768
THOMAS, H.C.
625, 628, 687, 688, 1542*,
3942*, 6496*
THOMAS, J.
4324*, 5596*, 7911*
THOMAS, J.L.
5680
THOMAS, J.Y.
1347
THOMAS, M.
3231, 3465, 8260
THOMAS, M.A.
2528
THOMAS, P.J.
2348*
THOMAS, S.
8067
THOMAS, T.L.
428
THOMASSET, M.
5447
THOMFORD, N.R.
947, 969
THOMMESEN, N.
8297*
THOMMESEN, P.
4976*
THOMPSON, A.G.
1902
THOMPSON, G.R.
2873*
THOMPSON, H.
2381, 4974, 6219, 7537
THOMPSON, H.H.
3651, 3654
THOMPSON, H.R.
7055
THOMPSON, J.
797
THOMPSON, J.C.
207, 1939, 2082, 4683*,
5358*, 5387*, 7967*
THOMPSON, M.A., JR.
4417
THOMPSON, M.H.
382, 1241, 3197*, 7572*
THOMPSON, M.P.
948
THOMPSON, M.R.
1877*, 1905, 2780
THOMPSON, N.C.
5550
THOMPSON, R.
2362, 6614
THOMPSON, R.G.
4146, 5180*
THOMPSON, R.P.H.
3479*, 4110*, 4735, 5072*,
5799*, 6528*
THOMPSON, W.G.
594, 2248
THOMPSON, W.J.
1908, 3666*, 3684, 4558*,
5379
THOMPSON, W.M.
3147*, 7735*
THOMSEN, A.C.
2504
THOMSEN, P.
1541
THOMSON, A.B.L.
1816
THOMSON, A.B.R.
17*, 1789, 1804, 1818, 1819,
2710, 2712, 5278*
THOMSON, A.D.
3461*
THOMSON, A.W.
6782*
THOMSON, J.G.
4149*
THOMSON, J.M.
614, 616, 709, 1183*
THOMSON, T.J.
3669*
THOMSON, W.H.F.
4191
THOMSON, W.O.
4884, 6333*
THOR, P.
114
THOR, P.J.
4528*, 4551*, 6711
THORBJARNARSON, B.
1733*
THOREN, P.
4874*, 5661
THORESEN, A.B.
3267

HORGEIRSSON, T.
1235
HORNTON, J.J.
1736
HORPE, E.
2043
HORPE, M.E.C.
3270
HORSBY, E.
3267
HOUVENOT, J.
2729*, 6694*
HOUVENOT, J.P.
3726*, 4679*
HOW, G.B.
1356
HRUPP, L.D.
4422
HUN, R.
3706
HUNE, P.O.
3267
HUCT, C.
3462*
HURBER, L.
7867
HURESON-KLEIN, A.
3815
HURMAN, R.G.
2870*, 7410*
HURMAYR, G.R.
288, 1348, 2846
HURMAYR, R.
288, 1348, 2846
HURSTON, O.G.
2571*, 4363*
TIAGO, E.
8398*
TICE, D.A.
701
TICHAI, I.
2126, 5310*
TIETZ, A.
7835
TIETZ, N.W.
3460*
TIGHE, J.R.
7641
TIKHOMIROVA, A.S.
4143
TILNEY, N.L.
7686
TILSON, M.D.
197, 3264, 7915*
TIMAR, M.
7456
TIMMER, C.J.
8031*
TIMPERLEY, W.R.
7050
TIMPL, R.
6994
TIMSON, C.M.
5272
TINKER, M.A.
4880*
TINSCHMANN, P.
721
TINSLEY, E.G.F.
4812*
TIRELLI, A.
6497*
TIRIBELLI, C.
3411, 7930
TISCORNIA, O.M.
112, 1017*, 1931*, 1954, 2809, 2855, 3745, 4601, 7367*, 7368*, 7376
TISMER, R.
4472*
TISSOT, E.
4075*, 6937, 6938
TITOVA, V.G.
684, 3764*
TJOA, W.S.
8458
TOAFF, M.E.
8305*
TOAFF, R.
8305*
TOBE, K.
1539
TOBE, T.
1754*
TOBEY, R.E.
8348*
TOBIAS, H.
6461*
TOBIASSEN, O.
1801
TOBIN, J.
7815*
TOCCALINO, H.
1353, 5169*, 7878
TOCHEN, M.L.
4154*
TODA, G.
2497*
TODANI, T.
7104*, 7849
TODD, G.J.
6864*
TODD, I.P.
5737
TODD, J.K.
2051, 4666
TODOROV, G.
8499
TOFFLER, R.
4793*
TOGONIDZE, N.A.
3334, 6582
TOH, B.H.
5881*
TOKUOKA, S.
1298
TOKUYAMA, K.
7762
TOLEDANO, A.
3683
TOLEDO-PEREYRA, L.H.
1130
TOLENTINO, M.
7020
TOLIN, R.
1842
TOLMAN, K.G.
6440*
TOLMAN, R.L.
1176
TOMARELLI, R.M.
7454
TOMASI, T.B.
2408
TOMASSETTI, P.
2257
TOMASSINI, P.
2825, 2826
TOMASZEWSKI, L.
183, 1093
TOMESANI, A.
3330, 5529
TOMIROTTI, M.
5613
TOMITA, T.
68
TOMIYAMA, Y.
5523, 5524
TOMKINS, A.M.
4113, 4923, 4924, 5249, 7892*
TOMMASI, S.
7178*
TOMPA, A.
8027*
TOMPKINS, M.
5474*
TOMPKINS, R.K.
1450, 1490, 6572*
TONDELLI, P.
6247
TONDER, M.
3266
TONELLI, A.
7705
TONER, P.G.
4483*
TONG, M.J.
3429*, 5115, 5864*
TONGIO, J.
538, 1105, 4150*
TONINI, M.
913*, 918, 919, 923, 7321*
TONISSEN, J.
5658*
TONJUM, S.
1314
TONNESEN, K.
2936
TONTHAT, H.
3476*
TOOR, E.W.
2031
TOOTHILL, C.
6133, 6978*
TOPKE, B.
3304
TOPPET, M.
4287*, 7789*
TOPPING, D.C.
179
TOPURIA, Z.M.
3590
TORIIE, S.
352, 2165*

TORIL ILLESCAS, M.
8175
TORJESEN, P.
6062
TORMA, M.J.
1880*
TORMANEN, C.D.
1993
TORNKVIST, T.
2540*
TORNQVIST, H.
7805*
TOROPOV, Y.D.
3305, 6302
TORPATS, T.Y.
4610*
TORRALBA, A.
1097
TORRANCE, B.
2839*, 3892
TORRANCE, H.B.
2163
TORRES-PINEDO, R.
2364
TORRIELLI, R.
343
TORRONEN, R.
8033*
TORSOLI, A.
4028
TORUN, B.
7326
TORUNO, H.R.
3552
TOSCANO, M.S.
1263*
TOSELLI, L.
5223
TOSELLI, M.
7156*
TOSKES, P.P.
871*, 1134, 2367
TOSTO, S.
7894
TOTH, A.
476
TOTHILL, P.
6224*
TOTSUKA, M.
6657
TOUGH, S.
4999
TOUILLON, C.
6759*
TOULET, J.
548*, 554, 3094, 5891
TOULOUKIAN, R.J.
2611
TOURE, P.
435
TOURNEUR, R.
4269
TOURNIER, C.
348
TOURNUT, R.
639*, 1649, 3547, 5394,
6178, 6882
TOURVAS, E.
3339*
TOUSSAINT, J.
2434, 4016, 4359*
TOUYA, E.
2212
TOVIA ARRIOJA, F.
1705
TOVIA ARRIOJA, M.
1705
TOWNLEY, R.R.W.
785, 1645*
TOWNSON, J.
4999
TOYAMA, S.
6177
TOYAMA, T.
1296
TRABOLSI, B.
6660
TRACK, N.S.
1338*
TRAEGER, J.
5393
TRAGER, R.S.
805
TRAGL, K.H.
3225, 6768*
TRAIGER, G.
3812
TRAISSAC, F.J.
544*, 546*
TRAJBER, H.J.
729
TRANSFELDT, E.E.
3256*
TRAPNELL, J.E.
1225, 2442
TRAPP, A.L.
2685*
TRAVAGLI, J.P.
3919
TRAVERS, R.
802
TRAVERSIN, E.
316
TRAVERSO, L.W.
1450
TRAVERT, G.
8252
TRAVIS, L.W.
7246
TRAYLOR, J.B.
2970, 3012
TRAZO, L.G.
7770
TREANOR, L.L.
7485*
TRECHSEL, U.
5498
TREDE, M.
4993
TREDGER, J.M.
1980
TREFFOT, M.J.
5051
TREGONING, D.
3071
TREGUBOV, G.S.
6343
TREHEUX, A.
1708
TREMOLADA, F.
4309*
TRENBEATH, J.M.
4244, 6389
TRENCIS-BUCK, L.
3588*
TRENGGONOWATI, R.
7865
TRENTINI, G.P.
4052
TREPO, C.
3430*, 4354*
TREPO, C.G.
4297*
TRET'YAKOVA, O.I.
3084
TRETIAKOV, A.A.
326
TRETYAKOVA, T.A.
1195
TREURNIET-DONKER, A.D.
5549
TREVISAN, M.A.S.
1252
TREWBY, P.N.
2474, 5027*, 5816*, 6412*
TRICHOPOULOS, D.
2736*
TRICOT, J.F.
3345
TRIER, J.S.
866, 1661, 2109, 3853,
5173*, 8090*
TRIGER, D.
5115
TRIGER, D.R.
1470
TRIGGIANI, E.
5576
TRILLER, J.
5830, 6193
TRIMBLE, E.R.
5945
TRIMPI, H.D.
4163
TRIOLO, R.
5058
TRIPONIS, V.
7706
TRIPP, J.H.
8483
TRIPPI, J.A.
2072, 2403
TRITTO, V.A.
7081
TRITZ, G.J.
7477
TROEGER, H.
7699
TROFFLER, R.
2346*
TROFIMOV, G.A.
8149

ROIDL, H.
351, 973, 3193*, 3194*,
4756, 4855
ROMMEL, J.
632
ROMPETER, G.
7594
RON, P.
4907*
TROPEA, A.
5584
TROTMAN, B.W.
1009*, 1054, 2021, 2575*,
2928, 3779, 5143*
TROUNCE, J.R.
2225
TROUPEL, S.
5006*
TROUT, D.L.
940
TROUT, H.H., III
5366*
TROVATO, M.
5613
TROVO, M.
3173
TROWBRIDGE, J.O.
5483
TROWELL, J.
7794
TROYER, E.
3210
TRUBITSYNA, I.E.
7975
TRUBSBACH, A.
8069
TRUEDSON, H.
7223
TRUELLE, J.L.
3233
TRUELOVE, S.C.
510*, 3189, 4835*, 4917,
4918, 5717*, 6357, 7064*,
7541
TRUHAUT, R.
6787
TRUJILLO RODRIGUEZ, L.
8318
TRUMP, B.F.
5237
TRUSOV, V.V.
376
TRUTYAK, Y.V.
6298
TSAI, A.C.
2010
TSANG, R.C.
1689
TSANTOULAS, D.C.
590, 1659
TSAO, D.
3852
TSASTROV, R.
4232
TSCHAIKOWSKI, K.L.
6170
TSCHANG, T.P.
7726*
TSCHAPPELER, H.
4885
TSIBULEVSKY, A.I.
2688
TSIKOFF, M.B.
7823*
TSILLI, E.I.
7468
TSIMMERMAN, Y.S.
388, 6859
TSINZERLING, A.V.
1696
TSINZERLING, V.F.
1696
TSO, P.
7302*, 7926
TSODIKOV, G.V.
4380
TSOUKANTAS, A.
6284
TSUCHIYA, H.
2569*
TSUCHIYA, M.
1011*, 8264*
TSUCHIYA, R.
7850
TSUCHIYA, S.
5670
TSUCHIYA, W.
2694*
TSUCHIYA, Y.
5165
TSUDA, F.
3369*
TSUDA, K.
1923
TSUDA, Y.
7198*
TSUJI, K.
5589*, 8264*
TSUJI, T.
7762
TSUJII, T.
8296*
TSUJINAKA, Y.
5670
TSUKADA, H.
159
TSUKADA, Y.
6081*
TSUKANOV, I.G.
8171
TSUKIOKA, J.
686
TSUKIYAMA, Y.
1228
TSUNEKAWA, H.
6877*
TSUNEOKA, K.
69
TSUPLYAEV, V.A.
264
TSUTSUMI, A.
7104*
TSUYA, A.
5827*
TSVETKOVA, L.N.
760
TSYBASOVA, A.I.
4305
TSYBULYAK, S.N.
4779
TSYGANOV, V.S.
430
TSYPLYAEV, V.A.
3965
TSYRLOV, I.B.
6086*
TSYTSORINA, T.N.
7468
TUBBS, R.R.
2660*, 6854*
TUBIANA, J.M.
7590, 8242
TUCH, K.
5355
TUCHWEBER, B.
1982, 2914, 7457
TUCKER, M.J.
2029
TUCZEK, H.V.
4733
TUDEHOPE, D.I.
5696, 5697
TUKALO, N.I.
6112
TULASSAY, Z.
2177*, 4982, 6899
TULUSAN, H.
4990*
TULZER, W.
4003
TUMA, D.J.
1019*, 2037, 7412*
TUMAK, M.S.
4058
TUMKO, G.V.
552
TUPITSINA, L.I.
5878
TURAKULOV, Y.K.
8053
TURBIN, B.N.
3570
TURCOTTE, J.
5426*
TURCZ, T.
4181
TURCZYNSKI, J.
8223
TURELLO, V.
4361, 6896
TURGANBAEV, A.T.
6870, 7564
TURIAF, J.
589
TURJMAN, N.A.
2059*, 2963*
TURKEL, S.B.
7248
TURNBERG, L.A.
4542, 5284*, 5456, 6013,
6710
TURNBULL, R.B., JR.
7898, 8509*
TURNER, J.H.
1217

TURNER, K.J.
6401*
TURNER, K.S.
6703
TURNER, L.J.
2248
TURNER, M.D.
863, 2307, 4799
TURNER, M.R.
143
TURNER, P.J.
2131
TURNER, R.
4169, 5713*
TURNER, R.C.
6714*
TURNER, S.G.
3017, 3603*
TURNER, S.S.
5712*
TURSZ, T.
6351*
TURTINEN, L.
980
TUSQUES, J.
3*
TUSZEWSKI, M.
2365, 4893, 4894, 4895,
7624, 7625
TUTELIYAN, V.A.
3917
TUZHILIN, S.A.
6195
TVERSKAYA, S.S.
6583
TWEEDLE, D.
5635
TWERSKY, J.
4167
TWIEHAUS, M.J.
6149
TYE, C.K.
338
TYGSTRUP, N.
257, 2557, 3365*, 6457*
TYLEN, U.
1439*
TYLICKI, M.
4954
TYMPNER, F.
1333*, 2288*, 4997, 5000
TYRRELL, D.A.J.
4931*
TYSZKIEWICZ, S.
8223
TYSZKIEWICZ, T.
1465
TYTGAT, G.N.J.
3825*, 4160, 4468*, 4877*,
5663, 5709*, 6312*, 6975
TYUKOVA, N.I.
3542
UCHAIKIN, V.F.
668
UCHIDA, K.
7225
UCHIDA, M.
7289*, 7494*
UCHIDA, Y.
2691, 6579*, 6847
UCHINO, F.
1474
UCHINO, J.
7096*, 7103*
UCHIYAMA, M.
1981, 2959
UDALL, J.N.
2085
UDDIN, M.
5345
UDUPA, K.N.
1695
UDVARDY, L.
3096
UEDA, K.
1166, 6955
UEDA, M.
7525*
UEDA, N.
1869, 1937, 3037
UEHLEKE, H.
1033
UENO, I.
1046, 6792
UESUGI, T.
3816
UETA, N.
7482
UFBERG, M.H.
6916*
UGARTE, G.
5109*, 7804*
UGLOVA, M.V.
3901, 7668
UGLOW, P.
6332*
UGOLEV, A.M.
202, 3849, 6823, 6838
UHLMANN, H.
235
UHLSCHMID, G.
4816*
UKIDA, M.
689
ULLMANN, B.
5513*
ULLMANN, V.
4245*
ULRICH, B.
319, 3919
ULSHEN, M.H.
3847
ULSTRUP, J.C.
790
ULVEN, A.
8106*
UMEMURA, H.
3306
UMENAI, T.
1540
UMEZONO, A.
3242
UMINSKA, H.
275
UMLAUFT, M.
2748
UNGAR, H.
1589
UNGEHEUER, E.
311
UNGER, G.
1027
UNGER, G.F.
8274*
UNGER, J.L.
1277
UNGER, R.H.
2684*
UNOURA, T.
3703
UNSELD, A.
2904
URAKAMI, Y.
5551
URAY, Z.
6102
URBAN, E.
1126, 2070, 2136, 2723,
5288*, 8087*
URBAN, M.
4282*
URBANEK, A.
3966
URIBE, M.
5844
URREA, L.H.
1234
URSEA, N.
3204
URSING, B.
4222*, 7283
URTAYEV, B.M.
5829
URTEAGA, J.
4432
URUSHIDANI, T.
1497, 6050
URWIN, C.
3817
USADEL, K.
7519
USHAKOV, V.L.
3490*
USHIO, K.
7669
USMANOV, N.U.
6231
USMIANI, J.
4239
USON GARGALLO, J.
3747
USPENSKY, V.M.
2274, 4095, 6685, 7978
USSANO, L.
8308
UTESHEV, N.S.
349
UTHMAN, S.M.
3277*
UTILI, R.
5069*, 7996*, 8039*
UTKIN, V.V.
8275
UTNE, H.E.
714

UVNAS, B.
4716*
UVNAS-WALLENSTEN, K.
3660*. 3668*, 4716*, 7349*
UYS, C.J.
3912, 8050
UZAWA, T.
8288*
V. BRAUN, H.H.
6400*
V. GERSTENBERGK, L.
3721
V. KLEIST, D.
5130*
V. LILIENFELD-TOAL, H.
5615
VACCAREZZA, C.M.
5253*
VACHON, A.
4629*
VACL, J.
665
VADALA, G.
3134, 6932
VAEZZADEH, K.
4194
VAGHEI, R.
2228
VAGNE, M.
3622, 3858, 7344*
VAHRMAN, J.
8354*
VAIDYA, A.B.
6650, 6652
VAIDYA, M.P.
471
VAIDYA, P.P.
471
VAILLE, C.
1957, 2856, 3727*, 3742, 5391*, 6095
VAINDER, M.
4112
VAINIO, H.
1030, 1034
VAINSHTEIN, S.G.
3723, 6893
VAISHNAVA, S.
839
VAISRUB, S.
4400, 8472
VAISSADE, P.
7933
VAITKEVICIUS, V.K.
7876
VAJARAPONSE, K.
2190
VAKHRUSHEV, Y.M.
376
VAKIL, B.J.
831, 6663
VAKIL, U.K.
963
VAKILI, C.
1424
VAKILZADEH, F.
8309
VALAS, R.B.
229
VALBERG, L.S.
17*, 1804, 5614
VALCURONE, G.
644
VALDES, M.
2483
VALE, J.A.
2482*
VALENKEVICH, L.N.
4406, 7988
VALENTI, J.
397, 1380, 1381
VALENTINI, M.
2221
VALENZUELA, J.E.
1948, 3740, 7329
VALET, G.
14
VALICI, A.
2757
VALIGURA, I.S.
6555*
VALKEMA, A.J.
4681*
VALLANIA, G.
5260
VALLAPERTA, P.
289
VALLAT, J.P.
6313
VALLON, A.G.
798
VALYAKINA, T.I.
5438
VALZELLI, G.
6593
VAN BEERS, D.
7789*
VAN BELLEN, B.
770
VAN BERGE HENEGOUWEN, G.P.
2577*, 4621*, 5426*, 6542*, 7436*, 7831
VAN BEZOOIJEN, C.F.A.
5405*, 7418*
VAN BIERVLIET, J.P.G.M.
6415*
VAN BLANKENSTEIN, M.
4480
VAN CAILLIE, M.
5700*
VAN DE LOO, W.
354
VAN DEN BOGAERT, P.
4436
VAN DEN ENDE, A.
5709*
VAN DEN ENDE, J.
3912
VAN DEN NOORTGATE, D.
7708
VAN DER DIJS, B.
5738

VAN DER HARST-OOSTVEEN, C.J.G.R. 4869*
VAN DER HEIDE, D.
7455
VAN DER HEIDEN, C.
6452*
VAN DER HOEDEN, R.
8271*
VAN DER LINDEN, W.
1052, 5139*, 7437*, 8051
VAN DER LOOS, H.
6282
VAN DER MEER, J.W.M.
2544*
VAN DER MERWE, J.P.
4480
VAN DER MERWE, W.
7999*
VAN DER MEULEN, J.
4490*
VAN DER POMPE, W.B.
5549
VAN DER VIJVER, J.C.
2803, 4554*
VAN DER WANT, J.J.L.
7903*
VAN DONGEN, R.J.A.M.
8491
VAN DOORN, A.B.D.
1074
VAN DRUTEN, J.A.M.
7509*
VAN EERDEWEGH, P.
5175*
VAN GANSE, W.
4263
VAN GEERT, C.
7866
VAN GELDER, A.
3127*
VAN GIJSEGEM, D.
274
VAN GOLDE, L.M.G.
8020*
VAN GOOL, J.
4280
VAN HEE, R.
1139
VAN HOLDER, R.
2472
VAN HOUTTE, P.
4021*
VAN HJSEN, N.
2691, 4883, 6847
VAN LANGENBERG, A.
7021
VAN LEEUWEN, A.
4919
VAN LEUSEN, R.
7831
VAN MAELE, V.
2472
VAN MILLER, J.P.
1984
VAN NUETEN, J.M.
5316*, 7946
VAN OS, C.H.
1767*
VAN RHIJN, A.
6452*

VAN ROOD, J.J.
4914, 4919
VAN ROSSUM, J.M.
6769*
VAN STEIRTEGHEM, A.
3257*
VAN'T NOORDENDE, J.M.
4490*, 7455
VAN THIEL, D.H.
3474*, 4998, 6495*
VAN TONGEREN, J.H.M.
4395*, 6591*, 7273
VAN TRAPPEN, G.
4177
VAN URK, H.
7120
VAN VLOTEN, W.A.
4869*
VAN WAES, L.
2472
VAN WIJK, H.B.
1727
VAN WIJNGAARDEN, J.D.
595
VAN WYCK, D.B.
5493
VAN ZON, A.
7983*
VANAT, I.M.
6555*, 8371
VANCOUVERING, K.
2911, 3776
VANDAN, Y.A.
4382
VANDELLI, A.
3330, 5529
VANDELLI, C.
7798*
VANDERHCOF, J.A.
3042*, 7412*
VANDERMEERS, A.
109, 7986*
VANDERMEERS-PIRET, M.C.
7986*
VANDOOREN, M.
7275*
VANEECLOO, F.M.
292*
VANESYAN, A.S.
3425*
VANG, J.
8400*
VANHEUVERZWYN, R.
254, 5763*
VANHOUTTE, P.M.
1139
VANISTA, J.
4283*
VANKEMMEL, M.
1707, 3109
VANMAELE, R.
2580*
VANOVSKI, B.
3487
VANSANT, J.H.
293*
VANTHIEL, D.H.
1890
VANTINI, I.
289, 2221, 2438, 2439, 2850,
3349, 4981
VANTRAPPEN, G.
769*, 2313*, 2388, 3531,
6699, 7279, 7323, 7937*
VAONA, B.
2850
VARADI, A.
6527*
VARAS LORENZO, M.J.
371
VARCO, R.
2455*
VARCO, R.L.
3219*, 5692
VARELA, G.
4677*
VARGA, F.
1834
VARGA, L.
2773*, 4251*, 7822
VARGISH, T.
4157*
VARHAUG, J.E.
1920, 2991*
VARIS, K.
1284*
VARKONYI, T.
2773*, 5469*
VARMA, R.R.
638, 5896*, 8403*
VARRO, V.
2773*, 5001, 5469*
VARTANYAN, M.G.
6234
VASCONCELOS TEIXEIRA, A.
8164*
VASILAS, A.
7864
VASILEVA, E.N.
144
VASILEVSKAYA, L.S.
605, 3653, 3689
VASILIEV, Y.V.
1237
VASILIEVA, E.N.
8072
VASILIEVA, V.M.
3964
VASQUEZ, L.
7326
VASSANELLI, P.
5463*, 5479*
VASSILOPOULOS, D.
3628*
VASU, M.A.
1446*
VATA, A.
660
VATIER, J.
88, 2805, 3709
VATN, M.H.
103, 964, 4068*
VAUGELADE, P.
7933
VAUGHAN, R.
1307
VAULTIER, J.P.
3844
VAUTHEY, P.
4939
VAUZELLE, J.L.
4102*
VAVILOVA, T.P.
6106
VAVROS, B.
4245*, 6900
VAY, L.W.
4832*
VAYRE, P.
3297
VAYSSE, N.
1947, 3730, 4586*, 4587*,
5394, 6178
VAYSSE, P.
5183
VAZQUEZ IGLESIAS, J.L.
8155
VEALL, N.
4503*
VECELLI, C.
3446
VEDEL, J.P.
5978*
VEDMINA, E.A.
805
VEDROVA, N.N.
727
VEDY, J.
3571
VEEN, H.F.
4685*, 4953
VEGH, G.
799
VEGLIO, V.
7148*
VEIDENHEIMER, M.C.
4892
VEIDT, J.
235
VEITH, N.M.
6796
VEKSLER, K.M.
3574
VEKSLER, Y.I.
3545
VELA, R.
8374
VELBRI, S.
4232
VELLISTO, I.
4672
VENABLES, C.W.
382, 1233, 1241, 3197*,
7572*
VENDSBORG, P.B.
2916
VENHO, V.M.K.
891, 2716
VENKITASUBRAMANIAN, T.A.
2935
VENNES, J.
1622
VENNES, J.A.
1572*, 2178*

VENTOLA, A.
2061*
VENTRUCCI, M.
3330, 5529
VENTJRA, U.
1814
VENUGOPAL, M.K.
6292*
VENZA, E.
7701, 7710
VEPRINSKAYA, S.I.
8387
VERBEKE, W.
2580*
VERBOLOVICH, V.P.
8082
VERCESI, G.
1493
VERDIER, G.
4001
VEREMEENKO, K.N.
5097
VERESS, S.
7573*
VERHAEGHE, M.
4722
VERHAGEN, A.D.
4870*
VERHOEVEN, A.G.M.
6975
VERICAT, F.
1097
VERINE, H.J.
959, 2428
VERKERK, S.
2518, 2519
VERLOHREN, H.J.
7816
VERME, G.
2517, 4496, 5104*, 7156*
VERMEER, B.J.
4869*
VERNACE, S.J.
4334*, 5865*
VERNETTE, M.
2422, 5835
VERNEY, E.
2946, 8010*
VERNON, T.M.
3558*
VERRENGIA, L.
6930
VERRIER JONES, J.
4975
VERRINDER, T.R.
2033
VERSIECK, J.
3390
VERSMOLD, H.T.
5042*
VERTA, M.
7631
VERWAERDE, J.C.
4197
VERWILGHEN, A.M.
7866
VERZIN, S.S.
8082
VESELL, E.S.
1570, 2467, 5023*
VESELY, D.L.
7338*
VESELY, K.T.
6923
VESELY, V.
2490*
VESIN, P.
3077, 3181
VESSAL, K.
2395
VESSEY, D.A.
2874*
VESTWEBER, K.H.
4756
VETRANO, G.
5710*
VETVIK, K.
6255
VEZZANDINI, P.
2257
VIAKINA, I.G.
4372
VIAL, P.
4750*
VIALLET, A.
1158, 3462*, 4339*, 7157*
VIAMONTE, M., JR.
2202, 5541, 5568*, 8402*
VIANJ, J.P.
4773
VIANELLO, A.
3153
VIAUD, J.M.
3109
VICARY, F.R.
3504*, 4456*, 8132
VICKERY, A.L., JR.
8506
VICKERY, C.J.
4543
VIDAL, M.A.
6
VIDER, M.
7006
VIDCN, N.
3600*
VIDYJKOV, V.I.
5839
VIEIRA, E.F.
5712*
VIEIRA-MATOS, A.N.
4595*
VIEIRA, O.M.
3176
VIELLE, G.
318
VIERLING, J.M.
1218, 1569
VIETA, J.O.
4178
VIGANOTTI, G.
1667
VIGINIA REBOCHO PAIS, M.
4686*
VIGNAL, J.
4075*, 6937, 6938
VIGNE, J.L.
4618*
VIJAYA SARATHY, C.
6692*
VILARDELL, F.
4769, 7761
VILARDELL, J.
5068*
VILCHEZ, C.A.
2039
VILENCHUK, R.E.
705
VILHAR, N.
3408*
VILIM, V.
2490*
VILJAKAINEN, E.
7746*
VILLA-CORNEJC, B.V.
256
VILLAKO, K.
3177, 5620
VILLALOBOS, J.J.
2573*
VILLANI, M.
4864
VILLANUEVA, M.L.
3832*
VILLAREJOS, V.M.
2017, 4298*, 5252, 6117,
7472
VILLARI, F.S.
6176
VILLATA, E.
934
VILLENEUVE, J.P.
4664
VILLIERS, P.
3889
VILLOUTREIX, H.
584
VILSHANSKAYA, F.L.
7720
VILSTRUP, H.
2916, 3782
VINCENT, D.
987, 3734
VINCENT, G.
3680
VINCENT, G.P., JR.
5501
VINCENT, M.E.
2203
VINCENT, S.H.
4073*
VINIK, A.I.
3693, 4987*, 6378*
VINNICHENKO, L.N.
15
VINOGRADOV, V.V.
8449
VINOGRADOVA, L.G.
4325*
VINOT, J.M.
3345
VINTERBY, A.
2034
VIRABIAN, T.L.
7974, 7981

VIRKAR, K.
597
VIRVIDAKIS, K.
2605
VISCONTI, G.P.
6868
VISHNEVETSKY, F.E.
6114
VISHNEVSKII, V.A.
8443
VISHNYAKOV, A.K.
6648
VISKUM, K.
360, 369
VISO, J.
821
VISSET, J.
4360*, 5653*
VIT'KO, I.M.
6557*
VITALE, J.J.
173*
VITEK, J.
232
VITERI, F.
2194, 7326
VITERI, F.E.
4145
VITI, G.
7613
VITIELLO, F.S.
3586*
VITLIN, V.I.
583
VITSYN, B.A.
8211
VITTORIA, A.
3923
VITTSYN, B.A.
4117
VITULLO, B.
1890
VIVANCO, F.
2425
VIVAS, C.A.
6246
VIVER, J.
6532*
VIVEROS, J.G.
2573*
VIZI, F.
5356*
VIZZI, F.
3548, 3973
VLADIMIROV, V.G.
4225
VLADOIANU, I.R.
1701
VLAHCEVIC, Z.R.
910, 1992, 2006, 3359*, 5119*
VODOLAGIN, V.D.
4380
VOGEL, A.
2253
VOGEL, H.M.
4279*
VOGEL, W.
1208
VOGTEN, A.J.M.
3453*, 4327
VOIGT, H.
2755, 3020
VOIGT, K.
6186
VOIGTSBERGER, P.
6560*
VOILLEMOT, N.
3701, 4289*
VOIROL, M.
112, 1942, 7368*
VOKAC, V.A.
8105*
VOLANS, G.N.
2482*
VOLBERG, F.
1593
VOLFF, G.
6432
VOLKL, A.
2335*, 2841
VOLKOVA, A.A.
8205
VOLKOVA, L.D.
6431
VOLLMAN, J.H.
1689
VOLLMER, K.O.
4631*, 6097
VOLP, R.F.
7306*
VOLPICELLI, N.A.
4061, 4210, 4211
VON DEM BORNE, A.E.
4468*
VON DER LIPPE, G.
897, 1441*, 1779*, 1780*, 3835*, 4509*, 4510*, 5783
VON GAISBERG, U.
7694
VON GOUMOENS, E.
4940, 8256
VON GRABE, C.
5304
VON KLEIST, S.
5006*
VON LEHMANN, B.
1022*, 1160, 5414*
VON LIEBE, V.
4938
VON REYN, C.F.
4457*
VON WYTTENBACH, A.
4879*
VONDRACKOVA, M.
3950
VONK, R.J.
42, 907, 4635
VORA, R.V.
2227
VORBACH, A.N.
3126*
VORNE, M.S.
1020*
VOROB'EV, L.P.
756, 7616
VORONIN, V.A.
6153
VORONOVA, G.V.
7801
VORONOVA, L.A.
6115
VORONTSOV, I.I.
4051, 4760
VOS, L.J.M.
7069, 7716
VOS-MAAS, M.
7464
VOSKRESENSKY, P.K.
6197
VOSSELER, M.G.
6116
VOTRUBA, M.
3959
VOZNESENSKII, N.K.
5046
VRADZALIEV, Z.
3324
VRIESENDORP, H.M.
3908
VRUBEL, F.
232
VU NGOC HUYEN
6781*
VUENTO, M.
3058
VUJIC, I.
2616
VUKUSICH, D.
2379
VULETIN, J.C.
7891
VULOVIC, D.
5883
VUOJOLAHTI, P.
5702*, 6988
VYAS, G.N.
5101*
VYAS, K.
3812
VYVODA, O.S.
7392*
WAAG, K.L.
8324
WACHSMUTH, I.K.
5170*, 7272
WACK, R.
7095*
WADA, M.
373
WADA, N.
1157
WADA, T.
806
WADE, A.E.
8007*
WADE, D.H.
4873*
WADHWANI, G.D.
1673
WADSTEIN, J.
5110*, 6505*
WADSTROM, T.
2647

WADSWORTH, P.F.
7476
WAGENKNECHT, C.
5074*
WAGENKNECHT, L.V.
8250
WAGLE, S.R.
1015*
WAGNER, C.
2448*
WAGNER, C.I.
5143*
WAGNER, G.
1000, 1001, 3351
WAGNER, H.
2108*
WAGNER, K.
6501*
WAGNER, M.
699
WAGNER, M.L.
1669
WAGNER, R.
4046*, 5808*
WAGNER, R.B.
1491
WAGNER, S.
6285
WAGNER, S.M.
6025
WAGONFELD, J.B.
2194, 5649*
WAHID, H.A.
7184*
WAHL, R.
1313
WAHLIN, T.
5991*, 6084*
WAHNER, H.W.
2545*, 6853*
WAICKMAN, F.J.
6984
WAJDA, Z.
49
WAKABAYASHI, A.
7078*
WAKABAYASHI, T.
6122, 6789
WAKAHARA, T.
603
WAKELIN, D.
3870*
WAKISAKA, J.
329
WAKSMUNSKI, F.S.
5959
WALD, A.
2059*, 4684*
WALDECK, F.
915*, 4518*, 5559*
WALDECK, N.
1058
WALDMAN, D.B.
178
WALDMANN, D.
5494, 6154, 6159
WALDMANN, T.A.
3372*
WALDRAM, R.
3364*, 4024*
WALDRON-EDWARD, D.
89, 1917, 3662*
WALDRON, R.
3909
WALIKE, B.C.
6980*
WALIKE, J.W.
6980*
WALK, L.
2259
WALKER, J.A.
674, 8349*
WALKER, J.T.
870*
WALKER, K.
1156, 4363*, 5238
WALKER, P.D.
4433
WALKER, P.R.
8038*
WALKER, R.I.
8040*
WALKER, S.H.
7780
WALKER-SMITH, J.
4478
WALKER-SMITH, J.A.
3255*, 4431
WALKER, V.
4092
WALKER, W.
7572*
WALKER, W.A.
811, 2707*, 6128*, 7088*,
7257, 7310
WALKER, W.G.
1549
WALL, D.R.
1608, 1617, 5919*
WALL, J.C.
2650
WALL, M.J.
213
WALL, W.J.
8307*
WALLACE, A.C.
6632
WALLACE, J.R.
5684
WALLACH, D.
3229
WALLER, S.
4432
WALLI, A.K.
169
WALLING, M.W.
5298
WALLIS, S.M.
4478
WALLS, K.W.
6651
WALMSLEY, G.L.
6212
WALMSLEY, P.
7764
WALRAVENS, P.A.
4412
WALSER, M.
23, 8083*
WALSH, J.
2299
WALSH, J.H.
204, 960, 971, 1841, 1867,
1901, 1903, 2779, 2780,
3694, 4391*, 4540, 4553*,
4556*, 4580, 5380, 6709,
7968*
WALT, A.J.
6366*
WALTER, J.F.
7734*
WALTER, K.
8510
WALTERS, C.L.
3085
WALTERS, R.L.
2588*
WALTERS, T.M.H.
5975
WALTHER, B.
6101
WALTHER, S.
1208
WALTMAN, A.C.
1255, 6756*, 7549
WALZ, V.
6551*
WALZEL, C.
537, 7729
WAMBERSIE, A.
5467*
WAN, B.Y.C.
2800
WANDS, J.R.
2883*, 5430*, 5907*, 7815*
WANG, C.A.
4443
WANG, S.M.S.
8459
WANG, T.H.
1458*
WANG-YANG, J.R.
3815
WANICKA, A.
1343*
WANITSCHKE, R.
26, 3608*, 4506*
WANKOWICZ, Z.
1581*
WANNAGAT, F.J.
5419*
WANSBROUGH-JONES, M.
3391
WANSBROUGH-JONES, M.H.
215
WANSON, J.C.
5400*
WANTJCH, C.
6729*
WAPNICK, S.
2116, 5002
WAPPNER, R.S.
7855*
WARD, A.M.
3467*, 4169, 8333

WARD, M.
5254*
WARD, M.E.
600, 6412*
WARD-MCQUAID, J.N.
7231
WARD, S.P.
2572*
WARD, W.O.
2744*
WARDLE, E.N.
4972
WARNER, A.
4762
WARNER, N.L.
6145*
WARNES, T.W.
5514*
WARNET, J.M.
6787
WARREN, K.S.
226, 2988*, 4462, 4737
WARREN, W.D.
7742*
WARRICK, M.W.
1899
WARSHAW, A.L.
1446*, 2707*, 4247*, 5668, 5676
WARTER, P.
538, 1105
WARTIOVAARA, J.
5178*
WARWICK, W.J.
7236
WASHBURN, J.W.
7163
WASHINO, M.
6877*
WASIAK, J.
535
WASSELL, A.
8401*
WASSERMAN, R.H.
2080
WASSIF, S.B.
5549
WASSNER, J.D.
5943
WATABE, S.
3093
WATAHIKI, H.
5687
WATANABE, A.
2154, 6120, 7406*
WATANABE, H.
458, 1738, 2181, 3156
WATANABE, K.
1893, 8103*
WATANABE, M.
1540
WATANABE, S.
2618, 8024*
WATANABE, Y.
6177, 7104*, 7849, 8181*
WATANANUKUL, P.
7111*
WATANATITTAN, S.
5140*
WATARI, T.
3130
WATELET, J.
5841
WATERBURY, L.A.
7815*
WATERFALL, W.E.
4541, 6706
WATERMAN, N.G.
5669
WATERSON, A.P.
654
WATERWORTH, M.W.
2106*, 4987*
WATKINS, E.
555
WATKINS, J.B.
5510*, 5556, 7312, 7552
WATKINSON, G.
2528
WATNE, A.L.
1395*, 7012
WATON, N.G.
4565*
WATRIN, B.
2216, 3080
WATSON, A.J.
4326, 5899, 7500*, 8339*
WATSON, E.L.
1800
WATSON, L.C.
5229
WATSON, T.A.
6632
WATT-BOOLSEN, S.
7268
WATT, D.W.
3251*
WATT, J.
6328*
WATT, J.K.
6391
WATT, R.
4497*
WATTEL, W.
2682*
WATTEN, R.H.
2661
WATTRE, P.
5866*
WATTS, H.D.
1256, 5755
WATTS, M.A.
7233
WATTS, R.S.
7421*
WAXLER, G.L.
2685*
WAXMAN, M.
6380*
WAXMAN, S.
1810
WAY, L.W.
4591*, 5920*, 6568*
WAYE, J.D.
3320*, 7681
WAYNE, R.
4729
WEAVER, D.
6366*
WEAVER, P.C.
428
WEAVER, R.M.
7045
WEBB, G.B.
7280
WEBB, J.N.
3326*, 5254*
WEBB, M.C.
5464*
WEBBER, B.
3907
WEBER, A.M.
1483, 2583, 7756, 8228
WEBER, F.
546*
WEBER, F.L., JR.
23, 4348, 8083*
WEBER, G.
1481
WEBER, H.P.
6985
WEBER, I.
5136
WEBER, J.C.
3357
WEBSTER, A.D.B.
6288*
WEBSTER, G.K.
5539
WEBSTER, M.
4231
WEBSTER, P.D., III
1756, 1953, 3746
WECHSLER, J.
3181
WEEDON, A.P.
6445*
WEEDON, M.R.
3943*
WEEKES, T.E.C.
1825*
WEEKS, J.B.
972
WEEMS, W.A.
935, 5318*
WEENS, H.S.
4379
WEETMAN, A.P.
1658
WEGNER, H.
4260*
WEHBA, J.
4274*
WEHLIN, L.
1439*
WEHLING, H.
1321
WEHNERT, H.U.
317
WEIBEL, E.R.
2678*
WEIDENHILLER, S.
6164

WEIDMAN, M.
7316
WEIERSMULLER, A.
5003*
WEIGAND, E.
3612*
WEIGAND, K.
7415*
WEIGEL, R.J.
5306*
WEIGL, E.
7791*
WEIHRAUCH, T.R.
6702
WEIL, B.
154
WEILL-BCUSSON, M.
5033*
WEILL, F.
1212, 4220*
WEILL, J.
1531
WEINBERG, A.G.
411, 7766
WEINBERG, E.D.
5948
WEINBERG, J.
2758
WEINBERGER, H.A.
6957
WEINER, C.I.
1322
WEINER, E.
7019
WEINER, H.
2595
WEINER, L.G.
3415*
WEINER, M.
6548*
WEINERT, W.
4356*
WEINGART, J.
402, 3676
WEINGARTNER, L.
5105*
WEINREICH, J.
1824*
WEINSHILBOUM, R.M.
3627*
WEINSTEIN, A.B.
5689
WEINSTEIN, W.M.
1789, 5267
WEINSTOCK, A.
3460*
WEINTRAUB, L.R.
2704*
WEINTRAUB, W.H.
8133
WEIR, D.
1548
WEIS, E.
6101
WEIS-FOGH, U.S.
1879*, 2827, 3663*
WEISBRODT, N.W.
931, 1827*, 4520*, 4528*,
5251, 5307*, 5450, 6705
WEISBURGER, J.H.
2379, 2626, 6881, 7260,
7998*. 8103*
WEISENFELD, N.
3692, 4856
WEISER, H.F.
4518*, 4687, 5559*
WEISER, M.
3768
WEISER, M.M.
5270, 5287*
WEISER, W.
4672
WEISGERBER, G.
3231
WEISKOPF, J.
1643
WEISS, A.M.
4153*
WEISS, B.A.
971
WEISS, E.B.
1580*
WEISS, G.N.
1580*
WEISS, H.
6793
WEISS, H.D.
286, 3119, 3902, 5519*
WEISS, J.
2419
WEISS, J.B.
5617
WEISS, J.M.
2817
WEISS, J.P.
1125
WEISS, M.
7277
WEISS, S.
8282*
WEISS, S.J.
4547
WEISS, S.M.
938
WEISS, W.
3079, 3966, 5744
WEISSBERG, D.
5741
WEISSBERG, D.L.
7025
WEISSMAN, J.B.
789
WEISZ-CARRINGTON, P.
5728
WEISZ, P.
1523*
WEITERING, J.G.
4635
WELBOURN, R.B.
4543
WELCH, C.E.
2597
WELCH, J.P.
5668, 5676
WELCH, J.S.
822
WELCH, R.
5625*
WELCH, R.W.
1837, 3643
WELKOS, S.
2367
WELLER, S.A.
2630
WELLING, P.G.
5303
WELLING, R.E.
2386
WELLS, J.G.
5170*, 6619
WELLS, P.N.T.
6517*
WELLS, W.W.
7427*
WELLWOOD, J.M.
5737
WELTY, T.
4457*
WENDT, P.
3902
WENGER, J.
6008
WENGER, J.J.
4150*
WENK, K.
4067*
WENNERHOLM, M.
2253
WENNERSTEN, C.
8300*
WENSINCK, F.
4480
WENZ, W.
492
WENZEL, W.W.
1182*
WEPIERRE, J.
3362*
WERKMAN, H.P.T.
7273
WERNER, B.
2746, 3765*, 6857, 7733,
7886
WERNER, B.G.
5863*, 6473*
WERNER, E.
3620
WERNER, G.T.
4460
WERNER, R.
1698
WERNER, S.B.
5204
WERNER, T.
1033
WERNZE, H.
1172, 5124*
WERTHAMER, S.
1740
WERTHER, J.L.
4574*, 6022
WERTKIN, M.G.
7023
WESDORP, R.I.C.
189, 4443

WESER, E.
860, 1388, 2970, 3012, 4688, 5443*
WESER, U.
4262*
WESTABY, D.
3379, 6451*
WESTBROEK, D.L.
3908, 4480, 4699
WESTBROK, D.L.
3890
WESTENBERGER, P.
5474*
WESTER, P.O.
3859*
WESTERGAARD, H.
3249*
WESTERMANN, E.
2790*
WESTON, M.J.
3395, 6413*
WESTON, W.
4412
WESTPHAL, O.
2652
WESTROM, B.R.
217
WESWIG, P.H.
1806
WETTENDORFF, P.
8279
WETTERHUS, S.
5628
WETTERSTRAND, W.H.
335
WEXLER, M.J.
7186*
WHALEN, J.P.
8451*
WHANGER, P.D.
1806
WHARTON, B.A.
8483
WHARTON, F.P.
8056
WHEATLEY, I.C.
5930*
WHEELER, H.O.
4233
WHEELER, M.H.
484, 975, 5145*, 6834*
WHEELER, P.G.
877
WHELDON, E.J.
1233
WHELTON, P.K.
1549
WHICHER, J.T.
6977*
WHIPP, S.C.
1680
WHITCOMB, F.F.
7168
WHITE, A.F.
2433*
WHITE, D.S.
1550
WHITE, H.J.O.
2325
WHITE, J.F.
1852, 6690*
WHITE, J.J.
2142
WHITE, M.H.
5492
WHITE, P.
8402*
WHITE, P.K.
3766*
WHITE, R.E.
1025
WHITE, R.I., JR.
1547
WHITE, T.T.
985, 2160
WHITE, W.F.
6405*
WHITE, Y.S.
6413*
WHITECROSS, D.
6042*
WHITEHEAD, R.
4835*
WHITEHEAD, R.G.
4639, 5951, 7245, 7524
WHITEHOUSE, G.H.
6328*
WHITEHOUSE, M.W.
2143, 2812
WHITFIELD, J.B.
1103*
WHITFIELD, J.F.
8038*
WHITSETT, T.L.
358*
WHITTINGTON, P.F.
4908*, 5256*
WHITTLE, B.J.R.
966, 2807, 8104*
WHITTON, P.D.
6761*
WHORTON, E.
1232
WHORWELL, P.J.
2671*, 4758, 6673*
WICK, G.
2468, 6994
WICKLMAYR, M.
6079*
WICKREMESINGHE, P.C.
3125*
WICKS, A.C.B.
347, 4135*, 7191, 7768
WIDDAS, W.F.
1811
WIDDOP, B.
2482*
WIDERLITE, L.W.
6606
WIEBE, T.
7805*
WIEBERS, D.O.
5822*
WIEBKIN, P.
119*
WIECHERS, B.
1410, 6186
WIECK, H.H.
3529
WIECZOREK, E.
1457*
WIEDNER, F.
3113, 3346, 3947*, 4017, 5772*
WIEGAND, R.D.
1168
WIEGELMANN, W.
5135
WIEGLEB, J.
6849
WIENERS, H.
5915*
WIENERT, V.
4951
WIESENFELD, N.
6278
WIESMANN, E.
3246
WIGGINS, H.
6323*
WIGGINS, H.S.
917, 1389*
WIGH, R.E.
1352
WIGLESWORTH, F.W.
1463*
WIGNALL, B.K.
8466
WIJNAND, H.P.
8031*
WIJNS, W.
7986*
WILBERG, S.
1331
WILCKEN, B.
5208
WILCOX, B.R.
4022*
WILCOX, J.R., JR.
3970
WILCOX, L.L.
2294
WILDNER, G.P.
3149
WILEY, A.L., JR.
2631
WILEY, Z.D.
2323
WILHELM, E.
3578*
WILK, P.
7898
WILK, P.J.
8509*
WILKEN, H.P.
565
WILKIE, L.I.
3493*, 6543*, 8426*, 8427*
WILKINS, D.C.
2050
WILKINS, R.A.
5771*
WILKINSON, A.
7226

WILKINSON, A.W.
1372
WILKINSON, G.R.
2448*, 2933, 7432*
WILKINSON, R.W.
5071*
WILKINSON, S.P.
2553, 3366*, 3416*, 4308*, 4345, 5125*, 5815*
WILLARD, J.C.
6139
WILLARD, J.G.
6139
WILLASSEN, Y.
2783*
WILLAVOYS, S.P.
936
WILLEMEN, A.
4657
WILLEMS, G.
1147, 1753*, 3060, 3515, 3594, 3720
WILLERSHAUSEN, B.
6101
WILLIAM, D.
8473
WILLIAMS, A.
2474
WILLIAMS, C.B.
7682
WILLIAMS, C.N.
5004*, 7280
WILLIAMS, D.C.
166, 8113
WILLIAMS, D.M.J.
1206
WILLIAMS, E.F.
970
WILLIAMS, E.W.
7917*
WILLIAMS, G.
5633, 6327*
WILLIAMS, G.C.
4616*, 6090*, 6766*
WILLIAMS, G.D.
4791*
WILLIAMS, G.M.
2149, 7260
WILLIAMS, G.R.
1495
WILLIAMS, H.J.
4797
WILLIAMS, J.A.
6683*, 7370*
WILLIAMS, J.P.G.
6806
WILLIAMS, K.
4037
WILLIAMS, M.A.
1058
WILLIAMS, R.
575, 627, 666, 676, 1261*, 1477, 1518*, 1639, 1659, 2105*, 2445, 2454*, 2471, 2474, 2520, 2535, 2552, 2553, 3364*, 3366*, 3367*, 3374*, 3391, 3395, 3398, 3416*,
WILLIAMS, R. (continued)
3437, 3461*, 3909, 4024*, 4037, 4285*, 4308*, 4314, 4345, 4347, 4351, 4668, 5027*, 5066*, 5072*, 5428*, 6068*, 6412*, 7094*, 7099*, 7117*, 7141*, 7190, 7751*, 7777*, 7802*, 7807*, 8295*, 8306*, 8307*, 8354*
WILLIAMS, R.B.
6805
WILLIAMS, R.C., JR.
629. 4210, 4211, 4962*
WILLIAMS, R.D.
3105
WILLIAMS, T.W.
6637
WILLIAMS, V.
3043*
WILLIAMS, W.J.
6447*
WILLIAMSON, D.H.
948, 6714*, 7108*
WILLIAMSON, J.W.
1390*
WILLIAMSON, R.C.N.
4685*, 4698
WILLICH, E.
5911*
WILLITAL, G.H.
3934*, 7698
WILLMAN, V.L.
1118
WILLNOW, U.
4867*
WILLOCK, R.
4041*
WILLOUGHBY, J.M.T.
855
WILLS, J.
7138*
WILLS, M.R.
2542*, 3363*, 3386
WILLS, W.
6473*
WILLSON, R.A.
2235, 5401*, 8034*
WILMERS, M.J.
8483
WILSON, C.G.
509*
WILSON, D.E.
98, 4582
WILSON, F.A.
893, 5718*, 7485*
WILSON, I.D.
216, 4962*
WILSON, J.A.S.
4798
WILSON, J.H.P.
4532*, 4681*
WILSON, J.P.
1182*
WILSON, P.M.
5329
WILSON, R.
5521*
WILSON, R.J.
6966
WILSON, R.M.
7372*
WILSON, S.
5237
WILSON, S.E.
5575, 8459
WILSON, S.M.
507, 1425
WINAND, J.
2944, 3788
WINANS, C.S.
5530, 5569
WINAWER, S.J.
4170, 4928*
WINCHESTER, J.F.
6449*
WINCHESTER, P.
1593, 2168*
WINCKLER, J.
5991*
WINCKLER, K.
2437, 2526, 4223*
WIND, G.
5054
WINDMUELLER, H.G.
7491*
WINDORFER, K.
3932*
WINELAND, M.D.
3420*
WINGATE, D.L.
916, 944, 2761, 3642, 3651, 3654, 7320*
WINKELMANN, E.
5973
WINKLER, C.
5118*
WINKLER, G.U.
5076*
WINKLER, K.
257, 714
WINKLER, R.
3891, 4959*, 7523, 7709, 8250
WINN, M.
810
WINNE, D.
2096*
WINNEKER, R.C.
5474*
WINSHIP, D.H.
1913, 2230, 6389
WINTER, S.
3771, 5741
WIRSCHING, R.
4733
WIRTSCHAFTER, S.K.
1402
WISE, L.
1307, 1360, 1361, 2334, 3223*, 4108*, 4732, 5257*, 6783*
WISE, R.E.
4374, 5914*
WISEMAN, D.A.
1138, 2115, 3672*
WISHART, G.J.
6807

WISHNOW, R.M.
4422
WISSE, E.
4490*, 7455, 7461
WISTOW, B.W.
5801*
WITHERELL, L.E.
5976
WITHERS, H.R.
3005
WITMER, C.
2902
WITTE, C.L.
5492
WITTE, S.
6976
WITTEBOL, P.
6275
WITTENBERG, J.
3102, 5517*
WITTES, R.E.
8329
WITTINE, M.F.
5180*
WITTING, U.
6847
WITTMAN, J.S., III
1999, 4606*
WITTMANN, T.
5469*
WITZ, F.
3265
WITZEL, L.
3040*, 4072*, 4850
WITZLEBEN, C.L.
1602
WITZTUM, J.L.
2007
WITZTUM, K.F.
6514*
WIZNITZER, T.
2993*
WLASIUK, M.
6466*
WOBSER, E.
6161
WOCKEL, W.
4214*
WOESSNER, W.D.
5328
WOGAN, G.N.
7100*
WOHLEB, B.
8028*
WOHLGEMUTH, B.
7707
WOJCICKA, B.M.
590, 5428*
WOJCICKA, J.
1581*
WOJCZUK, D.
4454
WOJEWSKA-ZAJACZKOWSKA, E.
532
WOJNAR, J.
7066
WOJTACHA-WENCEL, B.
7066
WOJTALIK, R.S.
2396
WOLDRING, M.G.
4532*, 4681*
WOLF, A.P.
3974
WOLF, B.S.
4442, 7546
WOLF, C.
4356*
WOLF, K.J.
4050
WOLF, R.
3915
WOLF, S.
2595
WOLF, S.A.
3718, 4573*
WOLF, W.
8444
WOLFF, G.
6891
WOLFF, M.
1408, 1409, 3573
WOLFF, R.
745
WOLFF, W.I.
504, 1421, 2370*, 4886,
4887, 8131, 8236*
WOLFMAN, E.F., JR.
1349, 3944*, 3945*, 4123,
7027
WOLFRAM, S.A.
6139
WOLFSDORF, J.
7999*
WOLFSON, W.
5792*
WOLGEMUTH, R.L.
3998
WOLKOFF, A.W.
1218
WOLLAND, T.
4018
WOLLIN, A.
94, 967, 3707, 4567*
WOLLMANN, A.
5076*
WOLLOCH, J.
8126
WOLLOCH, Y.
6554*
WOLMAN, M.G.
5967
WOLOSDWICZ, N.
710, 2995
WOLPERT, E.
2573*
WOLPERT, L.
2974
WOLTERSDORF, W.
3456
WONG, A.
5920*
WONG, A.Y.
1296
WONG, J.
5752
WONG, M.F.
3748
WONG, M.L.
3433*
WONG, T.F.
3065
WONG, V.T.
7783*
WOO, W.H.
488
WOOD, A.J.J.
4664
WOOD, B.P.
6406*
WOOD, B.T.
6619
WOOD, C.A.
2027, 7424*
WOOD, C.M.
3602*
WOOD, J.
6701
WOOD, J.D.
937, 6700
WOOD, J.R.
1820, 2930, 5916*
WOOD, R.
1168
WOOD, R.A.B.
3050*, 4523*
WOOD, T.
5520*
WOODFIELD, D.G.
3418*
WOODHOUSE, C.R.J.
6388
WOODLIEF, R.M.
7841
WOODMAN, E.
803
WOODRUFF, A.
7631
WOODS, J.E.
2056
WOODS, R.J.
1111
WOODSIDE, W.F.
2005
WOODWARD, E.R.
50, 972, 1956, 3731, 5572
WOOLF, I.L.
658, 1518*, 2245, 3437
WOOLSON, R.F.
941, 3631*
WOOTTON, A.M.
7403*
WORASCHK, H.J.
7617
WORATZ, G.
1208
WORBE, J.F.
5283*
WORK, W.P.
5952, 7259
WORMSLEY, K.G.
1337*, 2415*, 3037, 3198*,
3616, 5168*, 5642, 6069*,
6915*, 7982*

WORNING, H.
5224
WORSDALL, P.A.
5867*
WORTHINGTON, B.
3596
WORTHINGTON, K.K.
8084*
WORTZEL, E.
6204
WOSIEWITZ, U.
5265*, 7826*
WOSTMANN, B.
2876*
WOSZCZYK, J.
4895, 7625
WOTEKI, C.E.
1388
WOUSSEN-COLLE, M.C.
92, 961, 1885*, 3060, 3680,
3688, 6040*
WOZNIAK, L.
6103
WOZNIEWICZ, B.
3884
WOZNY, E.
6402*
WRAY, C.
8116
WRIGHT, C.B.
3864*, 5756
WRIGHT, D.
7868
WRIGHT, D.J.
7583
WRIGHT, D.J.M.
8056
WRIGHT, E.C.
1522*, 5086*
WRIGHT, F.W.
6570*, 8332
WRIGHT, H.K.
7915*
WRIGHT, J.E.
151
WRIGHT, J.R.
7815*
WRIGHT, L.F.
3667*
WRIGHT, N.A.
6876*, 7500*
WRIGHT, P.M.
3861*
WRIGHT, R.
449, 1694, 2671*
WRIGHT, R.A.
3558*
WRIGHT, S.G.
4113, 4923, 4924, 5249,
7892*
WROBEL, D.M.
7785*
WROCLAWSKI, E.R.
8312
WRONKOWSKI, Z.
7567*
WRUBLE, L.D.
310, 6477*
WU, A.L.
2976, 3857
WU, J.M.
7460
WU, M.
6128*
WU, S.M.
5807*
WU, T.K.
6365*
WU, W.
499, 5680
WUILLERET, B.
452*
WUJACK, H.
1615
WULFF, H.R.
2610, 6927
WUNSCH, E.
944, 986, 1858, 1950, 2735*,
2759, 2760, 2761, 2984*,
4069*, 4070*, 4593*, 7325,
7347*
WUSTEMAN, F.S.
5403*
WUSTENBERG, P.W.
259
WUSTER, M.
5462
WUSTROW, T.
3774, 3916
WUTHRICH, K.
1000, 1001
WUTTKE, V.
5519*
WYATT, A.P.
4745*
WYATT, G.P.
5203
WYATT, R.G.
7863, 8456*, 8481
WYLLIE, J.H.
381, 2292, 5384, 7663*
WYNDER, E.L.
2379, 7260, 7659*, 7717*,
7998*, 8103*
WYNN, V.
8008*
WYNN-WILLIAMS, A.
4141
WYNNE, J.M.
6962
WYNNE, R.D.A.
1933
WYRWICKA, W.
1896, 2781*
XHAARD, M.
3919
YABLONSKI, M.E.
2058*, 2068
YACHI, A.
806
YACHMENEV, A.V.
264
YAGER, P.A.
8349*
YAGI, K.
7093*
YAGIHASHI, S.
1747*
YAGIL, R.
2719
YAGLINSKY, V.A.
3881
YAITA, A.
3129
YAJIMA, H.
1143, 4522*, 6033
YAJIMA, T.
5333
YAJKO, R.D.
2404
YAKHONTOVA, C.I.
8139
YAKIMENKO, E.F.
6846
YAKIMOV, Y.V.
6194
YAKOBSON, G.S.
7468
YAKOVENKO, E.P.
7588
YAKOVLEV, Y.Y.
6340
YALE, C.E.
2987*, 4193, 5466*
YAMADA, G.
1539, 8357*
YAMADA, K.
6797
YAMADA, O.
7758
YAMADA, S.
806, 3014, 5458
YAMADA, T.
1016*, 1021*
YAMAGAMI, I.
2814
YAMAGATA, J.
7612
YAMAGATA, R.
3065
YAMAGATA, S.
458, 1923, 2181, 2618
YAMAGISHI, T.
3682, 3694, 3729, 3741,
8095
YAMAGUCHI, A.
7480
YAMAGUCHI, T.
6121
YAMAKI, R.
5818*
YAMAKITA, H.
3609*
YAMAMOTO, H.
2239, 4633*, 7612
YAMAMOTO, K.
4545*
YAMAMOTO, M.
1021*, 1919, 5182, 5212,
7910, 8298*
YAMAMOTO, N.
5523, 5524
YAMAMOTO, T.
1506*, 2908, 6525*, 7790*

YAMAMOTO, T.Y.
5996
YAMAMOTO, Y.
6797
YAMAMURA, H.
3670*
YAMAMURA, Y.
563
YAMAOKA, Y.
8298*
YAMASAKI, M.
8130
YAMASAKI, T.
5811*, 6370
YAMASE, H.
6797
YAMASHIRO, K.
6875*
YAMAZAKI, R.
5670
YAMAZAKI, S.
8288*
YAMAZAKI, T.
1484
YAMEY, A.
7488*
YAMIGISHI, G.
1738
YANAIHARA, C.
4545*
YANAIHARA, N.
4545*
YANAURA, S.
3791
YANCHUK, N.Y.
5850
YANG, G.Y.
816
YANGUNAEV, R.A.
8053
YANNOPOULOS, A.
2424
YANO, S.
1919
YANO, Y.
8134
YANSON, A.Y.
4382
YANTCHEV, I.
6836*
YARDLEY, J.H.
2963*, 4061, 4697, 5762*
YAREMA, I.V.
5829
YARTSEVA, H.M.
3468*
YASSIN, T.M.A.
4483*
YASTREB, N.I.
7587
YASUDA, H.
6579*
YASUHARA, H.
4641
YASUHARA, M.
5300
YASUI, H.
5858*
YASUKOCHI, H.
242
YASUMOTO, M.
329
YASUTAKE, S.
5818*
YATES, J.
3695
YATSENKO, A.A.
5829
YAU, W.
5306*
YAU, W.M.
3652
YAW, P.B.
7005
YAWATA, Y.
7758
YAZOVY, F.P.
6621
YEH, H.C.
7546
YEH, K.Y.
2064, 3826*, 8085*
YEH, S.D.J.
6998*, 8329
YEOH, T.S.
2073
YEOMANS, N.D.
866, 1315, 1915
YEPISHIN, A.V.
3383
YEPISHINA, N.A.
3383
YERMAKOV, V.
2667
YEUNG, L.L.
1075
YEUNG, W.C.
1279
YEZDIMIR, E.A.
3839
YIH, T.D.
6769*
YNGNER, T.
7447*
YOHAI, E.
5943
YOKOKURA, T.
5333
YOKOMICHI, H.
3658
YOKOTA, M.
1010*
YOKOTA, Y.
414
YOKOYAMA, I.
5592*
YOKOYAMA, S.
4525*, 4526*
YOKOYAMA, T.
5167*
YOKOYAMA, Y.
1394*, 5592*
YOLKEN, R.H.
7863
YONEHIRO, L.
7833
YONG, F.C.
7771*
YOON, B.H.
1444
YORIO, T.
5275*
YOSHIDA, A.
6815*
YOSHIDA, K.
808, 6248, 7480
YOSHIDA, M.
912*
YOSHIDA, N.
7954
YOSHIDA, S.
5602
YOSHIDA, T.
1484, 1981, 3103, 3156,
5813*, 6771*, 7097*, 8264*
YOSHIDA, Y.
8480
YOSHIHARA, N.
5858*
YOSHIHARA, S.
4633*
YOSHII, H.
6081*
YOSHIKAWA, M.
5453
YOSHIMOTO, S.
3118
YOSHINO, M.
5813*, 7097*
YOSHINO, S.
5665
YOSHIOKA, K.
5179*
YOSHITOMI, G.
4784
YOSHIZAWA, H.
5861*
YOSHIZAWA, Y.
174*
YOUINGU, P.
3556
YOUNG, A.E.
2470
YOUNG, A.M.
5344
YOUNG, B.W.
6805
YOUNG, E.A.
1388, 2970, 3012
YOUNG, E.J.
7757
YOUNG, L.B.
6190
YOUNG, R.C.
6617
YOUNG, S.
1378*, 2341
YOUNG, S.A.
7792
YOUNG, S.N.
572
YOUNG, T.K.
1792

YOUNOSZAI, M.K.
6014, 7883
YOUSEF, I.M.
1065, 4617*
YOUSUFZAI, S.Y.K.
6809
YOW, M.D.
4432
YU, J.S.
5208
YU, L.C.
2906
YU, P.Y.S.
3499*
YU, V.Y.H.
5696, 5697
YUASA, A.
5300
YUDAEV, I.Y.
4117
YUDIN, I.Y.
6339, 6345
YUMASHKINA, A.G.
7596
YUMOTO, Y.
5810*
YUNIS, E.J.
1427
YURKOV, Y.A.
6431
YURRYAVICHUS, B.P.
6233
YUU, H.
6744*
YVERGNEAUX, E.
732
YVERGNEAUX, J.P.
732
ZABARSKII, L.T.
262
ZABELINA, M.S.
750
ZABRODIN, O.N.
3893, 8189
ZACARIAS, J.
2462*
ZACCHI, C.
5584
ZACHAROVA, M.
1523*
ZACKI, G.
1994
ZAIDMAN, V.E.
3986
ZAIS, D.P.
1745, 5548
ZAITSEV, V.N.
3289
ZAJAC, J.
1449*
ZAJAC, S.
3884
ZAJACZKOWSKI, T.
532
ZAJICEK, G.
8094
ZAK, F.G.
1740
ZAKELJ, V.
416
ZAKHAROV, S.I.
3334
ZAKHAROVA, N.E.
6086*
ZAKI, G.
4640
ZAKIM, J.
2874*, 3370*, 5107
ZAKLAMA, M.S.
1995
ZAKOVA, M.
2490*
ZALDIVAR, R.
335, 5600
ZALEWSKI, J.
534, 728, 762, 1618, 6750,
7066, 8243
ZALEWSKY, C.A.
1317, 4552*
ZALTSMANE, V.K.
583, 4382, 5928
ZALUSKY, R.
8304*
ZAMAN, S.N.
6365*
ZAMCHECK, N.
1440*, 4173, 4777
ZAMRAZILOVA, E.
3689
ZANABONI, M.
3507*
ZANACCHI, G.
5905*
ZANETTI, A.R.
7788*, 8358*
ZANINI, A.C.
1675
ZANOBONI, A.
6509*
ZANOBONI-MUCIACCIA, W.
6509*
ZAORSKA-RAJCA, J.
551
ZAPF, J.
7379
ZAPIACH, L.
3172
ZAPOROZHETS, V.K.
4096
ZAPPI, T.
5865*
ZAPRUDNOV, A.M.
760
ZAREMBA, L.
728
ZAROASTROV, O.M.
148
ZARRINDAST, M.R.
2147
ZASSENHAUS, P.H.
3998
ZASTROW, R.
7074
ZAULI, D.
5860*
ZAVATE, O.
660
ZAVODSKAYA, I.S.
8189
ZAWOISKI, E.J.
6049
ZAZGORNIK, J.
1654
ZBORALSKE, F.F.
52, 298, 4517*, 7054
ZBORZIL, J.
1799
ZECCA, G.
8336*
ZECCOLINI, R.
1128
ZECHNER, O.
3960
ZEFF, R.H.
1624
ZEISSER, E.
7698
ZEITOUN, P.
3591
ZEITUNE, J.M.R.
6055, 6176
ZELDER, O.
3910, 4663
ZELEDON, R.
5252
ZELENETSKY, V.S.
5929
ZELIKOVSKI, A.
8126
ZEMAN, F.J.
5289*, 6130*
ZEMAN, R.K.
7687
ZEMBALA, M.
6890
ZEMRZUSKI, K.
8501
ZEMSKOV, V.S.
5828
ZER, M.
5955, 6554*, 7828
ZERNOV, N.G.
746
ZEROFOS, N.
3043*
ZERWEKH, J.E.
2088
ZEUS, J.
459, 842, 4943
ZEUSCHNER, M.
8244
ZEUSCHNER, Z.
8244
ZEUTHEN, T.
905
ZFASS, A.M.
178, 1945, 4555*
ZFAT, Z.
4906*
ZGONNIK, T.D.
4387
ZHARINOV, E.U.
8152

ZHAVORONKOVA, L.P.
5840
ZHGENTI, K.I.
4765
ZHILENKO, T.A.
1363
ZHIVKOV, V.
1998
ZHMINCHENKO, V.M.
6110
ZHOVNIR, A.P.
326
ZHUK, M.A.
6563*
ZHUKOV, V.S.
6306
ZHUKOVSKAYA, N.A.
6296
ZHUPAN, V.F.
8160
ZHURAVELEVA, T.D.
148
ZHURAVLEV, A.G.
4225
ZHURAVSKI, L.S.
3899
ZHURKIN, A.T.
8319
ZIAJA, K.
3879, 3880
ZIEGER, B.
3551, 3572
ZIEGLER, D.
1793, 2720, 2721
ZIEGLER, E.E.
7883
ZIEGLER, G.B.
5886
ZIEGLER, R.
995
ZIELINSKA, W.
1543*
ZIERDEN, E.
2108*
ZIGANSHIN, R.V.
8504
ZIKRIA, B.A.
6864*
ZILBERG, B.
2249, 5200
ZILIOTTO, A., JR.
8190*
ZILLETTI, L.
2091
ZILLY, W.
617, 1172, 5088*, 6411*
ZIMA, P.I.
8449
ZIMELMAN, A.P.
2704*
ZIMMERMAN, H.B.
7095*
ZIMMERMAN, H.J.
1462*, 1522*, 2704*, 5069*, 5086*, 7996*, 8039*
ZIMMERMANN, G.
2748
ZIMMERMANN, H.G.
8248
ZIMMON, D.S.
701, 2952, 3762*, 3806, 6510*
ZIMOVSKY, V.L.
6553*
ZINEVICH, A.K.
4821
ZINEVICH, V.P.
3228
ZINGRAFF, J.
5868*
ZINNER, M.J.
980, 1142, 2119, 6006*, 6143*
ZIPPRICH, B.
1163
ZIPSER, R.D.
1509*
ZISOOK, S.
5760*
ZITER, F.A.
5564*
ZITTOUN, J.
3077, 3268, 6902
ZIVIELLO, M.
5052
ZLATEVA, M.
3208
ZLATKINA, A.R.
3544
ZOBOVA, Z.N.
6321
ZOFFMANN, H.
2504
ZOGHBI, F.
5123*
ZOGRAFOS, A.
2736*
ZOHOUN, I.
1560
ZOLLER, M.
4806*, 7568*
ZOLLMAN, P.E.
2056
ZOLONITSKAYA, R.P.
4312
ZONTA, N.
8341*
ZORNOVA, J.
5558*
ZORZI, L.
8336*
ZOTTI, G.C.
8080
ZOTTI, S.
7821
ZOZULYA, A.A.
6105
ZSCHOCKE, R.
4356*
ZUBAIDI, G.
8142
ZUBAREV, P.N.
6535*
ZUBOVSKY, G.A.
3964
ZUBROFF, J.
8047
ZUCCHI, S.
5463*
ZUCKER, G.M.
5428*
ZUCKER, J.M.
5019*
ZUCKERMAN, A.J.
1518*, 1530, 1704, 2864*, 3430*, 4285*, 6480*, 7795, 7797, 8354*
ZUCKERMAN, G.R.
2410*
ZUCKERMAN, K.
1771*
ZUGEHOR, M.
7165*
ZUHLKE, V.
8323
ZUIDEMA, G.D.
526*, 3502*, 4596*
ZUIN, M.
224
ZUKOSKI, C.F.
2884*
ZULLI, P.
3518
ZUMTOBEL, V.
6285
ZUNIGA, G.
2438
ZUS, B.A.
4377, 6503
ZVARGULIS, J.E.
4278
ZWADZKA, A.
2093
ZWEIBAUM, A.
2063
ZWERGEL, T.
7900
ZWICK, R.
1830*
ZWOZDZIAK, L.
1211
ZYKOV, I.A.
4370*
ZYMALSKA, J.
6890

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

- ABDOMEN
  - ANGIOGRAPHY
    - COMPLICATIONS, 236
  - ANOMALY
    - SURGERY, 797
    - THERAPY, 1690
  - APPENDIX
    - ANOMALY, 1407
  - ARTERIES
    - ANEURYSM, 2609
    - ANGIOGRAPHY, 1707
    - ANOMALY, 7886
    - EMBRYOLOGY, 1105
    - STENOSIS, 1707, 1708
  - CHILD
    - DIAGNOSIS, 8290*
  - COMPLICATIONS
    - CHILD, 8290*
  - DUODENUM
    - ADHESIONS, 3158
  - FISSURE
    - THERAPY, 1690
  - GARDNER'S SYNDROME
    - NEOPLASMS, 1422
  - HERNIA
    - MORPHOLOGY, 4442
  - INTESTINES
    - PNEUMATOSIS, 6300
  - LIVER CIRRHOSIS
    - PAIN, 8405
  - LYMPHOMA
    - DIAGNOSIS, 5544
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 4769
    - LAPAROSCOPY, 4769
  - PAIN
    - AMYLASES, 6387
    - CHILD, 2620
    - PANCREATITIS, 6387
    - PSYCHOLOGICAL FACTORS, 2620
    - THERAPY, 2620
  - PANCREATITIS, CHRONIC
    - HEMORRHAGE, 7734*
  - PNEUMATOSIS
    - SURGERY, 6300
  - PSEUDOTUMORS
    - ABSCESS, 8505
    - ASCARIASIS, 8505
  - RADIONUCLIDES
    - CHILD, 5531
    - ULTRASONOGRAPHY, 5531
  - SURGERY
    - ABSCESS, 8459
    - COMPLICATIONS, 8459
    - INFANT, 807
    - OXYGEN, 7583
    - PARENTERAL ALIMENTATION, 6627
    - REVIEW, 807
    - SURVIVAL, 4450
  - TUBERCULOSIS
    - EPIDEMIOLOGY, 6608
  - ULTRASONOGRAPHY, 7270
    - CHILD, 5531
  - VAGOTOMY
    - DRAINAGE, 318
  - WOUNDS AND INJURIES
    - SCANNING, SCINTILLATION, 1215

- ABSCESS
  - ABDOMEN
    - PSEUDOTUMORS, 8505
    - SURGERY, 8459
  - AMEBIASIS
    - COMPLICATIONS, 5241*, 6649
    - LIVER, 5241*, 5247, 6655
    - PERITONITIS, 634
  - APPENDIX
    - PARASITES AND PARASITIC DISEASES, 5962
  - BILE
    - PERITONITIS, 634
  - BILIARY TRACT
    - RADIOLOGY, 5137*
    - SURGERY, 8459
  - CHILD
    - DIAGNOSIS, 6624
    - THERAPY, 6624
  - DRAINAGE
    - LIVER, 1473
    - TECHNIQUES, 1473
  - IMMUNITY
    - BACTERIAL INFECTIONS, 2648
    - LIVER, 2648
    - SIMULATION, 2648
  - LIVER
    - AMEBIASIS, 1472, 1715, 1716, 2173*, 4461, 6649, 7471
    - ANGIOGRAPHY, 2173*
    - BACTERIA, 2449*
    - BACTERIAL INFECTIONS, 2470, 6666, 7757
    - DIAGNOSIS, 2172*, 2173*, 8451*
    - DISEASES ASSOCIATED WITH, 5837
    - DRUG THERAPY, 2449*
    - HYPERPLASIA, 1249
    - RADIOLOGY, 2172*
    - RESPIRATORY SYSTEM, 5837
    - SCANNING, SCINTILLATION, 1244, 2173*, 3045*
    - SURVIVAL, 8451*
    - THERAPY, 551, 6666
    - ULTRASONOGRAPHY, 3045*
  - PANCREAS
    - COMPLICATIONS, 3333
    - MICROORGANISMS, 3332
  - PANCREATITIS
    - COMPLICATIONS, 3333
    - DIAGNOSIS, 4992*
    - PREVENTION, 4992*
    - THERAPY, 4992*
  - PROTOZOAL DISEASES
    - LIVER, 5247
  - PSEUDOTUMORS
    - ASCARIASIS, 8505
  - RUPTURE
    - LIVER, 634
    - PERITONITIS, 634
  - SCANNING, SCINTILLATION
    - RADIONUCLIDES, 8448
  - STOMACH
    - SURGERY, 8459
    - THERAPY, 1322

- ABSORPTION
  - ALBUMINS
    - MARKER STUDY, 6004*

ABSORPTION (continued)
- ALCOHOLS
  - DISACCHARIDES, 173*
  - FEEDING, 5303
  - MONOSACCHARIDES, 173*
- ALKALOIDS, 6803
- AMINO ACIDS
  - CLEARANCE STUDY, 1792
  - ENTERECTOMY, 5305
  - FATS, 3609*
  - FATTY ACIDS, 3609*
  - GASTROINTESTINAL SYSTEM, 1792
  - KALLIKREIN, 7914*
  - PANCREAS, 7933
  - PEPTIDES, 1778*
  - TECHNIQUES, 5304, 7929
- ANEMIA
  - INTESTINE, SMALL, 4413
- ANEMIA, PERNICIOUS
  - VITAMIN B12, 6609, 6989
- ANTI-INFLAMMATORY AGENTS
  - ANTACIDS, 7359
- ANTIBACTERIALS
  - BACTERIAL INFECTIONS, 1675
  - INTESTINES, 1675
- ANTIBIOTICS
  - ANTACIDS, 7359
  - DIARRHEA, 2641
  - FOOD, 6687*
- ANTICOAGULANTS
  - ANTACIDS, 7359
- ANTINEOPLASTIC AGENTS
  - CALCIUM, 1799
  - NEOPLASMS, MALIGNANT, 3164
- ASCARIASIS
  - VITAMIN A, 2663
- ASCITES
  - LYMPHATIC SYSTEM, 1562
- ASPIRIN
  - ACIDITY, 1772*
- BILE ACIDS AND SALTS, 3754*
  - DIET, 6693*
  - EXCRETION, 5424*
  - MICROORGANISMS, 6693*
- BILIARY TRACT
  - SULFOBROMOPHTHALEIN, 1966*
- BONES
  - CALCIUM, 5498
- CALCIUM
  - DUODENUM, 2700*
  - GROWTH FACTORS, 6014
  - HORMONE EFFECTS ON, 1801
  - HORMONES, ADRENAL CORTEX, 1362
  - INTESTINE, SMALL, 2606
  - INTESTINES, 1362, 2605
  - KIDNEY DISEASES, 2605, 2606
  - MARKER STUDY, 1798
  - PHOSPHONATES, 5498
  - VITAMIN D, 1362
- CARBOHYDRATES, 5340
  - CELIAC DISEASE, 4132*
  - CHILD, 6993
  - DRUG EFFECTS ON, 7931
  - INTESTINE, SMALL, 1811
  - KINETICS, 1811
  - LACTOSE INTOLERANCE, 4132*
  - PANCREAS, 7933
  - REVIEW, 6986

ABSORPTION (continued)
- CARCINOID TUMOR
  - GASTROINTESTINAL SYSTEM, 4100*
- CECUM
  - CALCIUM, 1770*
- CELIAC DISEASE
  - ANTIBIOTICS, 7636*
  - INTESTINES, 450
  - TRANSPORT, 5704*
  - XYLOSE, 3251*
- CHENODEOXYCHOLIC ACID, 6542*
- CHOLAGOGUES AND CHOLERETICS, 4627*
- CHOLANGIOGRAPHY
  - CONTRAST MEDIA, 4612*
- CHOLANGITIS
  - LIPIDS, 759
- CHOLECYSTITIS
  - LIPIDS, 759
- CHOLELITHIASIS
  - CHOLECYSTECTOMY, 2572*
- CHOLESTEROL
  - DRUG EFFECTS ON, 3762*
- CIRCULATION
  - AMINO ACIDS, 3011
- COENZYMES
  - REVIEW, 6987
- COLECTOMY, 2966*
- COLON
  - ALBUMINS, 2707*
  - ANTIGENS, 2707*
  - CALCIUM, 1770*
  - CATHARTICS, 3825*
  - DIARRHEA, 5302
  - DRUG EFFECTS ON, 3825*
  - ELECTROLYTES, 4506*
  - KIDNEYS, 1790
  - OXALATES, 2593*, 6019, 6020
  - SODIUM, 4506*, 6816*
  - SURGERY, 2966*
  - VITAMIN K, 7314
  - WATER, 4506*
- CYSTIC FIBROSIS
  - BILE ACIDS AND SALTS, 4909*
  - IRON, 7749*, 8268*
  - PROTEINS, 8268*
  - RADIONUCLIDES, 8268*
  - VITAMIN B12, 8268*
- DIABETES
  - PEPTIDES, 6008
- DIARRHEA
  - CARBOHYDRATES, 3537
  - CHELATING AGENTS, 4425
  - FATS, 3537
  - PARENTERAL ALIMENTATION, 3537
  - SODIUM, 6816*
- DIET
  - IRON, 6692*
  - PERFUSION, 3600*
- DIETARY FACTORS
  - IRON, 886
- L-DOPA
  - GASTROINTESTINAL SYSTEM, 889
  - PARASYMPATHOLYTICS, 889
- DRUG EFFECTS ON
  - ANTIBIOTICS, 6825
  - HISTAMINE, 6825
- DRUGS
  - ANTACIDS, 7359
  - FATTY ACIDS, 1782

- ABSORPTION (continued)
  - DRUGS (continued)
    - INTESTINE, SMALL, 874
    - POTASSIUM, 874
  - DUMPING SYNDROME
    - GALACTOSE, 4058
    - GLUCOSE, 4058
    - MONOSACCHARIDES, 4058
  - DUODENUM
    - AMINO ACIDS, 3236, 3601*
    - CALCIUM, 2974
    - IRON, 31, 1771*
  - ELECTROLYTES
    - CIRCULATION, 4503*
    - INTESTINES, 900
    - REVIEW, 900
  - ENTERECTOMY
    - OXALATES, 5703*
  - ENTERITIS
    - AMINO ACIDS, 3236
  - ESOPHAGUS
    - HYDROGEN, 7301*
  - FATS
    - CALCIUM, 6003*
    - CARCINOID TUMOR, 4100*
    - CIRCULATION, 3017
    - DIETARY FACTORS, 3604*
    - EMBRYOLOGY, 7312
    - FECES, 4681*
    - FETUS, 7312
    - LYMPH, 3017
    - MAGNESIUM, 6003*
    - NEONATE, 7312
  - FATTY ACIDS, 7934
  - FLUORIDES
    - DIETARY FACTORS, 902
    - LIPIDS, 902
  - FOLIC ACID
    - CELIAC DISEASE, 1383
    - REVIEW, 6987
  - GALLBLADDER
    - ELECTROPHYSIOLOGY, 905
    - REVIEW, 2020
    - WATER, 1769*
  - GASTROINTESTINAL DISEASES
    - AMINO ACIDS, 2617
    - DRUGS, 2600, 4138
    - REVIEW, 1661
  - GASTROINTESTINAL SYSTEM
    - ALCOHOLS, 3927
    - ANEMIA, 5220
    - CHILD, 8109
    - DRUGS, 19, 2600
    - INFANT, 8109
    - IRON, 3618
    - RADIOISOTOPES, 2705*
    - SELENIUM, 1806
    - VITAMIN A, 1657
    - VITAMIN B1, 2706*
  - GLUCOSE
    - BILE ACIDS AND SALTS, 28
    - DRUG EFFECTS ON, 6825
    - FATTY ACIDS, 28
    - JEJUNUM, 28, 4132*
  - H2 RECEPTOR ANTAGONISTS
    - ANTACIDS, 7359
    - FEEDING, 4405
  - HORMONE EFFECTS ON
    - ANGIOTENSIN, 7932

- ABSORPTION (continued)
  - HORMONE EFFECTS ON (continued)
    - GASTRIN, 4500*
    - NOREPINEPHRINE, 7932
  - ILEUM
    - AMINO ACIDS, 1778*, 5305
    - BILE, 412
    - BILE ACIDS AND SALTS, 849, 3606*, 5425*
    - CALCIUM, 2702*, 6014
    - CHLORIDES, 412
    - CROHN'S DISEASE, 849
    - ELECTROLYTES, 4499*
    - FATTY ACIDS, 3602*
    - HYPOGLYCEMIC AGENTS, 1787
    - PEPTIDES, 1778*, 5305
    - POTASSIUM, 6001*
    - SULFATES, 2728
    - SURGERY, 4865*
    - VITAMIN K, 7314
    - WATER, 4499*, 7305*
  - INFANT
    - CALCIUM, 1798
  - INTESTINAL OBSTRUCTION
    - ANTIBACTERIALS, 891
    - ANTIBIOTICS, 891
  - INTESTINE, LARGE
    - VITAMIN K, 7314
  - INTESTINE, SMALL, 3010
    - AGE FACTORS, 4406, 4913
    - ALBUMINS, 2707*
    - AMINO ACIDS, 16*, 1778*, 3011, 3609*, 5304, 6686*, 7297*, 7912*, 7914*, 7929
    - ANTIGENS, 2707*
    - BILE ACIDS AND SALTS, 400, 1775*, 5425*
    - CALCIUM, 2702*, 5287*, 6014
    - CARBOHYDRATES, 2725, 2726, 3830*, 4406, 7931
    - CARCINOGENS, 5336
    - CATHARTICS, 3611*, 3825*
    - CELLS, 6690*
    - CIRCULATION, 7297*
    - DEVELOPMENT, 4454
    - DIETARY FACTORS, 400, 873
    - DRUG EFFECTS ON, 2715, 3605*, 3825*, 6825, 7931
    - DRUGS, 1782, 2716, 5342
    - ELECTROLYTES, 4500*
    - EMBRYOLOGY, 7309, 7310, 7312
    - ENDOTOXINS, 2708*
    - ENVIRONMENTAL FACTORS, 1805
    - FATS, 3827*, 6003*, 7312
    - FATTY ACIDS, 1775*, 3602*, 7316, 7317, 7505
    - FETUS, 7309, 7312
    - FOLIC ACID, 1809
    - FOOD POISONING, 3244
    - FRUCTOSE, 2725, 4508*
    - GALACTOSE, 2725
    - GLUCOSE, 1777*, 2725, 2961*, 4500*, 4508*, 6825
    - HELMINTHIASIS, 5485
    - HORMONE EFFECTS ON, 2961*, 4500*, 7932
    - HYPOGLYCEMIC AGENTS, 1787
    - IRON, 1771*, 3621, 4512, 5341
    - LACTOSE, 2725

- ABSORPTION (continued)
  - INTESTINE, SMALL (continued)
    - MORPHOLOGY, 7309
    - MOTILITY, 7297*
    - NEONATE, 7311, 7312
    - NUTRITION DISORDERS, 3621
    - PARENTERAL ALIMENTATION, 3614
    - PEPTIDES, 16*, 7499*
    - PHOSPHATES, 3605*
    - SULFATES, 2728
    - TECHNIQUES, 1777*, 2714
    - TRANSPLANTATION, 2726
    - VITAMIN B1, 2706*
    - VITAMIN B2, 1814
    - VITAMIN B6, 6021
    - VITAMIN B12, 400, 3610*, 4509*, 4510*
    - VITAMIN K, 7314
    - WATER, 3611*, 4500*, 7305*
    - XYLOSE, 2188, 2725, 4454
    - ZINC, 5292*
  - INTESTINES, 1807
    - AMINO ACIDS, 2617, 7913*
    - CADMIUM, 1797
    - CALCIUM, 1799, 1801
    - CATHARTICS, 3825*
    - CHYLOMICRONS, 7302*
    - DRUG EFFECTS ON, 3605*, 3825*
    - DRUGS, 3613
    - ELECTROLYTES, 4503*
    - ENDOTOXINS, 2708*
    - ETHNIC FACTORS, 5301
    - FATS, 2727, 6695
    - FATTY ACIDS, 2727
    - FERRITIN, 884
    - GLUCOSE, 3832*
    - INFANT, 4116
    - IRON, 884, 3619, 6018
    - KINETICS, 22, 5338
    - LIPIDS, 7302*
    - NEONATE, 4116
    - NITROGEN, 7913*
    - PHOSPHATES, 3605*
    - PROSTAGLANDINS, 7919*
    - SODIUM, 3622, 4503*
    - TECHNIQUES, 4694
    - TRIGLYCERIDES, 2727, 6162
    - VITAMIN B12, 897
    - VITAMIN E, 4116
    - WATER, 3622
    - XYLOSE, 4511
  - ION TRANSPORT
    - HYPERTROPHY, 1796
  - IRON, 2112
    - CARBOHYDRATES, 885
    - DIET, 886
    - DIETARY FACTORS, 6691*
    - DUODENUM, 2703*
    - FIBERS, 5339
    - INTESTINE, SMALL, 869*, 2703*
    - PREGNANCY, 3619
    - STARCH, 1771*
  - JEJUNUM
    - AMINO ACIDS, 23, 1778*, 3011, 3236, 7912*, 8083*
    - BILE ACIDS AND SALTS, 5425*
    - CALCIUM, 2702*, 6014
    - CARBOHYDRATES, 6010
    - CHOLECYSTOGRAPHY, 1785

- ABSORPTION (continued)
  - JEJUNUM (continued)
    - CHOLINE, 2709*
    - DIETARY FACTORS, 859
    - ELECTROLYTES, 6012
    - FATS, 6003*
    - FATTY ACIDS, 7317
    - FETUS, 7309
    - FRUCTOSE, 4508*, 6010
    - GLUCOSE, 2961*, 4508*, 6010
    - HORMONE EFFECTS ON, 7932
    - HYPOGLYCEMIC AGENTS, 1787
    - LIPIDS, 174*
    - MORPHOLOGY, 7309
    - MOTILITY, 859
    - PEPTIDES, 24, 1778*, 7499*
    - SULFATES, 2728
    - SURFACTANTS, 876
    - VITAMIN B6, 6021
    - VITAMINS, 890
    - WATER, 6012, 6025, 7305*
  - LEAD
    - CHELATING AGENTS, 21
    - GASTROINTESTINAL SYSTEM, 879
    - INTESTINES, 21
    - TRACER STUDY, 21
  - LIPIDS
    - ALCOHOLS, 7916*
    - DETERGENTS, 7927
    - DIETARY FACTORS, 1656
    - DRUG EFFECTS ON, 7916*
    - INFANT, 1656
    - INTESTINES, 25
    - PHOSPHOLIPIDS, 892
    - REVIEW, 25
  - LIVER
    - BILE ACIDS AND SALTS, 38
    - INSECTICIDES, 2919
    - IRON, 2704*
    - LIPIDS, 907
    - METALS, 2719
    - PHYSICAL FACTORS, 907
    - POLLUTION, 3810
    - SULFOBROMOPHTHALEIN, 2865*
  - LIVER CIRRHOSIS
    - SALT, 8044*
    - WATER, 8044*
  - LIVER CIRRHOSIS, OBSTRUCTIVE
    - VITAMIN D, 3479*
  - LIVER DISEASES
    - LIVER FUNCTION TESTS, 678
  - LIVER DISEASES, ALCOHOLIC
    - ASCITES, 1562
  - MALABSORPTION SYNDROMES
    - DRUGS, 4138
  - MARKER STUDY
    - TRIETHERS, 4532*
    - TRIGLYCERIDES, 4532*
  - METALS
    - GASTROINTESTINAL SYSTEM, 879
    - TOXICOLOGY, 879
  - MITOCHONDRIA, 5479*
  - MONOSACCHARIDES, 5340
  - MOTILITY
    - AMINO ACIDS, 3011
  - MOUTH
    - CARBOHYDRATES, 7931
    - DRUG EFFECTS ON, 7931

ABSORPTION (continued)
- NUTRITION DISORDERS
  - IRON, 4512
- OBESITY
  - SHUNT, INTESTINAL, 4107*
- OXALATES
  - CATHARTICS, 6019
  - DRUG EFFECTS ON, 6019
- PANCREATECTOMY
  - LIPIDS, 174*
  - VITAMIN B12, 1780*
- PANCREATIC DISEASES
  - BILE ACIDS AND SALTS, 4909*
  - CHOLERA, 4391*
  - ELECTROLYTES, 4391*
  - VITAMIN B12, 1441*, 5783
  - WATER, 4391*
- PARASYMPATHOMIMETICS
  - CALCIUM, 2999
- PELLAGRA
  - XYLOSE, 2366
- PEPTIDASE
  - PEPTIDE HYDROLASES, 1778*
- PEPTIDES
  - ENTERECTOMY, 5305
  - REVIEW, 895
- PHOSPHORUS
  - HORMONES, ADRENAL CORTEX, 1362
  - INTESTINES, 1362
  - VITAMIN D, 1362
- PROSTAGLANDINS
  - CALCIUM, 7919*
  - STOMACH, 4562*
- PROTEINS
  - CHILD, 896
  - DIETARY FACTORS, 896
  - EMBRYOLOGY, 7309
  - FATS, 3603*
  - FETUS, 7309
  - GASTROINTESTINAL SYSTEM, 20
  - MARKER STUDY, 6004*
  - PHYSICAL FACTORS, 896
  - SURGERY, 6004*
- RADIOISOTOPES
  - AGE FACTORS, 2705*
  - TECHNIQUES, 5335
- RADIOPROTECTIVE AGENTS
  - MARKER STUDY, 1786
- RECTUM
  - ANTIEMETICS, 2740*
  - FATTY ACIDS, 3624
- SALICYLATES
  - ANTIMETABOLITES, 1808
  - INTESTINE, SMALL, 1808
- SCLERODERMA
  - AMINO ACIDS, 5219
  - INTESTINE, SMALL, 5219
- SHUNT, INTESTINAL
  - AMINO ACIDS, 2315*
  - DRUGS, 5673
  - GLUCOSE, 2315*
- SODIUM
  - CIRCULATION, 4503*
- SPRUE
  - OXALATES, 5704*
- STEROIDS
  - ANTACIDS, 7359
  - ENEMA, 509*

ABSORPTION (continued)
- STEROLS
  - DRUG EFFECTS ON, 3762*
- STOMACH
  - ALCOHOLS, 3623, 5282*
  - ASPIRIN, 1772*
  - CARCINOGENS, 5336, 6022
  - GLUCOSE, 3148
  - H2 RECEPTOR ANTAGONISTS, 7357
  - MARKER STUDY, 1772*
  - POTASSIUM, 4502*
  - RADIOISOTOPES, 5335
  - TRACER STUDY, 5335
- SULFOBROMOPHTHALEIN
  - CHOLESTASIS, 1966*
  - HEPATOCYTES, 1774*
  - LIVER FUNCTION TESTS, 1774*
- TRIGLYCERIDES
  - CIRCULATION, 3017
  - LYMPH, 3017
  - MALABSORPTION SYNDROMES, 6162
- ULCER, PEPTIC
  - SURGERY, 6263*
- VITAMIN A
  - NUTRITION, 899
  - REVIEW, 899
- VITAMIN B12
  - BICARBONATE SECRETION, 1441*
  - COLITIS, ULCERATIVE, 4963*
  - INTESTINES, 1779*
  - INTRINSIC FACTOR, 871*
  - PANCREAS, 1779*
  - PREGNANCY, 3610*
  - TRYPSIN, 4509*
  - TRYPSINOGEN, 4509*
- VITAMINS
  - ANTACIDS, 7359
- WATER
  - CAFFEINE, 6025
  - DRUG EFFECTS ON, 3611*, 6025
  - INTESTINES, 900
  - REVIEW, 900
- XYLOSE
  - CHILD, 4511
  - HEMOGLOBINS, 901
  - INTESTINE, SMALL, 901
  - TECHNIQUES, 4511
  - TEMPERATURE, 4511
- ZINC
  - TECHNIQUES, 3612*

ACETYLCHOLINE
- COLON
  - MUSCLES, 6026*
- DUODENUM
  - MUSCLES, 2759
  - PERISTALSIS, 2759
- INTESTINAL ABSORPTION
  - DRUG EFFECTS ON, 2968
- INTESTINES
  - CIRCULATION, 3878
- PANCREAS
  - ENZYMES, 115, 996, 3742
  - LIPASE, 2848
  - NUCLEOTIDES, 115
  - PROTEINS, 1954, 2848
  - SECRETION, 1954
- SALIVARY GLANDS
  - AMYLASES, 1869

ACHALASIA
- ANORECTUM
  - SPHINCTER, 3536
- DEGLUTITION DISORDERS
  - ETIOLOGY, 3124*
  - FAMILIAL FACTORS, 3124*
- DILATATION
  - THERAPY, 6221
- ESOPHAGEAL DISEASES
  - ETIOLOGY, 3124*
  - FAMILIAL FACTORS, 3124*
- ESOPHAGEAL REFLUX
  - SPHINCTER, 6205
  - SURGERY, 6205
- ESOPHAGUS
  - DIAGNOSIS, 4020*, 4029
  - DRUG EFFECTS ON, 4030
  - PARASYMPATHOLYTICS, 1276
  - RADIOLOGY, 4788*
  - SURGERY, 303, 3126*, 6872
  - THERAPY, 4020*, 4029
  - THYROCALCITONIN, 3135
- ETIOLOGY, 7565
- NERVOUS CONTROL
  - GANGLION CELLS, 2225
- STOMACH
  - SURGERY, 303

ACHLORHYDRIA
- ANEMIA, PERNICIOUS
  - GASTRIN, 4805*
  - GASTRITIS, 4805*
- DIARRHEA
  - BACTERIA, 2312*
- ETIOLOGY
  - HORMONES, GASTROINTESTINAL, 5197
- GASTRIN
  - CELLS, 4804*
  - ETIOLOGY, 2594*
  - SERUM, 4804*
- GASTRITIS
  - DISEASES ASSOCIATED WITH, 4822
- GLUCAGON
  - ETIOLOGY, 2594*
- HORMONES, GASTROINTESTINAL
  - ANALYSIS, 2594*
  - ETIOLOGY, 2594*
  - SERUM, 2594*
- JEJUNUM
  - MORPHOLOGY, 2312*
- MORPHOLOGY, 6885
- PROSTAGLANDINS
  - ETIOLOGY, 2594*
- SECRETIN
  - ETIOLOGY, 2594*

ACID-BASE BALANCE
- ASCITES
  - THERAPY, 4335*
- DUODENUM
  - MOTILITY, 59
- LIVER CIRRHOSIS
  - ASCITES, 4335*
  - THERAPY, 4335*
- NERVOUS SYSTEM
  - HEPATECTOMY, 3036
- STOMACH
  - ION TRANSPORT, 1875*

ACID PHOSPHATASE
- STOMACH
  - ACID SECRETION, 6039*

ACID SECRETION
- SEE ALSO HYPERCHLORHYDRIA, SECRETION
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - ALCOHOLS, 2282*
- ADENOSINE TRIPHOSPHATASE
  - DRUG EFFECTS ON, 5377
- ADENYL CYCLASE, 5379
  - H2 RECEPTOR ANTAGONISTS, 1908
- ALCOHOLS
  - ADENOSINE CYCLIC 3'.5' MONOPHOSPHATE, 3664*
  - ADENOSINE TRIPHOSPHATE, 3664*
- AMINO ACIDS
  - ENZYMES, 90
  - GASTRIN, 1867, 2779
- AMMONIA
  - POTASSIUM, 86
- ANESTHESIA
  - NERVOUS CONTROL, 6049
- ANTACIDS
  - DRUG EFFECTS ON, 1876*
- ANTIDEPRESSIVE AGENTS
  - ADOLESCENCE, 5383
- ANTRUM
  - DISTENTION, 2285*
  - GASTRIN, 1232
  - NERVOUS CONTROL, 71*
  - POUCH STUDY, 71*
  - ULCER, PEPTIC, 6261*
- ATROPINE
  - CALCIUM, 2307
- BILE ACIDS AND SALTS
  - TRANSPORT, 776
- BILIARY TRACT DISEASES
  - CHILD, 621
- BURNS
  - GASTROINTESTINAL DISEASES, 818
- CAFFEINE
  - H2 RECEPTOR ANTAGONISTS, 357*
- CALCIUM
  - SERUM, 6047
  - STOMACH, 3086
- CARBOXYLASES
  - PARKINSON'S DISEASE, 1498
- CHILD
  - SERUM, 1890
- DIET
  - SERUM, 1902
- L-DOPA
  - PARKINSON'S DISEASE, 1498
- DRUG EFFECTS ON, 2810, 5382
  - H2 RECEPTOR ANTAGONISTS, 2806, 6915*
  - HISTAMINE, 2795*
  - PENTAGASTRIN, 2795*
  - ULCER, PEPTIC, 8183
- DRUG-INDUCED
  - HISTAMINE, 972
- DUODENUM
  - HORMONES, 7344*
  - ULCER, 374, 385, 1340*, 2804, 3206, 4549, 4580, 4855
  - ULCER, PEPTIC, 5593*, 6926, 7976
- ENTERECTOMY, 3718

ACID SECRETION (continued)

- ESOPHAGUS
  - PRESSURE STUDY, 4521*
  - REFLUX, 4550*
- FEEDING
  - OXYNTIC GLAND, 5365*
- FISTULA
  - DIET, 6040*
  - DRUG EFFECTS ON, 6058
  - PROSTAGLANDINS, 951*
  - PROTEINS, 6040*
- GASTRIN
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1889
  - FEEDING, 961
  - HISTAMINE, 1889
  - INSULIN, 345
  - NERVOUS CONTROL, 4716*
  - PARASYMPATHOMIMETICS, 5365*
  - POUCH STUDY, 961
  - PREGNANCY, 1906
  - SERUM, 7970
  - STOMACH DISEASES, 345
- GASTRITIS, 3206, 3212, 6722*, 8169
  - CELLS, 6896
  - ETHNIC FACTORS, 338
- GASTRITIS, ATROPHIC
  - ETHNIC FACTORS, 338
- GASTROINTESTINAL DISEASES
  - SURGERY, 2183
- GASTRONE
  - BIOASSAY, 93
- GASTROSTOMY, 3150
- GLUCAGON, 1842
- GLUCOSE
  - CHOLESTASIS, 6057
- GLYCOPROTEINS
  - URINE, 214
- H2 RECEPTOR ANTAGONISTS
  - HISTAMINE, 2293
  - HORMONES, GASTROINTESTINAL, 5378
- HEIDENHAIN POUCH
  - ANTRECTOMY, 1885*
  - DIET, 6040*
  - ENTERECTOMY, 5370*
  - GASTRIN, 6040*
  - PENTAGASTRIN, 1885*, 7965*
  - PROSTAGLANDINS, 951*
  - PROTEINS, 6040*
  - TEMPERATURE, 7965*
- HELMINTHIASIS
  - ANEMIA, 2649
  - HISTAMINE, 2649
- HIATAL HERNIA
  - STOMACH, 8146*
  - SURGERY, 8146*
- HISTAMINE
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1908
  - H2 RECEPTOR ANTAGONISTS, 7964*
  - PENTAGASTRIN, 973
  - PREGNANCY, 1906
  - STOMACH, 973, 1908
  - TRACER STUDY, 7964*
  - VAGOTOMY, 973
- HORMONE EFFECTS ON
  - NERVOUS CONTROL, 3140*
- HYDROGEN
  - PERMEABILITY, 2818

ACID SECRETION (continued)

- HYPOGLYCEMIA
  - INSULIN, 1340*
- HYPOTHALAMUS
  - LESIONS, 1896
  - STOMACH, 2781*
- INFANT
  - PENTAGASTRIN, 1903
  - SERUM, 1890
- INSULIN
  - GLUCOSE, 962
- INTESTINES
  - HUMORAL FACTORS, 1905
- KWASHIORKOR
  - CHILD, 6176
- LIVER CIRRHOSIS
  - STOMACH, 5128*
- LIVER DISEASES
  - CHILD, 621
- NEONATE
  - PENTAGASTRIN, 1903
- NERVOUS CONTROL
  - DISTENTION, 960
  - FOOD, 960
- NOREPINEPHRINE, 5375
- PENTAGASTRIN, 4565*
  - ANTRECTOMY, 1885*
  - CHILD, 80
  - PARASYMPATHOMIMETICS, 5641
  - TOXINS, 5376
  - ULCER, 2310
- PEPTIDES
  - PENTAGASTRIN, 947
  - STOMACH, 947
- PREGNANCY
  - ANESTHESIA, 6051
  - HORMONE EFFECTS ON, 1906
- PROSTAGLANDINS, 2113
  - OXYGEN, 968
  - STOMACH, 99, 4562*
- PYLOROPLASTY, 3718
- PYLORUS
  - STENOSIS, 5593*
- SEROTONIN
  - STOMACH, 1873*
- SOMATOSTATIN
  - HORMONE EFFECTS ON, 1886*
  - PENTAGASTRIN, 1886*
- STOMACH, 2818, 3675*, 3677, 3688, 4575, 4577. 4855, 6017. 7343*, 7360
  - ACID PHOSPHATASE, 6039*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2282*, 2800, 4567*, 6738, 7961*
  - ADENYL CYCLASE, 4567*
  - ALCOHOLS, 1913, 3664*
  - AMINO ACIDS, 1901, 6055, 6740
  - ANESTHESIA, 6049, 7962*
  - ANTIDEPRESSIVE AGENTS, 5382
  - ANTISPASMODICS, 102, 1145
  - ANTRECTOMY, 2683*, 5366*
  - ANTRUM, 956, 1892
  - ATROPINE, 1893, 2785*, 2787*, 5624*, 6729*, 7962*, 7967*, 8183
  - BARIUM, 6731
  - BILE, 7390*
  - CALCIUM, 3669*, 5357*
  - CATECHOLAMINES, 8171

- ACID SECRETION (continued)
  - STOMACH (continued)
    - CELLS, 3685, 4552*, 6738, 7978
    - CHILD, 6176, 8171
    - CHOLECYSTOKININ, 2794*
    - CIRCULATION, 4572*
    - DIETARY FACTORS, 87
    - DISTENTION, 3673*, 3682, 4579, 5369*, 5624*
    - DOPAMINE, 3740
    - DRUG EFFECTS ON, 92, 2785*, 2786*, 2787*, 2789*, 2792*, 2802, 2806, 2828, 3141*, 3740, 4068*, 4552*, 4557*, 4572*, 5624*, 6737, 6915*, 7345*, 7357, 7363, 7959*, 7962*, 7963*, 7966*, 8183
    - DRUGS, 4088
    - DUODENUM, 7600
    - ELECTROPHYSIOLOGY, 5325*
    - ENTERECTOMY, 5370*
    - ENZYMES, 108, 4558*
    - EPINEPHRINE, 8171
    - EROSIONS, 365
    - ESOPHAGEAL REFLUX, 7358
    - FATS, 3696, 5358*, 7390*
    - FEEDING, 92, 374, 7364
    - FISTULA, 1901, 5501, 6040*, 6058
    - FOOD, 7968*
    - GASTRIN, 1232, 1906, 1922, 4580, 5366*
    - GLUCAGON, 1899, 2794*
    - GLUCOSE, 3702, 6055, 6057
    - H2 RECEPTOR ANTAGONISTS, 1881*, 1893, 1899, 2778, 2789*, 6048, 6283, 6915*, 7357, 7963*
    - HEMODIALYSIS, 4047*
    - HEMORRHAGE, 5368*
    - HISTAMINE, 106, 1906, 2778, 4567*, 5361*, 5366*, 6056, 7964*
    - HISTOCHEMISTRY, 7978
    - HORMONE CONTROL, 7342*
    - HORMONE EFFECTS ON, 1886*, 2788*, 2794*, 2802, 3671*, 4580, 5363*, 5369*, 6727*, 6740, 6743, 7347*, 7375*, 7977
    - HYPERGLYCEMIA, 4572*
    - HYPOTHALAMUS, 106, 1896
    - ILEUM, 5367*
    - INFANT, 6038*
    - INSULIN, 4862
    - INTESTINE, SMALL, 5367*
    - JEJUNUM, 5367*
    - LYSOZYMES, 3710
    - MORPHOLOGY, 8169
    - MORPHOMETRY, 7978
    - MOTILIN, 7347*
    - NERVOUS CONTROL, 71*, 2806, 3681, 3695, 4551*, 5364*, 5366*, 7342*, 7967*, 7968*
    - NICOTINE, 7348*
    - NOREPINEPHRINE, 7342*, 8171
    - NUTRITION DISORDERS, 7873
    - PAIN, 7980
    - PARASYMPATHOLYTICS, 2789*, 6737
    - PARASYMPATHOMIMETICS, 964
    - PARENTERAL ALIMENTATION, 4551*
    - PATHOLOGY, 365
    - PENTAGASTRIN, 964, 965, 969, 2140, 2787*, 5369*, 6743, 7962*

- ACID SECRETION (continued)
  - STOMACH (continued)
    - PEPSIN, 6044
    - PEPTIDES, 969, 4549, 4592*
    - PHOSPHODIESTERASES, 2800
    - PORTACAVAL SHUNT, 1905
    - POTASSIUM, 4502*
    - POUCH STUDY, 71*, 106, 4551*, 4571*
    - PRIMATES, 958
    - PROSTAGLANDINS, 98, 965, 966, 4582, 6727*, 7363
    - PYLOROPLASTY, 7364
    - REVIEW, 84, 957, 3616
    - SECRETAGOGUES, 1893, 1904, 1923, 3685, 4558*
    - SECRETIN, 2794*, 3671*
    - SECRETION, 6739
    - SEROTONIN, 4571*, 6729*
    - SHOCK, 5368*
    - SHUNT, INTESTINAL, 1307
    - SIMULATION, 1893, 1912
    - SLEEP, 358*
    - SOMATOSTATIN, 1886*, 1899, 3705, 5363*, 7375*
    - STEROIDS, 92
    - STRESS, 6052
    - SURGERY, 1912, 5494
    - TECHNIQUES, 1904, 2791*, 2798
    - TEMPERATURE, 7965*
    - THIOCYANATES, 2785*
    - THYROCALCITONIN, 2788*, 4559*
    - TRANQUILIZING AGENTS, 2272
    - TRANSPORT, 776
    - ULCER, 385, 3206
    - ULCER, PEPTIC, 365, 6261*, 6926, 7976
    - ULTRASTRUCTURE, 6039*
    - VAGOTOMY, 2683*, 4854, 5624*, 6271, 6743, 7364, 7603
    - VASOPRESSIN, 4572*
  - STOMACH DISEASES, 6722*
    - DEFICIENCY, 5618
  - STRESS
    - EROSIONS, 6052
  - TRYPSINOGEN
    - FEEDING, 2809
  - TUBERCULOSIS
    - MILK, 6626
  - ULCER
    - BACTERIA, 6732
    - CALCIUM, 3086
    - DRUG EFFECTS ON, 2820
    - DUODENUM, 359, 2304, 5636, 5641
    - ETHNIC FACTORS, 359
    - H2 RECEPTOR ANTAGONISTS, 4832*
    - PENTAGASTRIN, 5641
    - RISK FACTORS, 5636
    - STOMACH, 5636, 5647
    - THERAPY, 5642
  - ULCER, PEPTIC, 2266, 3212
    - ANTACIDS, 4833*
    - CHOLECYSTOKININ, 1339*
    - DISTENTION, 2285*
    - DRUG EFFECTS ON, 387, 4833*, 7976
    - DUODENUM, 1341*, 5356*
    - EPIDEMIOLOGY, 2265
    - ETIOLOGY, 3142*
    - FEEDING, 2830

ACID SECRETION (continued)
  ULCER, PEPTIC (continued)
    H2 RECEPTOR ANTAGONISTS, 381, 4833*
    NERVOUS CONTROL, 366
    PROSTAGLANDINS, 2284*
    REVIEW, 7579
    RISK FACTORS, 2265
    STOMACH, 5356*
  URINARY SYSTEM
    TRANSPLANTATION, 5633
  UROGASTRONE, 1900
  VAGOTOMY, 3150, 3718
    DRUG EFFECTS ON, 2795*
    STOMACH, 5494
    TECHNIQUES, 7353*
  VITAMIN B12
    AGE FACTORS, 5622
  WATER
    ULCER, 2310
  ZOLLINGER-ELLISON SYNDROME
    DIAGNOSIS, 3988
    PEPTIDES, 4549

ACIDITY

    SLEEP, 5630
  ANTRUM
    ION TRANSPORT, 4570*
  ASPIRIN
    ABSORPTION, 1772*
  CALCIUM
    BLOOD, 950*
    SECRETION, 950*
  CECUM
    BACTERIA, 7509*
    DIET, 6139
    FEEDING, 6139
  CIRCULATION
    DUODENUM, 5470*
  COMMON BILE DUCT
    BILE, 3493*
  DUODENUM
    SECRETIN, 6819*
  ESOPHAGITIS, 3127*
    PREVENTION, 1261*
  ESOPHAGUS
    REFLUX, 3127*, 4550*
    SPHINCTER, 1831*
  GALLBLADDER
    BILE, 3493*
  GASTRIN
    CELLS, 2681*
  INTESTINES
    PHOSPHOLIPASE, 4679*
  LIVER
    LACTATES, 1045
  PANCREAS
    BICARBONATE SECRETION, 1933, 1939, 1949, 5387*
    SECRETIN, 1949, 5387*
  PLASMA
    SECRETIN, 1939
  SECRETIN
    SERUM, 2097*
  SECRETION
    DUODENUM, 1337*
    PANCREAS, 1337*

ACIDITY (continued)
  SERUM
    GASTRIN, 5387*
  STOMACH
    ANESTHESIA, 6051
    ASPIRIN, 1772*
    ION TRANSPORT, 4570*
    PREGNANCY, 6051
    SURGERY, 1140, 2821
  ULCER
    DUODENUM, 5630
    PERFUSION, 8105*
    SLEEP, 5630
    ULCER, PEPTIC, 5630
  ULCER, PEPTIC
    BICARBONATE SECRETION, 1336*, 1337*
    BILE PIGMENTS, 1337*
    DUODENUM, 8180*
    SECRETIN, 1336*
    SECRETION, 1337*

ACIDOSIS
  COLON
    ELECTROLYTES, 4501*
    ION TRANSPORT, 4501*
  DRUG-INDUCED, 5932*
  OBESITY
    SURGERY, 2335
  PANCREATITIS
    DRUG-INDUCED, 5787*
  SERUM
    AMYLASES, 5932*

ACIDS
  BILE
    ULCER, 1917
  COLON
    EPITHELIUM, 1750*
    MARKER STUDY, 1750*
    NUCLEIC ACIDS, 7483*
    PERFUSION, 7483*
    PERMEABILITY, 7483*
    SECRETION, 7483*
    ULTRASTRUCTURE, 1750*
  DUODENUM, 3841
    GLUCAGON, 953*
    PERFUSION, 1873*
    SECRETIN, 953*
    SEROTONIN, 1873*
    STOMACH, 3140*
    ULCER, 4090
  ENDOSCOPY
    PANCREAS, 2843
  FATTY LIVER
    HYPOLIPEMIC AGENTS, 6809
  GASTRITIS
    CIRCULATION, 1920
    PERMEABILITY, 1920
    SIMULATION, 1920
  GASTROINTESTINAL SYSTEM
    MOTILITY, 5333
  HEPATITIS, CHRONIC
    THERAPY, 4253*
  HEPATOCYTES
    FATTY ACIDS, 4648
    TOXICITY, 4629*

ACIDS (continued)
- ILEUM
  - EPITHELIUM, 1750*
  - MARKER STUDY, 1750*
  - ULTRASTRUCTURE, 1750*
- INTESTINAL ABSORPTION, 5296
- INTESTINE, SMALL
  - MOTILITY, 1855
- INTESTINES
  - EPITHELIUM, 1750*
  - MARKER STUDY, 1750*
  - ULTRASTRUCTURE, 1750*
- JEJUNUM, 3630*
- LIVER
  - CHOLESTEROL, 6808
  - PHOSPHOLIPIDS, 6808
  - TRIGLYCERIDES, 6808
- LIVER CIRRHOSIS
  - THERAPY, 4253*
- LIVER DISEASES
  - THERAPY, 4253*
- LIVER DISEASES, ALCOHOLIC
  - THERAPY, 4253*
- OBESITY
  - SURGERY, 6942*
- PANCREAS
  - AMYLASES, 2837*
  - SECRETION, 1942
- PERFUSION
  - DUODENUM, 943
- PROTEINS
  - DIET, 5463*
  - SHUNT, 5463*
- REFLUX
  - POSTURAL FACTORS, 1263*
- SEROTONIN
  - VEINS, 2116
- STOMACH
  - BLEEDING, 4564*
  - DRUG EFFECTS ON, 3154
  - ELECTRICAL CONTROL, 1862
  - GASTRIN, 3140*
  - MOTILITY, 81, 3630*, 7940*
  - PERMEABILITY, 955
  - SECRETION, 3140*
  - ULCER, 7516
  - VAGOTOMY, 3140*
- STOMACH DISEASES
  - DIAGNOSIS, 5532
  - THERAPY, 5532
- ULCER
  - PREVENTION, 7516

ACRODERMATITIS
- CHILD
  - AUSTRALIA ANTIGEN, 2497*, 3442
  - HEPATITIS, INFECTIOUS, 3442
- DRUG THERAPY
  - ZINC, 6974
- HEPATITIS, INFECTIOUS
  - IMMUNITY, 3442
- INFANT
  - THERAPY, 2351
- INTESTINE, SMALL
  - MORPHOLOGY, 8225*
  - ZINC, 8225*
- THERAPY
  - ZINC, 4938

ACRODERMATITIS (continued)
- ZINC
  - CHILD, 465
  - DEFICIENCY, 7633*
  - DIAGNOSIS, 4412
  - INFANT, 2351
  - THERAPY, 465, 1662, 2351, 2352, 2608
  - ULTRASTRUCTURE, 7633*

ACYLTRANSFERASES
- JAUNDICE, OBSTRUCTIVE
  - CHOLESTEROL, 2586
- LIVER
  - METABOLISM, 8000*
  - SECRETION, 8000*
- LIVER DISEASES, 5797*
- LIVER DISEASES, ALCOHOLIC
  - DEFICIENCY, 3464*
- NEOPLASM METASTASIS
  - LIVER, 4254*

ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
- ACID SECRETION
  - ALCOHOLS, 2282*, 3664*
  - GASTRIN, 1889
  - HISTAMINE, 1908
- ADENOSINE TRIPHOSPHATE
  - CALCIUM, 6059*
  - PANCREAS, 6059*
  - PROTEINS, 6059*
- ANTRUM
  - GASTRIN, 4556*
- BILE ACIDS AND SALTS
  - EXCRETION, 1597
- CECUM
  - DRUG EFFECTS ON, 7947
  - MOTILITY, 7947
- CHOLESTEROL
  - SYNTHESIS, 4652
- COLON
  - BILE ACIDS AND SALTS, 2060*
- GASTRECTOMY
  - URINE, 5615
- GASTROINTESTINAL SYSTEM
  - SECRETION, 7957
- GLUCONEOGENESIS
  - ADENOSINE TRIPHOSPHATE. 6804
- GLYCOPROTEINS
  - SYNTHESIS, 2061*
- HEPATITIS
  - GLUCAGON, 5927*
- INTESTINE, SMALL
  - CHOLERA, 3840
  - DISTENTION, 2963*
  - DRUG EFFECTS ON, 6814*
  - ELECTROPHYSIOLOGY, 56
  - MOTILITY, 56
  - SHIGELLOSIS, 3840
  - TOXINS, 3840
- INTESTINES
  - ESCHERICHIA COLI, 2131
  - MUSCLES, 4527*
  - SECRETION, 2060*
  - TOXINS, 2131
  - VITAMIN D, 2075
- JAUNDICE, OBSTRUCTIVE
  - GLUCAGON, 5927*

ADENOSINE CYCLIC 3',5' MONOPHOSPHATE (continued)
    JEJUNUM
        DISTENTION, 2963*
        DRUG EFFECTS ON, 6814*
        ENTEROTOXINS, 2060*
    LIVER
        GLUCONEOGENESIS, 6804
        VITAMIN C, 6765*
    LIVER CIRRHOSIS
        DIAGNOSIS, 6508*
    LIVER DISEASES
        DIAGNOSIS, 6508*
    METABOLISM
        DRUG EFFECTS ON, 3707
    PANCREAS
        BICARBONATE SECRETION, 114
        DOPAMINE, 1947
        ENZYMES, 2845
        HORMONE EFFECTS ON, 2845
        HORMONES, GASTROINTESTINAL, 996
        SECRETIN, 986, 1947, 2845
        SECRETION, 987, 2853, 4585*
    PANCREATITIS
        HEMORRHAGE, 2838*
    PITUITARY GLAND
        HORMONE EFFECTS ON, 5363*
        SOMATOSTATIN, 5363*
    PROTEINS
        SYNTHESIS, 6768*
    SALIVARY GLANDS
        CALCIUM, 6034
        ENZYMES, 1868
        MEMBRANES, 75
        PROTEINS, 6034
    SECRETION
        AMYLASES, 7985*
        GASTRIN, 4555*, 7350*
    STOMACH
        ACID SECRETION, 2282*, 2800, 4567*, 6738, 7961*
        ADRENERGIC RECEPTOR AGONISTS, 6723*
        ADRENERGIC RECEPTOR BLOCKADERS, 6723*
        CELLS, 3684, 3707
        DRUG EFFECTS ON, 3707
        GASTRIN, 4556*
        INTRINSIC FACTOR, 3711
        ION TRANSPORT, 1907
        METABOLISM, 3707
        PROSTAGLANDINS, 2743*, 3707
        SECRETIN, 3707

ADENOSINE TRIPHOSPHATASE
    ACID SECRETION
        DRUG EFFECTS ON, 5377
    AGE FACTORS
        PHOSPHOLIPIDS, 155
    BILE
        LIVER, 2909
        SECRETION, 4645
        SYNTHESIS, 3775
        THYROID GLAND, 2909
    COLON
        BILE ACIDS AND SALTS, 6816*
    ILEUM
        HYDROLYSIS, 2076
        MOTILITY, 61

ADENOSINE TRIPHOSPHATASE (continued)
    INTESTINE, SMALL
        ALKALINE PHOSPHATASE, 2076
        HYDROLYSIS, 2076
        MEMBRANES, 2076
    INTESTINES
        MEMBRANES, 5452
    JEJUNUM
        HYDROLYSIS, 2076
    LIVER
        DRUG EFFECTS ON, 6127
        GLYCOSIDES, 4635
        HORMONE EFFECTS ON, 5408*
        INSULIN, 3771
        PHOSPHOLIPIDS, 155
        VITAMIN D, 142
    MICROSOMES
        MAGNESIUM, 61
    MOTILITY
        MAGNESIUM, 61
    SALIVARY GLANDS, 7296
        NEOPLASMS, BENIGN, 7296
    SECRETION
        BILE, 5427*
    STOMACH
        ANTIBODIES, 1910
        FEEDING, 108
        HISTAMINE, 108
    ULCER
        STRESS, 6730*

ADENOSINE TRIPHOSPHATE
    ACID SECRETION
        ALCOHOLS, 3664*
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
        CALCIUM, 6059*
        PANCREAS, 6059*
        PROTEINS, 6059*
    BILE
        NERVOUS CONTROL, 6106
    ENTEROCOLITIS, 3545
    GLUCONEOGENESIS
        ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6804
        GLUCAGON, 6804
    GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
        CALCIUM, 6059*
        PANCREAS, 6059*
        PROTEINS, 6059*
    HEPATITIS, CHRONIC, 2529
    INTESTINE, SMALL
        ELECTRICAL CONTROL, 1854
    LIVER
        ELECTROPHYSIOLOGY, 8041*
        GLUCAGON, 2937
        NERVOUS CONTROL, 6106
        SULFOBROMOPHTHALEIN, 1051
    STOMACH, 2827
        DRUG EFFECTS ON, 4557*
        WOUNDS AND INJURIES, 1909

ADENYL CYCLASE
    ACID SECRETION, 5379
        H2 RECEPTOR ANTAGONISTS, 1908
    BACTERIA
        ENTEROTOXINS, 1091

ADENYL CYCLASE (continued)
- COLON
  - ALCOHOLS, 2074
  - BILE ACIDS AND SALTS, 2074
  - FATTY ACIDS, 2074
  - HORMONES, 178
- LIVER
  - FATTY ACIDS, 1058
  - NUCLEOTIDES, 1987
- PANCREAS
  - CERULEIN, 1758
  - CHOLECYSTOKININ, 2853
  - HORMONES, 118, 990
  - PANCREOZYMIN, 2853
  - SECRETIN, 118, 2853
  - SECRETION, 2853
- PANCREATITIS
  - HEMORRHAGE, 2838*
- STOMACH
  - ACID SECRETION, 4567*
  - DRUG EFFECTS ON, 3708
  - H2 RECEPTOR ANTAGONISTS, 1883*, 2790*
  - HISTAMINE, 1883*, 2790*, 5359*
  - PROSTAGLANDINS, 1925, 5359*
  - SECRETION, 967, 6735

ADHESIONS
- ABDOMEN
  - DUODENUM, 3158
- COLON
  - OBSTRUCTION, 4167
- INTESTINE, SMALL
  - SURGERY, 2321
- PERITONEUM
  - IATROGENESIS, 5939*

ADHESIVES
- SEE TISSUE ADHESIVES

ADOLESCENCE
- AMYLASES, 5786*
- ANTIDEPRESSIVE AGENTS
  - ACID SECRETION, 5383
  - GASTRIN, 5383
- BILIARY TRACT
  - ULCER, PEPTIC, 6268
- CHOLELITHIASIS
  - COMMON BILE DUCT CALCULI, 2574*
  - DIAGNOSIS, 2574*
  - PREGNANCY, 2574*
  - RESPIRATORY SYSTEM, 7221
  - SEX FACTORS, 2574*
- COLON
  - NEOPLASMS, 4955
  - POLYPS, 4955
- CROHN'S DISEASE
  - DRUG THERAPY, 5256*
  - GROWTH FACTORS, 4466*
  - PROGNOSIS, 4466*
  - SURGERY, 4466*
- DUODENUM
  - OBSTRUCTION, 1195
- HEPATITIS, CHRONIC
  - IMMUNOGLOBULINS, 3457
  - PROGNOSIS, 3457
- HEPATITIS, INFECTIOUS
  - TRANSMISSION, 8366

ADOLESCENCE (continued)
- INFLAMMATORY BOWEL DISEASES
  - ENDOCRINE DISEASES, 7287
- INTESTINAL OBSTRUCTION
  - COLON, 5735
- LACTOSE INTOLERANCE
  - MILK, 440
- LIVER
  - CIRCULATION, 1204
  - ULCER, PEPTIC, 6268
- NEOPLASM METASTASIS
  - COLON, 5734
- NEOPLASMS
  - COLON, 5734
- PANCREATITIS
  - AMYLASES, 5786*
  - ETIOLOGY, 5786*
  - SURVIVAL, 5786*
  - THERAPY, 5786*
- RECTUM
  - NEOPLASMS, MALIGNANT, 478

ADRENAL CORTEX HORMONES
- SEE HORMONES, ADRENAL CORTEX

ADRENAL GLANDS
- CHOLECYSTITIS
  - HORMONES, 753
- GALLBLADDER
  - SCANNING, SCINTILLATION, 3101
- STEROIDS
  - OXIDOREDUCTASES, 1651

ADRENERGIC RECEPTOR AGONISTS
- BILIARY TRACT
  - DRUG EFFECTS ON, 3791
- COMMON BILE DUCT
  - DRUG EFFECTS ON, 3791
- GALLBLADDER
  - DRUG EFFECTS ON, 3791
- INTESTINE, LARGE
  - MOTILITY, 2739*
- IRRITABLE COLON
  - DRUG THERAPY, 5738
  - ETIOLOGY, 5738
- ODDI'S SPHINCTER
  - DRUG EFFECTS ON, 3791
  - MOTILITY, 6848
- PANCREAS
  - SECRETION, 4586*
  - VASODILATOR AGENTS, 4586*
- SALIVARY GLANDS
  - CALCIUM, 7340
  - ULTRASTRUCTURE, 5269
- STOMACH
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*
- TRANSPORT
  - CALCIUM, 7340

ADRENERGIC RECEPTOR BLOCKADERS
- BILIARY TRACT
  - DRUG EFFECTS ON, 3791
- GALLBLADDER
  - DRUG EFFECTS ON, 3791

ADRENERGIC RECEPTOR BLOCKADERS (continued)
- GASTRIN
  - DYSPEPSIA, 2271
  - ULCER, 2271
- INTESTINE, LARGE
  - MOTILITY, 2739*
- INTESTINE, SMALL
  - CHOLINE, 2073
- LIVER CIRRHOSIS
  - RENIN, 2553
- ODDI'S SPHINCTER
  - DRUG EFFECTS ON, 3791
- PANCREAS
  - SECRETION, 2856, 4586*
- SALIVA
  - CHEMICAL COMPOSITION, 2777
- STOMACH
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6723*
  - NERVOUS CONTROL, 5326
  - SECRETION, 6046
- THERAPY
  - COMPLICATIONS, 5213
  - PERITONITIS, 5213

AFFERENT LOOP SYNDROME
- ETIOLOGY, 3211
- GASTRECTOMY
  - OSMOSIS, 5465*
- INTESTINES
  - MOTILITY, 5322*
- RADIONUCLIDES
  - RADIOLOGY, 5680
- STOMACH
  - MOTILITY, 5322*

AFLATOXINS
- LIVER
  - NEOPLASMS, 7100*
- LIVER CIRRHOSIS
  - ETIOLOGY, 1567
  - URINE, 1567
- PROTEINS
  - SYNTHESIS, 8010*
- TOXICOLOGY
  - DIETARY FACTORS, 1503

ALBUMINS
- ABSORPTION
  - MARKER STUDY, 6004*
- ALCOHOLS
  - EXCRETION, 1282*
- AMINO ACIDS
  - HEPATECTOMY, 151
  - METABOLISM, 151
  - SYNTHESIS, 151
- AMYLASES
  - ASSAY, 6065
- BILIRUBIN
  - BINDING, 6764*
  - FATTY ACIDS, 6764*
- COLITIS, ULCERATIVE
  - CLEARANCE STUDY, 4972
- COLON
  - ABSORPTION, 2707*
- CONTRAST MEDIA
  - BINDING, 3819

ALBUMINS (continued)
- CROHN'S DISEASE
  - CLEARANCE STUDY, 4972
- DIET
  - PROTEINS, 3860*
- FATTY ACIDS
  - BILIRUBIN, 7771*
  - BINDING, 6764*, 7771*
- GASTRECTOMY
  - METABOLISM, 6910
- GASTRITIS
  - EXCRETION, 1282*
- GASTRITIS, ATROPHIC
  - EXCRETION, 1282*
- HEME
  - SYNTHESIS, 2012
- HEPATITIS, CHRONIC
  - ANTIBODIES, 7090*
- HEPATITIS, TOXIC
  - GALACTOSAMINE, 7431*
- HEPATOCYTES, 7291*
- HORMONES, ADRENAL CORTEX
  - SYNTHESIS, 76
- ILEUM
  - VILLI, 1773*
- INFECTION
  - KWASHIORKOR, 5951
  - MARASMUS, 5951
- INFLAMMATORY BOWEL DISEASES
  - CLEARANCE STUDY, 4972
- INTESTINE, SMALL
  - ABSORPTION, 2707*
  - VILLI, 1773*
- INTESTINES
  - SHOCK, 3872*
- KWASHIORKOR
  - GROWTH DISORDERS, 5951
- LIVER
  - CARBON TETRACHLORIDE, 76
  - CLEARANCE STUDY, 4972
  - FETUS, 1967*
  - RETICULOENDOTHELIAL SYSTEM, 3914
  - SYNTHESIS, 76, 1967*, 6541*
- LIVER CIRRHOSIS
  - ANTIBODIES, 7090*
  - CLEARANCE STUDY, 2531*
  - REVIEW, 2546
  - SERUM, 3480*
- LIVER DISEASES
  - ANTIBODIES, 7090*
- LIVER DISEASES, ALCOHOLIC
  - CLEARANCE STUDY, 2531*
- MALABSORPTION SYNDROMES
  - DISEASES ASSOCIATED WITH, 7648
- MARASMUS
  - GROWTH DISORDERS, 5951
- NEONATE
  - REVIEW, 2546
- NUTRITION DISORDERS, 7524
- PANCREATITIS
  - HEMORRHAGE, 4231
  - HYPOCALCEMIA, 5789*
  - SERUM, 5789*
- STEROIDS
  - HEPATECTOMY, 151
  - METABOLISM, 151
  - SYNTHESIS, 151
- SURGERY
  - REVIEW, 2546

- ALBUMINS (continued)
  - TISSUE CULTURE
    - LIVER, 134
    - ULTRASTRUCTURE, 134
  - UREMIA
    - METABOLISM, 6611
  - URINARY SYSTEM
    - DISEASE, 2546

- ALCOHOL DEHYDROGENASES
  - SEE ALCOHOL OXIDOREDUCTASES

- ALCOHOL OXIDOREDUCTASES
  - ALCOHOLS
    - METABOLISM, 2870*
  - LIVER, 8055
    - COENZYMES, 7405*
    - SYNTHESIS, 8059

- ALCOHOLIC LIVER DISEASE
  - SEE LIVER DISEASES, ALCOHOLIC

- ALCOHOLISM
  - ASCITES
    - DRUG THERAPY, 6506*
  - BIOCHEMISTRY, 7411*
  - BLOOD
    - ALCOHOLS, 5899
  - CHOLESTASIS
    - MARKER STUDY, 4638
  - DIAGNOSIS, 4326
    - AMINO ACIDS, 7171*
    - IMMUNOGLOBULINS, 7804*
    - PLASMA, 7171*
  - DRUG METABOLISM, 6515, 7803*
  - EDEMA
    - LIVER CIRRHOSIS, 1556*
  - ENZYMES
    - REVIEW, 7172
  - FETUS, 7442*
  - GASTRIN
    - PANCREATITIS, 2602
  - GASTROINTESTINAL SYSTEM, 8068
  - GLYCOGEN
    - METABOLISM, 8067
  - HEPATITIS, CHRONIC
    - ETIOLOGY, 5106*
  - HEPATOCYTES
    - OXIDATION, 5398*
  - HYPERTENSION, 5898*, 6417*
    - REVIEW, 7809
  - LACTOSE INTOLERANCE
    - MILK, 1385
  - LIVER
    - ENZYMES, 5110*, 6505*
    - GLYCOGEN, 8067
    - LIPIDS, 8016*
    - NEOPLASMS, MALIGNANT, 7768
    - PROTEINS, 7442*
    - SIDEROSIS, 8389*
    - VITAMIN B12, 695
  - LIVER CIRRHOSIS, 4328, 5895*
    - ETIOLOGY, 703, 3465, 3466, 7802*, 8408
    - IMMUNOLOGY, 7802*
    - PROGNOSIS, 5895*, 7802*
    - SEX FACTORS, 7802*
  - LIVER DISEASES
    - LIPIDS, 694

- ALCOHOLISM (continued)
  - LIVER DISEASES, ALCOHOLIC
    - HEPATITIS, 2532*
    - HEPATITIS, NONVIRAL, 4325*
    - REVIEW, 7809
  - LIVER INJURY, 5848*
    - ALDEHYDES, 7428*
    - BIOPSY, 4319*
    - ENZYMES, 3460*
    - HEPATITIS, NONVIRAL, 4319*
    - LIVER CIRRHOSIS, 4319*
    - SULFHYDRYL COMPOUNDS, 6077*
  - MAGNESIUM
    - DEFICIENCY, 6610
    - MUSCLES, 6610
  - MALLORY-WEISS SYNDROME, 7563
  - METABOLISM, 7411*
  - MICROSOMES
    - ENZYMES, 4411
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 8282*
  - MUSCLES
    - ELECTROLYTES, 6610
  - NEONATE, 7442*
  - PANCREAS, 6369
    - FATTY ACIDS, 3743
    - NERVOUS CONTROL, 5391*
    - PARASYMPATHOMIMETICS, 7367*
    - SECRETION, 3743
  - PANCREATITIS
    - ANEURYSM, 4244
    - ANTIBIOTICS, 526*
    - CALCIFICATION, 537
    - CHOLECYSTOGRAPHY, 4991*
    - METABOLISM, 4243
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 4989*
    - GASTRIN, 3356
    - SURGERY, 2442
  - PREGNANCY, 7442*
  - PROTEINS
    - SYNTHESIS, 7442*
  - RESPIRATORY SYSTEM
    - CARBOHYDRATES, 4546
    - REVIEW, 7810
  - SERUM
    - ALKALINE PHOSPHATASE, 8391
    - AMINO TRANSFERASES, 8391
    - AMYLASES, 5110*, 6505*
    - BILIRUBIN, 5110*, 6505*
    - ENZYMES, 8391
    - IMMUNOGLOBULINS, 8391
  - SIMULATION
    - BIOCHEMISTRY, 4638
    - HISTOCHEMISTRY, 4638
  - STOMACH
    - CELLS, 4488*
    - MORPHOMETRY, 4488*
    - ULCER, PEPTIC, 4847
  - VITAMIN B1
    - LIVER DISEASES, ALCOHOLIC, 5112*
  - VITAMIN B2
    - LIVER DISEASES, ALCOHOLIC, 5112*
  - VITAMIN B6
    - LIVER DISEASES, ALCOHOLIC, 5112*

- ALCOHOLS
  - ABSORPTION
    - DISACCHARIDES, 173*

ALCOHOLS (continued)
  ABSORPTION (continued)
    FEEDING, 5303
    LIPIDS, 7916*
    MONOSACCHARIDES, 173*
  ACID SECRETION
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 2282*, 3664*
    ADENOSINE TRIPHOSPHATE, 3664*
  ALBUMINS
    EXCRETION, 1282*
  ANTILIPEMIC AGENTS
    DRUG EFFECTS ON, 6831
  BICARBONATE SECRETION
    HORMONE EFFECTS ON, 1931*
  BILE
    BILE ACIDS AND SALTS, 3783
    SECRETION, 1017*
  BIOCHEMISTRY, 7411*
  BLOOD
    ALCOHOLISM, 5899
    LIPIDS, 7515*
  CARBOHYDRATES
    LIVER, 148
    METABOLISM, 148
  COLLAGEN
    DRUG EFFECTS ON, 2871*, 2872*
  COLON, 3531
    ADENYL CYCLASE, 2074
  DRUG METABOLISM, 6515
    ENZYMES, 1020*, 1037
  DUMPING SYNDROME
    KININS, 5477*
    THERAPY, 5477*
  ESOPHAGUS, 3531
    HYDROGEN, 7301*
    NEOPLASMS, 6213
  FATTY LIVER
    BIOCHEMISTRY, 2052
    CARBOXYLASES, 5116
    DIETARY FACTORS, 5116
    IRON, 4725
    METABOLISM, 150
    NICOTINIC ACIDS, 1019*
    OXIDATION, 5116
    SIMULATION, 150, 1018*
  FRUCTOSE, 6515
  GASTRIN
    DRUG EFFECTS ON, 4683*
  GASTROINTESTINAL SYSTEM, 3531
    ABSORPTION, 3927
  GLUCOSE
    TRANSPORT, 30
  GLYCERIN
    ENZYMES, 2035
    LIVER, 2035
  HEPATOCYTES
    DRUG METABOLISM, 5398*
    ENZYMES, 4624*
  HYDROGEN
    METABOLISM, 7429*
  ILEUM
    GUANYL CYCLASE, 7338*
    ION TRANSPORT, 4498*
  INTESTINE, SMALL, 3531
  JEJUNUM
    ION TRANSPORT, 4498*
  LIPIDS
    METABOLISM, 7805*

ALCOHOLS (continued)
  LIVER
    ALDEHYDES, 3760*
    BILIRUBIN, 3808
    DOPAMINE, 3807
    ENZYMES, 4625*, 7408*, 7409*
    FETUS, 6121
    FIBROSIS, 7139*
    GALACTOSE, 2034
    GLYCEROPHOSPHATES, 165
    GUANYL CYCLASE, 7338*
    HEME, 2868
    INFANT, 6121
    LIPIDS, 122*, 3759*, 5399*
    METABOLISM, 1038, 2002, 2906, 4411,
      6078*, 7174*, 7428*, 7429*
    MORPHOLOGY, 7174*
    MORPHOMETRY, 3759*
    OXIDATION, 1036, 3760*, 7410*
    OXIDOREDUCTASES, 4623*
    PHOSPHOHYDROLASE, 4622*
    PHOSPHOLIPIDS, 149
    PORPHYRINS, 2868
    PROTEINS, 3761*, 7439*
    SEDATIVES, 2002
    URIC ACID, 6079*
  LIVER CIRRHOSIS, 7191
    DRUG-INDUCED, 7139*
    EXCRETION, 714
    HEMORRHAGE, 5117
    STATISTICAL STUDY, 6601
  LIVER DISEASES
    LIVER FUNCTION TESTS, 602
    METABOLISM, 602
  LIVER DISEASES, ALCOHOLIC
    BLOOD, 5899
    METABOLISM, 5109*
  LIVER INJURY, 5850
    DRUG-INDUCED, 1511
    SIMULATION, 3806
  LYMPH
    LIPIDS, 7916*
  LYMPHATIC SYSTEM
    LIPIDS, 7916*
  LYSOSOMES
    ENZYMES, 4625*
  METABOLISM, 7411*
    ALCOHOL OXIDOREDUCTASE, 2870*
    BIOCHEMISTRY, 6515
    DRUG EFFECTS ON, 4626
    REVIEW, 7410*
    TOXICITY, 7410*
  MITOCHONDRIA
    ENZYMES, 147
    LIVER, 147
    MONOAMINE OXIDASE, 147
  NEOPLASMS
    NITROSAMINES, 6213
  NERVOUS SYSTEM
    PHOSPHOLIPIDS, 149
  ODDI'S SPHINCTER
    ELECTROPHYSIOLOGY, 2745*
  OXIDATION
    HEPATITIS, 5430*
  OXIDATIVE PHOSPHORYLATION
    DRUG EFFECTS ON, 4637
  PANCREAS
    BICARBONATE SECRETION, 1931*,
      4683*, 7368*

ALCOHOLS (continued)
- PANCREAS (continued)
  - GUANYL CYCLASE, 7338*
  - HORMONE EFFECTS ON, 1931*
  - NERVOUS CONTROL, 1957
  - OXIDATION, 3726*
  - PARASYMPATHOMIMETICS, 1957
  - SECRETIN, 1956
  - SECRETION, 112, 1931*, 1957, 4601, 4683*, 7368*
  - WOUNDS AND INJURIES, 2441
- PANCREATITIS, 4227
  - ETIOLOGY, 4222*
- PANCREATITIS, CHRONIC
  - ETIOLOGY, 2440
  - FATS, 6385
  - GENETICS, 4988*
  - NERVOUS CONTROL, 6385
  - PROTEINS, 6385
- PROTEINS
  - EXCRETION, 1282*
  - PREGNANCY, 2905
  - SYNTHESIS, 2905, 8011*
- SECRETIN
  - DRUG EFFECTS ON, 4683*
  - SECRETION, 1956
- STOMACH, 3531
  - ABSORPTION, 3623, 5282*
  - ACID SECRETION, 1913, 3664*
  - ENZYMES, 3665*
  - GUANYL CYCLASE, 7338*
  - HISTAMINE, 78*
  - ION TRANSPORT, 36
- TOXICITY
  - BIOCHEMISTRY, 6515
- TRIGLYCERIDES
  - LIVER DISEASES, 578
- ULCER
  - DRUG-INDUCED, 4089
  - DUODENUM, 4089
- ULCER, PEPTIC
  - DRUG-INDUCED, 3191
- VITAMIN A
  - DEFICIENCY, 6078*

ALDEHYDES
- LIVER
  - ALCOHOLS, 3760*
  - DOPAMINE, 3807
  - METABOLISM, 7428*
  - OXIDATION, 3760*
  - OXIDOREDUCTASES, 2025
- LIVER DISEASES, ALCOHOLIC
  - ETIOLOGY, 7428*
- LIVER INJURY
  - ALCOHOLISM, 7428*
- PANCREAS
  - PERFUSION, 993

ALDOLASE
- LIVER
  - ISOENZYMES, 8292*
  - NEOPLASMS, MALIGNANT, 8292*
- NEOPLASMS, MALIGNANT
  - ISOENZYMES, 8292*

ALGAE
- CECUM
  - ULCER, 3024

ALKALINE PHOSPHATASE
- ALCOHOLISM
  - SERUM, 8391
- BILIARY TRACT DISEASES
  - ISOENZYMES, 4249*
  - OBSTRUCTION, 4249*
- CHOLESTASIS
  - CELLS, 7403*
  - SYNTHESIS, 1103*
- COLITIS, ULCERATIVE
  - ISOENZYMES, 4209
- DUODENUM
  - SECRETION, 4690
  - ULCER, 3205
- HEPATITIS, CHRONIC
  - DRUG THERAPY, 8387
- HEPATOCYTES
  - CHOLESTASIS, 7403*
- INTESTINE, SMALL
  - ADENOSINE TRIPHOSPHATASE, 2076
  - FATTY ACIDS, 7486*, 7487*
  - SECRETION, 4690
  - SURGERY, 8087*
  - TRANSPORT, 8087*
  - WOUNDS AND INJURIES, 6135
- INTESTINES
  - FETUS, 6137
- JEJUNUM
  - SECRETION, 4690
- LIVER
  - CELLS, 7403*
  - CHOLESTASIS, 1047
  - NEOPLASMS, 563
  - TECHNIQUES, 604
- LIVER CIRRHOSIS
  - DRUG THERAPY, 8387
  - ISOENZYMES, 679, 3098
- LIVER DISEASES
  - DIAGNOSIS, 3099, 5514*
  - ISOENZYMES, 3099, 4249*
  - OBSTRUCTION, 4249*
- LYMPH
  - TRANSPORT, 5933*
- PARENTERAL ALIMENTATION
  - METABOLISM, 5184
- SALIVARY GLANDS, 7296
  - NEOPLASMS, BENIGN, 7296
- SERUM
  - SOLVENTS, 2901
- SHUNT, INTESTINAL
  - OBESITY, 7625
- TRANSPORT
  - DIETARY FACTORS, 5933*
  - TRIGLYCERIDES, 5933*
- ULCER, PEPTIC
  - ENZYMES, 3205

ALKALIS
- DUODENUM, 2836*

ALKALOIDS
- ABSORPTION, 6803
- DUODENUM
  - MOTILITY, 7941
- EXCRETION, 6803
- HEPATITIS, TOXIC
  - TOXICOLOGY, 642
- HYPERTENSION, PORTAL
  - DRUG-INDUCED, 6450*

ALKALOIDS (continued)
    INTESTINAL ABSORPTION
        AMINO ACIDS, 6686*
    INTESTINE, SMALL
        MOTILITY, 7941
        VILLI, 1852
    LIVER
        TOXICOLOGY, 2148
    LIVER INJURY
        DRUG-INDUCED, 6450*
    PANCREAS
        DRUG EFFECTS ON, 7371*
    STOMACH
        TOXICOLOGY, 2148

ALKALOSIS
    COLON
        ELECTROLYTES, 4501*
        ION TRANSPORT, 4501*

ALLERGY
    SEE HYPERSENSITIVITY

ALPHA 1 ANTITRYPSIN
    DEFICIENCY
        DISEASES ASSOCIATED WITH, 5805*, 7119
        LIVER CIRRHOSIS, 336
        LIVER DISEASES, 6402*, 8287*
        PROGNOSIS, 3413*
        REVIEW, 5805*
        THERAPY, 336
    GENETIC FACTORS, 6399
    HEPATITIS, 3361*
    HEPATITIS, CHRONIC, 3361*
    HEPATITIS, INFECTIOUS
        DEFICIENCY, 8286*
    HYPERBILIRUBINEMIA
        DEFICIENCY, 8286*
        NEONATE, 8286*
    LIVER
        DEFICIENCY, 7119
        FIBROSIS, 5005*
        NEOPLASMS, MALIGNANT, 5005*
    LIVER CIRRHOSIS, 5005*
        DEFICIENCY, 8412
    LIVER DISEASES, 3361*, 5005*
        ETIOLOGY, 5046
        GENETICS, 8287*
        INFANT, 8287*
    PANCREATITIS, 4998

ALPHA-CHAIN DISEASE
    INTESTINE, SMALL
        LYMPHOMA, 6977*
    LYMPHOMA
        DIAGNOSIS, 6977*
        ENVIRONMENTAL FACTORS, 1351*
        EPIDEMIOLOGY, 1351*
    MALABSORPTION SYNDROMES, 6977*
        DIAGNOSIS, 6977*
        ENTEROPATHY, 6310*

ALPHA FETOPROTEIN
    CELLS
        ULTRASTRUCTURE, 6759*
    DUODENUM
        ATRESIA, 411

ALPHA FETOPROTEIN (continued)
    GASTROINTESTINAL SYSTEM
        NEOPLASMS, MALIGNANT, 3057
    HEPATITIS, 3449, 4280
        NECROSIS, 3372*
    HEPATITIS, INFECTIOUS, 5096
        DIAGNOSIS, 4293*
        NECROSIS, 3372*
        RADIOIMMUNOASSAY, 7089*
    HYPERBILIRUBINEMIA
        NEONATE, 3408*
    IMMUNOLOGY, 3384
    JAUNDICE
        NEONATE, 3408*
    LIVER
        CARBON TETRACHLORIDE, 2154, 3751*
        FETUS, 1967*
        HEPATECTOMY, 3751*
        NECROSIS, 3372*
        NEOPLASMS, 3391, 6081*, 7089*, 7096*, 7104*
        NEOPLASMS, MALIGNANT, 3392, 3408*, 5810*, 5812*, 6403*, 6404*, 6405*, 7762, 7768
        REGENERATION, 3751*
        SURGERY, 2154
        SYNTHESIS, 1967*, 3751*
        ULTRASTRUCTURE, 6759*
    LIVER CIRRHOSIS, 3392, 3485
        RADIOIMMUNOASSAY, 7089*
    LIVER DISEASES, 3392, 5095
        LYMPHOCYTES, 629
        PROGNOSIS, 2454*
        SERUM, 2454*
    LIVER DISEASES, ALCOHOLIC, 3392
    LIVER INJURY, 4280
        CARBON TETRACHLORIDE, 6114, 8345
        DRUG-INDUCED, 3030
        GALACTOSAMINE, 3030
        NECROSIS, 3030
        REGENERATION, 3030
    NEOPLASM METASTASIS
        DIAGNOSIS, 5012*
    NEOPLASMS
        PROGNOSIS, 6590*
    NEOPLASMS, MALIGNANT
        DIAGNOSIS, 5012*
        LIVER, 5012*
    NUTRITION DISORDERS, 8484
    PLASMA
        HEPATITIS, INFECTIOUS, 5879*
    REVIEW, 8334
    SERUM
        LIVER INJURY, 3030
    STOMACH
        NEOPLASMS, 4803*, 7089*
        SECRETION, 4803*
        SERUM, 4803*
    SYNTHESIS, 6114, 7518
    URINARY SYSTEM
        NEOPLASMS, 7131

AMEBIASIS
    ABSCESS
        COMPLICATIONS, 5241*
        LIVER, 6655
        PERITONITIS, 634
    ANTIGENS
        TRANSFORMATION, 5239*

- AMEBIASIS (continued)
  - ANUS
    - DIAGNOSIS, 3564
    - REVIEW, 3564
    - THERAPY, 3564
  - COLITIS
    - DIAGNOSIS, 4943
    - ETIOLOGY, 3543, 3557*
    - GANGRENE, 5248
  - COLON
    - DIAGNOSIS, 7893
    - ENZYMES, 7893
    - NECROSIS, 3557*
    - PERFORATION, 4178
    - RADIOLOGY, 6642*
    - STRICTURE, 823
  - COMPLICATIONS
    - ABSCESS, 6649
  - DIAGNOSIS
    - ENZYMES, 7893
  - DRUG THERAPY, 3565, 5973
    - TOLERANCE, 3566
  - DYSENTERY
    - CHILD, 6659
    - COMPLICATIONS, 5240*
    - DRUG THERAPY, 824, 6659
    - THERAPY, 5240*
  - ENTERITIS
    - ETIOLOGY, 3543
  - EPIDEMIOLOGY
    - FAMILIAL FACTORS, 6651
    - TRANSMISSION, 7274
  - IMMUNOLOGY, 5239*, 7471
  - INTEGUMENTARY SYSTEM
    - COLITIS, ULCERATIVE, 1714
  - INTESTINES
    - COLITIS, 6667
    - COMPLICATIONS, 4460
    - DYSENTERY, 6667
    - EPIDEMIOLOGY, 4460, 6667
    - ETIOLOGY, 4460
    - REVIEW, 4460
  - LIVER
    - ABSCESS, 1472, 1715, 1716, 2173*, 4461, 5241*, 5247, 6649, 7471
    - COMPLICATIONS, 2662, 4460, 6649
    - DIAGNOSIS, 6660
    - DRUG THERAPY, 1472, 6660
    - EPIDEMIOLOGY, 4460, 6667
    - ETIOLOGY, 4460
    - REVIEW, 4460
    - RUPTURE, 6655
    - SURVIVAL, 2662
    - THERAPY, 6655
  - LIVER DISEASES
    - ECHINOCOCCOSIS, 820
  - PROCTOCOLITIS
    - DIAGNOSIS, 3567
    - THERAPY, 3567
  - RECTUM
    - EPIDEMIOLOGY, 6667
  - SERUM
    - ANTIBODIES, 5806*
  - SIMULATION
    - LIVER, 5497
    - NEONATE, 5497
  - THERAPY, 5241*
  - TRANSMISSION, 6641*, 8473
    - REVIEW, 8472
  - VENEREAL DISEASES, 6641*

- AMINES
  - COLON
    - GARDNER'S SYNDROME, 6999*
    - NEOPLASMS, 6999*
  - DUODENUM
    - MORPHOLOGY, 6742
    - ULCER, 6742
  - ESOPHAGUS
    - MOTILITY, 6707
    - SPHINCTER, 6707
  - INTESTINE, SMALL
    - ENZYMES, 180, 1099
    - METABOLISM, 180
  - LIVER COMA
    - BLOOD PLATELETS, 6510*
  - RECTUM
    - COLITIS, ULCERATIVE, 5759*
    - GARDNER'S SYNDROME, 6999*
    - IRRITABLE COLON, 5759*
    - NEOPLASMS, 6999*
  - SYNTHESIS
    - NUTRITION, 6806

- AMINO ACIDS
  - ABSORPTION
    - CIRCULATION, 3011
    - CLEARANCE STUDY, 1792
    - ENTERECTOMY, 5305
    - FATS, 3609*
    - FATTY ACIDS, 3609*
    - GASTROINTESTINAL SYSTEM, 1792
    - KALLIKREIN, 7914*
    - MOTILITY, 3011
    - PANCREAS, 7933
    - PEPTIDES, 1778*
    - TECHNIQUES, 5304, 7929
  - ACID SECRETION
    - ENZYMES, 90
    - GASTRIN, 1867, 2779
  - ALBUMINS
    - HEPATECTOMY, 151
    - METABOLISM, 151
    - SYNTHESIS, 151
  - ALCOHOLISM
    - DIAGNOSIS, 7171*
  - AMINO TRANSFERASES
    - TRANSPORT, 6758*
  - BILE, 6069*
  - BILE ACIDS AND SALTS, 2874*
    - CIRCULATION, 1968*
  - BILIARY TRACT
    - CONTRAST MEDIA, 5525
    - SECRETION, 4677*
  - CECUM
    - METABOLISM, 181
    - MICROORGANISMS, 3834*
  - CHEMICAL COMPOSITION
    - FECES, 6713*
  - COLLAGEN
    - METABOLISM, 8023*
  - COLON
    - ELECTROPHYSIOLOGY, 1766*
    - GROWTH FACTORS, 1766*
    - WOUNDS AND INJURIES, 1398
  - CROHN'S DISEASE
    - SERUM, 2673
  - DEFICIENCY
    - FOLIC ACID, 7473

AMINO ACIDS (continued)

- DIET
  - DEFICIENCY, 6815*
- DIGESTION
  - DIET, 6712*
- DUODENUM, 3630*
  - ABSORPTION, 3236, 3601*
  - BILE ACIDS AND SALTS, 3601*
  - MOTILITY, 3653
- ELECTROPHYSIOLOGY
  - JEJUNUM, 2699*
- ENTERITIS
  - ABSORPTION, 3236
- EROSIONS
  - ASPIRIN, 2144
- FATTY LIVER
  - DEFICIENCY, 8017*
  - DIETARY FACTORS, 1995
- GASTRIN, 3691
- GASTRITIS, ATROPHIC
  - METABOLISM, 4821
- GASTROINTESTINAL DISEASES
  - ABSORPTION, 2617
- GASTROINTESTINAL SYSTEM
  - PARENTERAL ALIMENTATION, 7361
- HEPATITIS, CHRONIC
  - CHILD, 8327
  - ENZYMES, 682
  - METABOLISM, 8327
- HEPATITIS, INFECTIOUS
  - CHILD, 4780, 8370
- HEPATOCYTES
  - TRANSPORT, 6024, 6760*
- ILEUM
  - ABSORPTION, 1778*, 5305
- INTESTINAL ABSORPTION, 7298*
  - ALKALOIDS, 6686*
  - BILE ACIDS AND SALTS, 7911*
  - DRUG EFFECTS ON, 2968
- INTESTINE, LARGE
  - MICROORGANISMS, 3834*
- INTESTINE, SMALL, 4677*
  - ABSORPTION, 16*, 1778*, 3011, 3609*, 5304, 6686*, 7297*, 7912*, 7914*, 7929
  - CELLS, 2970
  - DRUG EFFECTS ON, 5297
  - ENZYMES, 6815*, 7491*
  - EPITHELIUM, 2092
  - GROWTH FACTORS, 3012
  - HYPEREMIA, 3767
  - ION TRANSPORT, 6009
  - KINETICS, 7491*
  - MICROORGANISMS, 3834*
  - SYNTHESIS, 2092
  - TRANSPORT, 5297, 7914*, 7929
- INTESTINES
  - ABSORPTION, 2617, 7913*
  - MUSCLES, 4527*
  - PERFUSION, 2617
  - TRANSPORT, 4692, 7913*
- JAUNDICE, OBSTRUCTIVE
  - DIAGNOSIS, 3112
- JEJUNUM, 3630*
  - ABSORPTION, 23, 1778*, 3011, 3236, 7912*, 8083*
  - METABOLISM, 23, 8083*
  - TRANSPORT, 2699*

AMINO ACIDS (continued)

- KERNICTERUS, 2473
  - DIETARY FACTORS, 3394
  - HEPATITIS, INFECTIOUS, 4295*
  - HEPATITIS, TOXIC, 4295*
  - PLASMA, 3393
  - THERAPY, 3394
- KIDNEYS
  - SYNTHESIS, 6777*
- LIVER, 2009, 3927
  - DIETARY FACTORS, 3766, 3917, 4639
  - ENZYMES, 682
  - GLUCONEOGENESIS, 157
  - LIPIDS, 8017*
  - LYSOSOMES, 3917
  - METABOLISM, 6761*, 7387*, 7993*, 8048, 8049
  - MITOCHONDRIA, 3917
  - PERFUSION, 6761*
  - PHOSPHOLIPIDS, 2935
  - PROTEINS, 6761*
  - SCHISTOSOMIASIS, 8048, 8049
  - SYNTHESIS, 6777*
  - TRANSPORT, 7387*
- LIVER CIRRHOSIS
  - CHILD, 8327
  - DEFICIENCY, 6522*
  - METABOLISM, 8327
  - SERUM, 2548
- LIVER COMA
  - NERVOUS SYSTEM, 4665
  - PLASMA, 3768
- LIVER DISEASES
  - METABOLISM, 575
- LIVER INJURY
  - ANALGESICS AND ANTIPYRETICS, 6449*
  - DIAGNOSIS, 7171*
- METABOLISM
  - GLUTATHIONE, 7993*
  - SCHISTOSOMIASIS, 8048, 8049
  - TYROSINEMIA, 4261
- MICROORGANISMS
  - METABOLISM, 3834*
- MUSCLES
  - DIETARY FACTORS, 4639
- NERVOUS SYSTEM
  - METABOLISM, 575
  - PATHOLOGY, 676
- NUCLEIC ACIDS
  - LIVER, 2946
- PANCREAS
  - METABOLISM, 2842, 3734
  - NEOPLASMS, MALIGNANT, 2425
  - SECRETION, 4677*
  - TRANSPORT, 2841, 7987*
- PARENTERAL ALIMENTATION
  - METABOLISM, 5184
- PLASMA
  - ANALYSIS, 1554*
  - CASEIN, 5281*
- PORTACAVAL SHUNT, 8081
- PROTEIN-LOSING ENTEROPATHIES
  - BLIND LOOP SYNDROME, 1134
- PYLOROPLASTY
  - ANALYSIS, 5635
- PYLORUS
  - STENOSIS, 4096
- SCLERODERMA
  - ABSORPTION, 5219

AMINO ACIDS (continued)
- SERUM, 6069*
- SHUNT, INTESTINAL
  - ABSORPTION, 2315*
  - LIVER INJURY, 7637*
  - OBESITY, 4874*, 5661
  - PSYCHOLOGICAL FACTORS, 4874*
- STOMACH
  - ACID SECRETION, 1901, 6055, 6740
  - GASTRIN, 1901
  - HORMONE EFFECTS ON, 952*
  - METABOLISM, 4821
  - MOTILIN, 952*
  - MOTILITY, 941, 2744*, 3630*, 3631*, 3653, 7940*
  - MUCUS, 4566*
  - NEOPLASMS, MALIGNANT, 4821
  - PENTAGASTRIN, 952*
  - POLYPS, 4821
  - SECRETIN, 952*
  - SECRETION, 3700, 7969*
- STOMACH DISEASES
  - METABOLISM, 4821
- SYNTHESIS
  - DIETARY FACTORS, 6777*
- TRANSPORT
  - KALLIKREIN, 7914*
  - LIVER, 6758*
  - TECHNIQUES, 7929
- ULCER
  - DRUG-INDUCED, 6050
- URINE
  - ANALYSIS, 1554*
- VAGOTOMY
  - ANALYSIS, 5635
- WILSON'S DISEASE
  - LIVER FUNCTION TESTS, 8314
  - METABOLISM, 8314

AMINO PEPTIDASES
- DUODENUM
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
- INTESTINES
  - MEMBRANES, 2077
- LIVER DISEASES, 1239

AMINO TRANSFERASES
- ALCOHOLISM
  - SERUM, 8391
- AMINO ACIDS
  - TRANSPORT, 6758*
- CELL CULTURE
  - CARBON TETRACHLORIDE, 8024*
- HEPATITIS, CHRONIC
  - DIAGNOSIS, 5889
- HEPATITIS, INFECTIOUS
  - DIAGNOSIS, 6465*
  - GLUCURONIDASE, 663
- LIVER, 6118
  - HYPOTENSION, 612
  - ISCHEMIA, 612
- LIVER DISEASES
  - DIAGNOSIS, 8145
  - INFANT, 4750*
- PARENTERAL ALIMENTATION
  - METABOLISM, 5184

AMMONIA
- ACID SECRETION
  - POTASSIUM, 86
- BLOOD
  - UREMIA, 4734
- HEPATECTOMY
  - DIET, 2026
  - METABOLISM, 2026
- HYPERTENSION, PORTAL
  - LIVER FUNCTION TESTS, 4343
- ILEUM
  - METABOLISM, 3842
- INTESTINE, SMALL
  - METABOLISM, 3842
- JAUNDICE
  - METABOLISM, 8298*
- LIVER
  - METABOLISM, 8298*
- LIVER CIRRHOSIS
  - LIVER FUNCTION TESTS, 4343
  - METABOLISM, 8141
  - OXIDATION, 5121*
- LIVER COMA
  - ETIOLOGY, 8416
  - FATTY ACIDS, 571
  - METABOLISM, 8141
- LIVER DISEASES
  - KERNICTERUS, 7182*
- NERVOUS SYSTEM
  - LIVER DISEASES, 1568
  - METABOLISM, 1568
- NUCLEIC ACIDS
  - SYNTHESIS, 179

AMPULLA OF VATER
- SEE VATER'S AMPULLA

AMYLASES
- ABDOMEN
  - PAIN, 6387
- ADOLESCENCE, 5786*
- ALBUMINS
  - ASSAY, 6065
- ALCOHOLISM
  - SERUM, 6505*
- ANESTHESIA
  - PANCREAS, 3727*
- BLOOD, 6822
- CERULEIN
  - PANCREATIC DISEASES, 3938*
  - SECRETIN, 3938*
- CHILD, 5786*
  - PANCREATITIS, 6387
- CHOLECYSTITIS
  - THERAPY, 747
- CLEARANCE STUDY
  - TECHNIQUES, 3937
- DIAGNOSIS
  - PANCREATITIS, 3982
- GALLBLADDER DISEASES
  - THERAPY, 747
- GASTROINTESTINAL DISEASES
  - REVIEW, 2182
- GLOBULINS
  - ASSAY, 6065
  - CHEMICAL COMPOSITION, 6063
- GLYCOGEN
  - HYDROLYSIS, 6064

AMYLASES (continued)
- HEPATITIS, CHRONIC
  - PANCREAS, 3370*
  - SALIVARY GLANDS, 3370*, 5107
  - SERUM, 3370*
- HEPATITIS, INFECTIOUS
  - PANCREAS FUNCTION TESTS, 6463*
- HORMONES, GASTROINTESTINAL
  - PANCREAS, 2849
- INTESTINE, SMALL, 6823
  - SECRETION, 6822
- INTESTINES, 1092
- ISOENZYMES
  - TEMPERATURE, 6358*
- LIVER DISEASES
  - PANCREAS, 3370*
  - SALIVARY GLANDS, 3370*, 5107
  - SERUM, 3370*
- METABOLISM
  - PAROTID GLAND, 2774
- NEOPLASMS
  - DIAGNOSIS, 2411*
- PANCREAS
  - ACIDS, 2837*
  - CHOLECYSTOKININ, 3724*
  - HORMONE CONTROL, 7985*
  - HORMONES, GASTROINTESTINAL, 1936
  - HYDROLYSIS, 6064
  - IONOPHORES, 1958
  - PANCREOZYMIN, 3724*
  - PARASYMPATHOMIMETICS, 4602
  - SECRETIN, 3724*
  - SECRETION, 1936, 2837*, 3735, 4603, 5389*, 5442*, 7370*, 7984*, 7985*
  - STARVATION, 4595*
  - SYNTHESIS, 2837*
- PANCREAS FUNCTION TESTS
  - CLEARANCE STUDY, 2993*
- PANCREATIC DISEASES, 3121
  - DIAGNOSIS, 3975, 5788*
- PANCREATITIS, 3982
  - ADOLESCENCE, 5786*
  - ASCITES, 4219*
  - CHILD, 5786*
  - CHOLELITHIASIS, 2430*
  - CLEARANCE STUDY, 2993*, 3492*, 4226, 4787
  - CREATININE, 3343*
  - DIAGNOSIS, 3902, 3981
  - ENZYMES, 3123
  - SERUM, 6381
  - SIMULATION, 1450
  - TECHNIQUES, 1450
- PANCREATITIS, CHRONIC
  - ASCITES, 4219*
  - DIAGNOSIS, 2411*, 8272*
  - ISOENZYMES, 4224*, 8272*
- PANCREATOGRAPHY
  - SERUM, 5529
- PEPTIDES
  - PANCREAS, 2849
- PROTEINS
  - ASSAY, 6065
- RESPIRATORY SYSTEM
  - DISEASE, 4247*
- SALIVARY GLANDS
  - ACETYLCHOLINE, 1869
  - DENTISTRY, 6716*

AMYLASES (continued)
- SALIVARY GLANDS (continued)
  - DIAGNOSIS, 5788*
  - DISEASE, 4247*
  - HYDROLYSIS, 6064
  - PANCREATIC DISEASES, 5788*
  - SECRETION, 7341
  - SYMPATHOMIMETICS, 1869
- SECRETION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7985*
  - CALCIUM, 4547
  - DRUG EFFECTS ON, 7370*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 7985*
  - HORMONE CONTROL, 7985*
  - KINETICS, 1938
- SERUM, 5179*
  - ACIDOSIS, 5932*
  - AGE FACTORS, 6744*
  - ALCOHOLISM, 5110*
  - CHILD, 6744*
  - INFANT, 6744*
  - LIVER DISEASES, 4247*
  - NEOPLASMS, 2411*
  - PANCREATITIS, CHRONIC, 2411*
  - TECHNIQUES, 7550
- STARCH
  - HYDROLYSIS, 6064
- TEMPERATURE, 3981
- URINE
  - AGE FACTORS, 6744*
  - CHILD, 6744*
  - INFANT, 6744*
  - TECHNIQUES, 7550
- UROGENITAL SYSTEM
  - DISEASE, 4247*

AMYLOIDOSIS
- CROHN'S DISEASE, 3583
- DRUG THERAPY, 8043
- INFLAMMATORY BOWEL DISEASES
  - COMPLICATIONS, 4964*
- LIVER
  - COMPLICATIONS, 3103
  - SCANNING, SCINTILLATION, 3103
  - ULTRASTRUCTURE, 1474
- LIVER FUNCTION TESTS
  - DYES, 3093
- STOMACH
  - NEOPLASMS, MALIGNANT, 5232
- TRANSPORT
  - LIVER, 1475
  - METALS, 1475

ANALGESICS AND ANTIPYRETICS
- COLON
  - MOTILITY, 923
  - PERISTALSIS, 923
- DRUG METABOLISM
  - NECROSIS, 2105*
  - SULFHYDRYL COMPOUNDS, 2105*
- DUODENUM
  - MORPHOLOGY, 6884
- HEMORRHAGE
  - DRUG-INDUCED, 3547
- HEPATITIS, CHRONIC
  - DRUG-INDUCED, 6440*
- HEPATITIS, TOXIC, 6441*

ANALGESICS AND ANTIPYRETICS (continued)
- HEPATOCYTES
  - DRUG METABOLISM, 2105*
- INTESTINE, SMALL
  - METABOLISM, 2973
  - TRANSPORT, 2973
- INTESTINES
  - MOTILITY, 6552*
- LIVER
  - CYTOCHROMES, 5401*
  - DRUG METABOLISM, 4636, 8029*
  - MORPHOLOGY, 8339*
- LIVER CIRRHOSIS
  - DRUG-INDUCED, 6440*
- LIVER COMA
  - DRUG-INDUCED, 3416*
- LIVER DISEASES
  - BREATH TEST, 2467
  - DRUG METABOLISM, 601, 7084*
  - SALIVA, 2467
  - URINE, 2467
- LIVER FUNCTION TESTS
  - DRUG EFFECTS ON, 8339*
- LIVER INJURY, 5846*, 5847*
  - AMINO ACIDS, 6449*
  - DRUG-INDUCED, 3416*, 6440*, 6441*, 6449*
  - PREVENTION, 6449*
  - THERAPY, 6449*
- PANCREATITIS
  - DRUG-INDUCED, 3339*
- SERUM
  - BILE ACIDS AND SALTS, 8339*
- STOMACH
  - ASPIRIN, 6045
  - DRUG EFFECTS ON, 6045
  - ELECTRICAL CONTROL, 1884*
  - ELECTROPHYSIOLOGY, 6552*, 7333
  - ION TRANSPORT, 1884*
  - MORPHOLOGY, 6884
  - MOTILITY, 6552*
  - WOUNDS AND INJURIES, 1884*

ANCYLOSTOMIASIS
- ASCARIASIS, 6644*
- DRUG THERAPY
  - CHILD, 839
- INTESTINE, SMALL
  - REVIEW, 826

ANDROGENS
- DUODENUM
  - ULCER, PEPTIC, 7582
- FATTY LIVER
  - FUNGI, 6787
  - METALS, 6787
- ILEUM
  - MOTILITY, 7952
- INTESTINE, SMALL
  - MOTILITY, 7952
- JAUNDICE, CHOLESTATIC
  - ETIOLOGY, 3379
- LIVER
  - HORMONE EFFECTS ON, 7476
  - NECROSIS, 3379
  - NEOPLASMS, 3379
  - STEROIDS, 2950
  - TOXICITY, 7476

ANDROGENS (continued)
- LIVER DISEASES
  - ETIOLOGY, 3379
- LIVER INJURY, 7476
  - ETIOLOGY, 6451*
  - HORMONES, 6451*
- PELIOSIS HEPATIS
  - DRUG-INDUCED, 8299*
  - ETIOLOGY, 3379, 6451*
- STEROIDS
  - LIVER, 129
  - METABOLISM, 129
  - NEONATE, 129

ANEMIA
- ANTRUM
  - POLYPS, 3541
- COLITIS, ULCERATIVE
  - DRUG THERAPY, 5770
- COLON
  - NEOPLASMS, MALIGNANT, 7665
- DIETARY FACTORS
  - CARBOHYDRATES, 7868
- FECES
  - TECHNIQUES, 1186*
- FOLIC ACID
  - DEFICIENCY, 8482
- GASTRIN, 3541
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 5220
  - DIGESTION, 5220
  - MORPHOLOGY, 5220
  - MOTILITY, 5220
- HELMINTHIASIS
  - ACID SECRETION, 2649
  - MALABSORPTION SYNDROMES, 827
- HEPATITIS, INFECTIOUS, 5878
- HERNIA
  - DISEASES ASSOCIATED WITH, 1262*
- INTESTINE, SMALL
  - ABSORPTION, 4413
  - FOLIC ACID, 4413
  - GLUCOSE, 4413
  - XYLOSE, 4413
- IRON
  - DEFICIENCY, 1262*, 6696
  - METABOLISM, 6696
- LIVER
  - HEMANGIOMA, 2457*
  - IRON, 1494
- MITOCHONDRIA
  - ULTRASTRUCTURE, 8282*
- PARENTERAL ALIMENTATION
  - COMPLICATIONS, 8482
- SPRUE, TROPICAL
  - EPIDEMIOLOGY, 4134*
- STOMACH, 4414
  - IRON, 325
  - NEOPLASMS, 3992
  - PATHOLOGY, 325
  - POLYPS, 3541, 3992
- VITAMIN B12
  - DEFICIENCY, 8482
- YERSINIA
  - DISEASES ASSOCIATED WITH, 8202

ANEMIA, APLASTIC
- DISEASES ASSOCIATED WITH, 7111*
- LIVER
  - NECROSIS, 7111*

- ANEMIA, HEMOLYTIC
  - COLITIS
    - DISEASES ASSOCIATED WITH, 4154*
  - HEPATITIS, CHRONIC
    - DISEASES ASSOCIATED WITH, 5886
  - JAUNDICE, CHRONIC IDIOPATHIC
    - DISEASES ASSOCIATED WITH, 4275*
  - LIVER DISEASES, ALCOHOLIC
    - ERYTHROCYTES, 8390*

- ANEMIA, PERNICIOUS
  - ACHLORHYDRIA
    - GASTRIN, 4805*
    - GASTRITIS, 4805*
  - COLLAGEN
    - DISEASE, 8480
  - COMPLICATIONS, 3144*
  - DISEASES ASSOCIATED WITH, 8480
  - DUODENUM
    - INTRINSIC FACTOR, 1377
  - GASTRITIS, ATROPHIC, 3144*
    - DISEASES ASSOCIATED WITH, 3143*
  - PEPSINOGEN, 3686
  - SPRUE
    - DIAGNOSIS, 4901*
  - STOMACH
    - ENDOSCOPY, 6173
    - PATHOLOGY, 334, 8492
    - POLYPS, 3144*
  - VITAMIN B12
    - ABSORPTION, 6609, 6989
    - RADIONUCLIDES, 6609, 6989

- ANEMIA, SICKLE CELL
  - COMPLICATIONS
    - HYPERBILIRUBINEMIA, 7133*
    - LIVER CIRRHOSIS, 8302*
  - HYPERBILIRUBINEMIA
    - PROGNOSIS, 7133*
  - LIVER
    - COMPLICATIONS, 8302*
    - EPIDEMIOLOGY, 8302*

- ANESTHESIA
  - ACID SECRETION
    - NERVOUS CONTROL, 6049
  - ARTERIES
    - WOUNDS AND INJURIES, 1469
  - BICARBONATE SECRETION, 3727*
  - ESOPHAGUS
    - ENDOSCOPY, 4759
    - PRESSURE STUDY, 5582
    - SPHINCTER, 5582
  - GASTROINTESTINAL SYSTEM
    - CIRCULATION, 3862*
  - HEMORRHAGE
    - VASOPRESSIN, 6874*
  - INTESTINES
    - MOTILITY, 6552*
  - LIVER
    - ENZYMES, 8343
    - PROTEINS, 8343
    - SURGERY, 8343
  - LIVER DISEASES
    - TECHNIQUES, 600
  - LIVER FUNCTION TESTS
    - SURGERY, 1510*

- ANESTHESIA (continued)
  - PANCREAS
    - AMYLASES, 3727*
    - LIPASE, 3727*
    - NUCLEIC ACIDS, 3727*
    - PROTEINS, 3727*
  - PANCREAS FUNCTION TESTS
    - HORMONE EFFECTS ON, 2861
    - SECRETION, 2861
  - PREGNANCY
    - ACID SECRETION, 6051
  - STOMACH
    - ACID SECRETION, 6049, 7962*
    - ACIDITY, 6051
    - ELECTROPHYSIOLOGY, 6552*
    - MOTILITY, 6552*
    - PRESSURE STUDY, 5582
    - SECRETION, 1296
    - SEROTONIN, 6728*

- ANESTHETICS
  - CYTOCHROMES
    - TOXICOLOGY, 2915
  - HEPATITIS
    - DIAGNOSIS, 6447*
    - DRUG-INDUCED, 6447*
    - HYPERSENSITIVITY, 6447*
  - HEPATITIS, TOXIC, 5070*, 7778
  - JEJUNUM
    - TRANSPORT, 872
  - LIVER
    - NECROSIS, 7778
    - PHENOBARBITAL, 2915
    - SURGERY, 600
    - TOXICOLOGY, 2915
  - LIVER INJURY
    - CELL CULTURE, 120*
    - CYTOLOGY, 123*
    - DRUG-INDUCED, 7778
  - PANCREAS
    - BICARBONATE SECRETION, 7372*
    - SECRETION, 7372*
  - SERUM
    - SECRETIN, 7372*
  - STOMACH
    - ELECTROPHYSIOLOGY, 7315
    - ION TRANSPORT, 7315

- ANESTHETICS, LOCAL
  - LIVER DISEASES
    - DRUG METABOLISM, 601

- ANEURYSM
  - ABDOMEN
    - ARTERIES, 2609
  - AORTA
    - PERFORATION, 7556
  - DISEASES ASSOCIATED WITH
    - HEPATITIS, 7138*
  - ENTERECTOMY
    - COMPLICATIONS, 7686
  - HEMATOBILIA
    - BLEEDING, 7129
  - INTESTINE, LARGE
    - ARTERIES, 7686
    - SEPSIS, 7686

ANEURYSM (continued)
- LIVER
  - DISEASES ASSOCIATED WITH, 7138*
  - DRUG-INDUCED, 7138*
  - HEMATOBILIA, 1487
  - HEPATITIS, 7138*
- PANCREAS
  - ARTERIES, 2433*
  - HEMORRHAGE, 7734*
- PANCREATITIS
  - ALCOHOLISM, 4244
  - ARTERIES, 2433*
  - MESENTERY, 4244
- RUPTURE
  - ARTERIES, 5832

ANGIOGRAPHY
- ABDOMEN
  - ARTERIES, 1707
  - COMPLICATIONS, 236
- ANUS, 4189
- ARTERIES
  - STENOSIS, 1209
- BILE DUCTS
  - ARTERIES, 725
- BILIARY TRACT DISEASES
  - CHOLANGIOGRAPHY, 2202
- BLEEDING
  - DIAGNOSIS, 4038*
  - THERAPY, 4038*
- CELIAC DISEASE
  - TECHNIQUES, 1197
- CIRCULATION
  - NEOPLASMS, 7267
- COLON
  - CIRCULATION, 6681*
- DUODENUM
  - INFLAMMATION, 7608*
  - NEOPLASMS, 3239
  - VARICES, 6291*
- GALLBLADDER
  - ANOMALY, CONGENITAL, 1640
  - INFLAMMATION, 1621
  - NEOPLASM METASTASIS, 5052
  - NEOPLASMS, BENIGN, 1571*
  - NEOPLASMS, MALIGNANT, 1571*, 5052
- GASTROINTESTINAL SYSTEM
  - BLEEDING, 2180, 4038*, 4435
  - HEMORRHAGE, 7549
  - REVIEW, 7549
- HEMANGIOMA
  - DIAGNOSIS, 5030*
- HEMATOBILIA
  - DIAGNOSIS, 7120
  - THERAPY, 7120
- HEMORRHAGE
  - DIAGNOSIS, 2252
  - DUODENUM, 2252
  - REVIEW, 2252
  - STOMACH, 2252
  - THERAPY, 2252
- HEMORRHOIDS, 4189
- HEPATIC VEIN THROMBOSIS
  - DIAGNOSIS, 3109
- HEPATITIS
  - CHILD, 7086*
- HYPERTENSION, PORTAL
  - DIAGNOSIS, 721, 5129*
  - MESENTERY, 721
  - TECHNIQUES, 5129*

ANGIOGRAPHY (continued)
- ILEUM
  - INTUSSUSCEPTION, 3218*
- INTESTINE, LARGE
  - HEMORRHAGE, 1255
- INTESTINE, SMALL
  - CARCINOID TUMOR, 4101*
  - INTUSSUSCEPTION, 3218*
  - NECROSIS, 6960
- LIVER, 7529*
  - ABSCESS, 2173*
  - CIRCULATION, 161
  - CYSTS, 1249, 7759
  - HAMARTOMA, 3108
  - HEMANGIOMA, 1249
  - HEMATOMA, 3109
  - HEMORRHAGE, 5819*
  - HYPERPLASIA, 1249
  - NEOPLASM METASTASIS, 1453*, 5052
  - NEOPLASMS, 1210, 1249, 5811*, 5836, 7747*
  - NEOPLASMS, BENIGN, 5831
  - NEOPLASMS, MALIGNANT, 5043, 5052, 5830
  - PROSTAGLANDINS, 6393*
  - TECHNIQUES, 260
- LIVER CIRRHOSIS
  - CHILD, 7086*
  - DIAGNOSIS, 4749*
  - HYPERTENSION, PORTAL, 5129*
- LIVER DISEASES
  - CHILD, 7086*
  - CHOLANGIOGRAPHY, 2202
  - DIAGNOSIS, 3966, 4749*, 7529*
  - NEOPLASMS, 7086*
- LIVER DISEASES, ALCOHOLIC
  - HEMODYNAMICS, 1547
- LIVER INJURY
  - HEMORRHAGE, 5819*
- MESENTERY
  - DYSPLASIA, 7657*
  - HEMORRHAGE, 7657*
- NEOPLASMS, MALIGNANT
  - LIVER, 3105
  - VEINS, 3105
- PANCREAS
  - CONTRAST MEDIA, 286
  - DISEASE, 7608*
  - NEOPLASMS, 3050*, 6362*
  - NEOPLASMS, MALIGNANT, 6361*
- PANCREATIC DISEASES
  - DIAGNOSIS, 7070
  - DRUGS, 1221
  - HEMORRHAGE, 7734*
  - TOMOGRAPHY, 6854*
- PANCREATITIS
  - COMPLICATIONS, 6391
  - DIAGNOSIS, 3050*
- PANCREATITIS, CHRONIC
  - DIAGNOSIS, 7083
  - REVIEW, 3939*
- RECTUM
  - BLEEDING, 4149*
- STOMACH
  - BLEEDING, 8128
  - NEOPLASMS, MALIGNANT, 3082
  - ULCER, 8128
- TECHNIQUES
  - DIAGNOSIS, 1453*

- NGIOGRAPHY (continued)
  - ULCER
    - BLEEDING, 2252

- NGIOMA
  - SEE HEMANGIOMA

- NGIOTENSIN
  - ABSORPTION
    - HORMONE EFFECTS ON, 7932
  - INTESTINE, SMALL
    - TRANSPORT, 7303*
  - JEJUNUM
    - TRANSPORT, 1791, 7303*
  - TRANSPORT
    - HORMONE EFFECTS ON, 7932

- ANISAKIASIS
  - COLON
    - PATHOLOGY, 1722
  - GASTROINTESTINAL SYSTEM
    - ETIOLOGY, 6657
  - IMMUNOGLOBULINS
    - EPIDEMIOLOGY, 6657
  - PARASITES AND PARASITIC DISEASES
    - REVIEW, 825
  - TRANSMISSION, 6657

- ANOMALY
  - ABDOMEN
    - ARTERIES, 7886
    - SURGERY, 797
    - THERAPY, 1690
  - ANORECTUM
    - COLON, 7057
  - ANTRUM
    - RADIOLOGY, 1331
  - APPENDIX
    - ABDOMEN, 1407
  - BILE DUCTS
    - HYPOPLASIA, 581
    - VEINS, 8440
  - BILIARY TRACT, 7843
    - RADIOLOGY, 5137*
  - BLEEDING
    - RECTUM, 6322*
  - CARDIOVASCULAR SYSTEM
    - DEGLUTITION DISORDERS, 3132
  - CECUM
    - APPENDECTOMY, 6337*
    - DIAGNOSIS, 2373
    - ENDOSCOPY, 2373
  - CHOLANGIOGRAPHY
    - COMMON BILE DUCT, 3589*
  - COLON, 7660*
    - CONSTIPATION, 2384
    - NEONATE, 466
    - NEOPLASMS, 2384
    - NERVOUS SYSTEM, 466
    - RADIOLOGY, 2384
    - RECTUM, 6322*
    - SIGMOID, 8260
  - COMMON BILE DUCT, 5165
  - DUODENUM
    - AGE FACTORS, 7610, 7619
    - COMPRESSION, 416
    - ENDOSCOPY, 402, 1219
    - GENETIC FACTORS, 416
    - RADIOLOGY, 7610, 7619

- ANOMALY (continued)
  - DUODENUM (continued)
    - SEX FACTORS, 7619
    - SURGERY, 402
    - ULCER, PEPTIC, 7581
  - ESOPHAGUS
    - GASTRIN, 4799
    - HIATAL HERNIA, 2233
    - MORPHOLOGY, 4799
    - PEPSIN, 4799
    - PEPSINOGEN, 4799
    - REFLUX, 306
  - GALLBLADDER, 562
    - CHOLANGIOGRAPHY, 7852
    - DUPLICATION, 1641, 1642
    - NEOPLASMS, BENIGN, 7219*
    - PANCREAS, 2432*
    - ULTRASONOGRAPHY, 7219*
  - GASTROINTESTINAL SYSTEM
    - DIAGNOSIS, 4885
    - DUPLICATION, 4415
    - RADIOLOGY, 4885
  - HERNIA
    - RECTUM, 5725
  - ILEUM
    - UROGENITAL SYSTEM, 6970
  - INTESTINAL OBSTRUCTION
    - GENETICS, 4109*
    - VEINS, 7661*
  - INTESTINE, SMALL
    - DIAGNOSIS, 4885
    - MALABSORPTION SYNDROMES, 4868*
    - RADIOLOGY, 4885
  - INTESTINES
    - SURGERY, 8219
  - KIDNEYS
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - LIVER
    - ARTERIES, 1466
    - CIRCULATION, 1484
    - HYPERTROPHY, 1492
    - NEOPLASMS, BENIGN, 7219*
    - SCANNING, SCINTILLATION, 2176*
    - ULTRASONOGRAPHY, 7219*
  - NEONATE
    - RECTUM, 5725
  - ODDI'S SPHINCTER
    - DIAGNOSIS, 5774*
  - OMENTUM
    - TORSION, 5222
  - PANCREAS, 3328*
    - DIAGNOSIS, 2179*
    - ENDOSCOPY, 1219, 2410*, 6179
    - HEMORRHAGE, 7734*
    - NEOPLASMS, BENIGN, 2410*
    - PANCREATOGRAPHY, 6179
    - RADIOLOGY, 2410*
    - SIMULATION, 2410*
  - PANCREATIC DUCT, 3328*, 5165
  - PANCREATITIS
    - ETIOLOGY, 4983
  - PYLORUS
    - DUPLICATION, 2277, 5616
    - OBSTRUCTION, 1305
    - RADIOLOGY, 1331, 5616
  - RADIOLOGY
    - PANCREAS, 2179*

ANOMALY (continued)
- RECTUM
  - HERNIA, 5725
  - SIMULATION, 5725
- SIGMOID
  - FAMILIAL FACTORS, 8260
- SIMULATION
  - NEOPLASMS. 2233
- STOMACH
  - ENDOSCOPY, 1219, 7072
  - ESOPHAGUS, 4797
  - HEMORRHAGE, 344
  - HIATAL HERNIA, 2233
  - OBSTRUCTION, 1305
  - PANCREAS, 4977*
  - RADIOLOGY, 7072
  - SURGERY, 7072

ANOMALY, CONGENITAL
- CARDIOVASCULAR SYSTEM
  - DEGLUTITION DISORDERS, 6873
- COLON
  - DIAGNOSIS, 7690, 7691
  - MALROTATION, 7690
  - RADIOLOGY, 7690, 7691
- GALLBLADDER
  - ANGIOGRAPHY, 1640
  - FAMILIAL FACTORS, 6559*
  - RADIOLOGY, 1640
- INTESTINES, 8210
- LIVER, 7113*

ANORECTICS
- SEE APPETITE DEPRESSANTS

ANORECTUM
- SEE ALSO ANUS, RECTUM
- COLON
  - ANOMALY, 7057
- CROHN'S DISEASE
  - ELECTROPHYSIOLOGY, 8508*
- INCONTINENCE
  - ETIOLOGY, 4949
  - NERVOUS CONTROL, 4949
- INFLAMMATORY BOWEL DISEASES
  - ULTRASTRUCTURE, 4926*
- MANOMETRY
  - CHILD, 7698
  - NEONATE, 7698
- MORPHOLOGY
  - MUSCLES, 5329
- NEOPLASMS, MALIGNANT
  - FISSURE, 7672
- SPHINCTER
  - ACHALASIA, 3536

ANOREXIA
- SEE ALSO APPETITE DISORDERS

ANOXIA
- HEPATOMEGALY
  - CYTOLOGY, 123*
- LIVER
  - ELECTROPHYSIOLOGY, 8041*
- LIVER INJURY
  - CYTOLOGY, 123*
- STOMACH
  - ELECTROPHYSIOLOGY, 2992*

ANTACIDS
- ABSORPTION
  - ANTI-INFLAMMATORY AGENTS, 7359
  - ANTIBIOTICS, 7359
  - ANTICOAGULANTS, 7359
  - DRUGS, 7359
  - H2 RECEPTOR ANTAGONISTS, 7359
  - STEROIDS, 7359
  - VITAMINS, 7359
- ACID SECRETION
  - DRUG EFFECTS ON, 1876*
- ANTI-INFLAMMATORY AGENTS
  - DRUG EFFECTS ON, 7508*
- BINDING
  - BILE ACIDS AND SALTS, 6070*
- DRUG METABOLISM
  - DRUG EFFECTS ON, 3615
- DUODENUM
  - ULCER, PEPTIC, 4833*
- HYPERPLASIA
  - THERAPY, 1914
- INTESTINAL ABSORPTION
  - HEMODIALYSIS, 8230
  - IRON, 8230
- SERUM
  - GASTRIN, 1876*
- STOMACH
  - ENDOSCOPY, 7973
  - EPITHELIUM, 7346*
  - HYPERPLASIA, 1914
  - ULCER, 378
- ULCER
  - DUODENUM, 2291
  - PREVENTION, 4071*
- ULCER, PEPTIC, 2831
  - ACID SECRETION, 4833*
  - DRUG THERAPY, 6914*, 7587, 8187
  - HYPERPLASIA, 1876*
  - PAIN, 2283*
  - THERAPY, 4851

ANTHELMINTICS
- DRUG THERAPY
  - COMPLICATIONS, 6663
- ECHINOCOCCOSIS
  - EPIDEMIOLOGY, 6656
- PARASITES AND PARASITIC DISEASES
  - COMPLICATIONS, 6652
  - DRUG EFFECTS ON, 6650
  - DRUG THERAPY, 6663
  - TOLERANCE, 6652
- SYNTHESIS, 5960

ANTI-INFLAMMATORY AGENTS
- ABSORPTION
  - ANTACIDS, 7359
- COLITIS, ULCERATIVE
  - DRUG THERAPY, 7719
- CROHN'S DISEASE
  - DRUG THERAPY, 1736, 7719
- DRUG EFFECTS ON
  - ANTACIDS, 7508*
- DRUG METABOLISM, 7508*
- ESOPHAGUS
  - PRESSURE STUDY, 6031
- FATTY LIVER
  - DRUG THERAPY, 7121
- GASTROINTESTINAL SYSTEM
  - BLEEDING, 4440, 6593

ANTI-INFLAMMATORY AGENTS (continued)
  HEPATITIS, CHRONIC
    DRUG THERAPY, 2556
  HEPATITIS, INFECTIOUS
    CHOLINESTERASES, 8371
  ILEUM
    MOTILITY, 5316*
    PERISTALSIS, 5316*
  INFLAMMATION
    LIVER, 8032*
  INTESTINE, SMALL
    ULCER, 1132
    WOUNDS AND INJURIES, 4127
  INTESTINES
    INFLAMMATION, 7719
    ULCER, 8102*
  JEJUNUM
    ENTEROTOXINS, 2059*
    ION TRANSPORT, 2059*
    WATER, ELECTROLYTE BALANCE, 2059*
  LIVER
    GRANULOMA, 7142*
    MICROSOMES, 8032*
    TRANSPLANTATION, 3035
  LIVER CIRRHOSIS
    DRUG THERAPY, 2556
  LIVER INJURY
    DRUG-INDUCED, 7142*
  METABOLISM, 7508*, 7512*
  PERITONITIS
    DRUG-INDUCED, 8102*
  PYLORUS
    SPHINCTER, 7329
  STOMACH
    CIRCULATION, 1880*
    MORPHOLOGY, 6724*, 8164*
    MOTILITY, 7329
    PERMEABILITY, 1880*
    REFLUX, 7329
    ULCER, 350
  TOXICITY
    PREVENTION, 7250
  ULCER
    DRUG-INDUCED, 8102*
    PREVENTION, 1880*
    STRESS, 979

ANTIBACTERIALS
  ABSORPTION
    BACTERIAL INFECTIONS, 1675
    INTESTINES, 1675
  COMPLICATIONS
    SEX FACTORS, 2369*
  DIARRHEA, 1679
  DRUG THERAPY
    COLITIS, 2369*
    DIARRHEA, 2369*
    SEQUELAE, 2369*
  DRUG TOXICITY
    LIVER, 4281
  DYSENTERY
    CHILD, 786
  ENTERITIS
    CHILD, 787
  GLYCOSIDES, 6625
  INTESTINAL OBSTRUCTION
    ABSORPTION, 891
    METABOLISM, 891

ANTIBACTERIALS (continued)
  INTESTINE, LARGE
    SURGERY, 1672
  PARENTERAL ALIMENTATION
    COMPLICATIONS, 2369*

ANTIBIOTICS
  ABSORPTION
    ANTACIDS, 7359
    DIARRHEA, 2641
    DRUG EFFECTS ON, 6825
    FOOD, 6687*
  BILIARY TRACT
    BACTERIAL INFECTIONS, 7202*
  BILIARY TRACT DISEASES
    BACTERIAL INFECTIONS, 5140*
  CELIAC DISEASE
    ABSORPTION, 7636*
    DIAGNOSIS, 7636*
  CHOLECYSTITIS
    DRUG THERAPY, 1586
    ETIOLOGY, 1977*
  CHOLELITHIASIS
    ETIOLOGY, 1977*
    PREVENTION, 1976*
  CIRCULATION
    ESTROGENS, 4650
  COLITIS, 3522*
    AGE FACTORS, 3523*
    BACTERIA, 5718*
    CHILD, 7000*
    DIAGNOSIS, 2390
    DRUG-INDUCED, 482, 485, 2390, 4179, 4180, 4730, 4931*, 4932*, 5718*, 6329*, 7000*
    EPIDEMIOLOGY, 6329*
    ETIOLOGY, 3296
    GEOGRAPHICAL FACTORS, 3523*, 6329*
  COLITIS, ULCERATIVE
    HEMOPHILIA, 5769
  COLON
    SEPSIS, 5719*, 7017
    SURGERY, 5719*, 7662*
  COMPLICATIONS
    INTESTINES, 4936
    KIDNEYS, 6532*
  CROHN'S DISEASE, 5977*
  DIARRHEA, 3522*
    AGE FACTORS, 3521*, 3523*
    BACTERIAL INFECTIONS, 4421
    COMPLICATIONS, 4421
    DRUG-INDUCED, 4180, 4932*
    GEOGRAPHICAL FACTORS, 3523*
    SEX FACTORS, 3521*
  DRUG THERAPY
    COMPLICATIONS, 3521*, 3522*, 3523*, 4936, 6532*
  ENTEROCOLITIS
    YERSINIA, 2388
  ENTEROCOLITIS, NECROTIZING
    DRUG-INDUCED, 483, 484, 1411
  ESOPHAGUS
    PERFORATION, 313
  FECES
    PEPTIDASE, 7378
    TRYPSIN, 7378
  GILBERT'S DISEASE
    DIAGNOSIS, 3411
    METABOLISM, 3411

- ANTIBIOTICS (continued)
  - HEPATITIS
    - DRUG-INDUCED, 8340*
  - HYPERBILIRUBINEMIA
    - BINDING, 8320
  - INTESTINAL OBSTRUCTION
    - ABSORPTION, 891
    - METABOLISM, 891
  - INTESTINE, LARGE
    - SURGERY, 7056
  - INTESTINE, SMALL
    - BACTERIA, 8454*
  - INTESTINES
    - BACTERIA, 813, 3530
    - BILE ACIDS AND SALTS, 7389*
    - ENZYMES, 1097
  - JAUNDICE
    - DRUG-INDUCED, 6446*
    - ETIOLOGY, 6446*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
  - LIPODYSTROPHY, INTESTINAL
    - DRUG THERAPY, 5705*
  - LIVER
    - DRUG METABOLISM, 1172
    - ENZYMES, 3415*
    - LIPIDS, 122*
    - MORPHOLOGY, 1172
    - SCANNING, SCINTILLATION, 5809*
  - LIVER CIRRHOSIS
    - ENDOTOXINS, 712
    - PERITONITIS, 6507*
  - LIVER COMA
    - DRUG THERAPY, 5119*
  - LIVER DISEASES
    - BINDING, 8320
    - KERNICTERUS, 716
    - METABOLISM, 5396*, 5397*
  - LIVER FUNCTION TESTS, 1172
  - LIVER INJURY, 3415*
    - METABOLISM, 5396*, 5397*, 8076
  - PANCREAS
    - PEPTIDASE, 7378
    - TRYPSIN, 7378
  - PANCREATITIS
    - ALCOHOLISM, 526*
  - PERITONITIS
    - DRUG THERAPY, 6507*
  - PROCTITIS
    - COLITIS, 3275*
  - PROTEINS
    - BINDING, 8320
  - PYLORUS
    - STENOSIS, 1310
  - RECTUM
    - SEPSIS, 5719*
    - SURGERY, 5719*, 7662*
  - SALMONELLOSIS, 2650
    - DRUG THERAPY, 8474, 8475
    - THERAPY, 1674
  - SHIGELLOSIS
    - CHILD, 803
    - INFANT, 803
  - SODIUM
    - DEFICIENCY, 6532*
  - URINE
    - OXALATES, 5658*
- ANTIBODIES
  - AMEBIASIS
    - SERUM, 5806*
  - ATRESIA
    - CHILD, 5102*
  - AUSTRALIA ANTIGEN
    - CIRCULATION, 5866*
    - EPIDEMIOLOGY, 6477*
    - ETHNIC FACTORS, 6476*
    - RADIOIMMUNOASSAY, 7785*
    - SOCIOECONOMIC FACTORS, 6476*
  - CELIAC DISEASE
    - CHILD, 2343*, 6994
    - DIAGNOSIS, 2343*
    - GLUTEN, 2355
    - IMMUNOGLOBULINS, 4130*
  - CHOLERA
    - VACCINES, 777
  - CHOLESTASIS
    - AUTOIMMUNE DISEASES, 4252*
  - COLITIS, ULCERATIVE
    - COLON, 4961*
    - FAMILIAL FACTORS, 4962*
    - LYMPHOCYTES, 4210
  - CROHN'S DISEASE
    - FAMILIAL FACTORS, 4962*
    - LYMPHOCYTES, 4210
  - DERMATITIS HERPETIFORMIS
    - GLUTEN, 2355
  - DIARRHEA
    - CHILD, 6167
  - DRUG DEPENDENCE
    - HEPATITIS, INFECTIOUS, 2518
  - GASTRITIS, 2244
  - GASTROINTESTINAL SYSTEM
    - BACTERIA, 4702*
  - HEPATITIS, 4781, 8351*
    - CARRIER STATE, 8359*
    - DIAGNOSIS, 7789*
    - EPIDEMIOLOGY, 6484*, 7792
    - ETHNIC FACTORS, 7157*
  - HEPATITIS, CHRONIC, 5881*, 5884
    - ALBUMINS, 7090*
    - ANTIGENS, 5865*
    - AUTOIMMUNE DISEASES, 4252*
    - CHOLESTASIS, 4317
    - DIAGNOSIS, 7165*, 7798*
    - ETIOLOGY, 3451*
    - KIDNEYS, 5103*
    - LIVER, 5103*
    - LIVER CIRRHOSIS, OBSTRUCTIVE, 5101*
    - MITOCHONDRIA, 4332*, 4333*
    - MUSCLES, 4332*
    - PATHOLOGY, 5100*, 6500*
  - HEPATITIS, INFECTIOUS, 8351*
    - ANTIGENS, 6472*
    - AUSTRALIA ANTIGEN, 5083*
    - CARRIER STATE, 5856*
    - DIAGNOSIS, 3432*, 7789*
    - EPIDEMIOLOGY, 5080*, 6484*
    - ETHNIC FACTORS, 7157*
    - GENETIC FACTORS, 5856*
    - IMMUNOTHERAPY, 3428*
    - MUSCLES, 2519
    - PATHOLOGY, 1518*
    - SERODIAGNOSIS, 6472*
  - HEPATITIS, SERUM
    - PLASMA, 6483*

ANTIBODIES (continued)
- IMMUNOGLOBULINS
  - COMPLEMENT, 215
- INFLAMMATORY BOWEL DISEASES
  - FAMILIAL FACTORS, 4211, 4962*
  - LYMPHOCYTES, 4210
  - NUCLEIC ACIDS, 4211
- INTESTINES
  - ESCHERICHIA COLI, 8100*
- LIVER
  - NEOPLASMS, MALIGNANT, 3369*
- LIVER CIRRHOSIS, 4781, 5884, 5905*
  - ALBUMINS, 7090*
  - AUTOIMMUNE DISEASES, 4252*
  - BACTERIA, 3475*
  - DIAGNOSIS, 7165*
  - MITOCHONDRIA, 4332*, 4333*
  - MUSCLES, 4332*
  - NEONATE, 5102*
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - DIAGNOSIS, 4317, 7798*
  - PATHOLOGY, 5100*
  - RADIOIMMUNOASSAY, 5101*
- LIVER DISEASES, 4781
  - ALBUMINS, 7090*
  - AUSTRALIA ANTIGEN, 3371*
  - BACTERIA, 1470
  - CHILD, 5102*
  - DIAGNOSIS, 7165*
  - INFLAMMATION, 3371*
  - MITOCHONDRIA, 7177*
  - MUSCULOSKELETAL SYSTEM, 631
  - NUCLEIC ACIDS, 687
  - VIRUSES, 1470
- MUSCLES
  - IMMUNOGLOBULINS, 2518
- SCHISTOSOMIASIS
  - ENZYMES, 5968
  - IMMUNOLOGY, 6645*
- SERUM
  - HEPATITIS, CHRONIC, 3430*
- STOMACH
  - ADENOSINE TRIPHOSPHATASE, 1910
  - NEOPLASMS, MALIGNANT, 5589*
  - SECRETION, 321
- VENEREAL DISEASES, 6422*
- VIRUSES
  - CATHARTICS, 632

ANTICHOLINERGIC AGENTS
- SEE PARASYMPATHOLYTICS

ANTICOAGULANTS
- ABSORPTION
  - ANTACIDS, 7359
- DUODENUM
  - HEMORRHAGE, 2237*
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 2237*
- HEMATOMA
  - GASTROINTESTINAL SYSTEM, 4103*
  - INTESTINES, 4103*
- INTESTINE, SMALL
  - HEMORRHAGE, 2237*

ANTICONVULSANTS
- FOLIC ACID
  - METABOLISM, 7923
- HEPATOCYTES
  - MORPHOLOGY, 3378

ANTICONVULSANTS (continued)
- INTESTINAL ABSORPTION
  - FOLIC ACID, 7923
- LIVER CIRRHOSIS
  - DRUG METABOLISM, 7811*
- MICROSOMES
  - LIVER DISEASES, 1570

ANTIDEPRESSIVE AGENTS
- ACID SECRETION
  - ADOLESCENCE, 5383
- GASTRIN
  - ADOLESCENCE, 5383
- STOMACH
  - ACID SECRETION, 5382
  - PEPSIN, 5382

ANTIDIABETIC AGENTS
- SEE HYPOGLYCEMIC AGENTS

ANTIDIARRHEALS
- DIARRHEA
  - DRUG-INDUCED, 7867
- DUMPING SYNDROME
  - PREVENTION, 5598*
- ILEOSTOMY, 5709*
  - FECES, 4097*
- INTESTINES
  - SURGERY, 5709*
- METABOLISM, 2405
- RADIOIMMUNOASSAY
  - TECHNIQUES, 6830*

ANTIEMETICS
- DUODENUM
  - MOTILITY, 2740*
- ESOPHAGUS
  - MOTILITY, 2224*
  - REFLUX, 5309*
  - SPHINCTER, 2224*, 5327
- JEJUNUM
  - BIOPSY, 1184*
  - DRUG EFFECTS ON, 1184*
- NAUSEA
  - REVIEW, 8479
- RECTUM
  - ABSORPTION, 2740*
- STOMACH
  - ELECTROPHYSIOLOGY, 47*
  - MOTILITY, 47*, 3633*, 5309*
- VOMITING
  - REVIEW, 8479

ANTIFIBRINOLYTIC AGENTS
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 1286*

ANTIGEN, AUSTRALIA
- SEE AUSTRALIA ANTIGEN

ANTIGEN, CARCINOEMBRYONIC
- SEE CARCINOEMBRYONIC ANTIGEN

ANTIGENS
- ATROPHY
  - VILLI, 4914
- BEHCET'S SYNDROME
  - CHROMOSOMES, 5167*

- ANTIGENS (continued)
  - CARCINOEMBRYONIC ANTIGEN
    - GASTROINTESTINAL DISEASES, 5006*
    - NEOPLASMS, 5006*
    - SERUM, 5006*
  - CELIAC DISEASE, 3267
    - CHILD, 4905*, 4906*
    - DERMATITIS HERPETIFORMIS, 1378*
    - GEOGRAPHICAL FACTORS, 4906*
    - IMMUNOLOGY, 4919
  - COLITIS, ULCERATIVE
    - COLON, 1104*
    - EPIDEMIOLOGY, 8264*
    - GENETIC FACTORS, 1744
  - COLON
    - ABSORPTION, 2707*
    - BACTERIA, 1644*, 4715*
    - BLOOD GROUPS, 1644*, 4715*
    - SECRETION, 2063
  - CROHN'S DISEASE
    - ARTHRITIS, 7896*
    - GENETIC FACTORS, 1744
    - GENETICS, 8263*
  - DERMATITIS HERPETIFORMIS, 3267
  - DOWN'S SYNDROME
    - HEPATITIS, INFECTIOUS, 2486*
  - DUODENUM
    - ULCER, PEPTIC, 6911*
  - FASCIOLIASIS
    - DIAGNOSIS, 5504
  - GALLBLADDER
    - BILE, 4357*
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, MALIGNANT, 3057, 7862
  - GENETICS
    - COLITIS, ULCERATIVE, 8263*
    - CROHN'S DISEASE, 8263*
  - HEMOCHROMATOSIS
    - GENETIC FACTORS, 3398
  - HEMODIALYSIS, 3438
  - HEPATITIS, 1520*, 1521*, 3437, 3438, 4303, 8358*
    - CARRIER STATE, 7788*
    - CELLS, 3439
    - DANE PARTICLES, 6471*
    - DIAGNOSIS, 5871*
    - DISEASES ASSOCIATED WITH, 1520*
    - ETHNIC FACTORS, 7157*
    - LIVER CIRRHOSIS, 1520*
    - PROGNOSIS, 3436
    - RADIOIMMUNOASSAY, 5871*
    - RADIOIMMUNOLOGY, 5871*
    - SERUM, 3439
  - HEPATITIS, CHRONIC, 3438, 4303, 4311*, 4312
    - ANTIBODIES, 5865*
    - AUSTRALIA ANTIGEN, 5864*
    - CELLS, 3439
    - DANE PARTICLES, 5864*
    - EPIDEMIOLOGY, 2496*
    - GENETIC FACTORS, 3451*, 3453*
    - HEMODIALYSIS, 5868*
    - IMMUNITY, 4314
    - INTERFERON, 2516
    - SERUM, 3439
    - VIROLOGY, 5864*

- ANTIGENS (continued)
  - HEPATITIS, INFECTIOUS, 3429*, 3433*, 3437, 4303, 8358*
    - ANTIBODIES, 6472*
    - AUSTRALIA ANTIGEN, 5863*
    - BIOPSY, 7156*
    - BLOOD, 7150*
    - CELLS, 3439
    - DANE PARTICLES, 5863*, 6471*
    - DIAGNOSIS, 7150*
    - EPIDEMIOLOGY, 2496*
    - ETHNIC FACTORS, 7157*
    - FAMILIAL FACTORS, 6493
    - GEOGRAPHICAL FACTORS, 6493
    - HEPATITIS, CHRONIC, 7156*
    - IMMUNOGLOBULINS, 8355*
    - IMMUNOLOGY, 5104*
    - LIVER, 7150*
    - PROGNOSIS, 3436, 7150*
    - SERODIAGNOSIS, 6472*
    - SERUM, 3439
    - TRANSMISSION, 646
    - VIROLOGY, 5863*
    - VIRUSES, 8349*
  - HEPATITIS, SERUM
    - DIAGNOSIS, 5093
  - HEPATOCYTES
    - MEMBRANES, 6846
    - ULTRASTRUCTURE, 4288*
  - INFLAMMATORY BOWEL DISEASES
    - DISEASES ASSOCIATED WITH, 5748
    - GENETICS, 8263*
  - INTESTINE, SMALL
    - ABSORPTION, 2707*
    - BACTERIA, 8454*
    - CELLS, 3881
    - SCLEROSIS, 7891
  - INTESTINES
    - HYPERSENSITIVITY, 3025
  - JEJUNUM
    - SCLEROSIS, 7891
  - KIDNEYS
    - BILE, 4357*
  - LACTOSE INTOLERANCE
    - CHILD, 4905*
  - LIVER, 4312
    - MORPHOLOGY, 8357*
    - NEOPLASMS, MALIGNANT, 2028
    - TRANSPLANTATION, 3035
    - ULTRASTRUCTURE, 8357*
  - LIVER CIRRHOSIS, 3438, 4303, 4311*, 4312, 4313
    - GENETIC FACTORS, 3453*
  - LIVER DISEASES, 3438, 4303, 4311*
    - CELLS, 3439
    - GENETIC FACTORS, 3453*
    - HEPATITIS, INFECTIOUS, 656
    - HEPATOCYTES, 5861*
    - SERUM, 3439
    - SPLEEN, 1011*
  - LIVER DISEASES, ALCOHOLIC, 4311*
    - DISEASES ASSOCIATED WITH, 5114*
    - IMMUNITY, 2535
  - MUSCLES
    - BILE, 4357*
  - PANCREAS
    - ASCITES, 2412*
    - NEOPLASMS, MALIGNANT, 2412*
  - PORPHYRIA, 6420*

NTIGENS (continued)
    SCHISTOSOMIASIS, 5507
    SERUM
        HEPATITIS, CHRONIC, 3430*
    STOMACH
        NEOPLASMS, MALIGNANT, 5589*
        SECRETION, 3058
    ULCER
        GENETIC FACTORS, 2303
    ULCER, PEPTIC
        ETIOLOGY, 6911*
        GENETIC FACTORS, 6911*
    ULTRASTRUCTURE
        HEPATOCYTES, 4290*

NTIHORMONES
    GASTRITIS, 380
    PANCREAS
        SECRETION, 1942
    STOMACH
        SECRETION, 3689
    ULCER, PEPTIC, 380

ANTIHYPERTENSIVE AGENTS
    COLITIS
        HYPERSENSITIVITY, 2481*
    HEPATITIS
        HYPERSENSITIVITY, 2481*
    LIVER
        DRUG METABOLISM, 8029*
    STOMACH
        MORPHOLOGY, 3713
        SECRETION, 3713

ANTIMETABOLITES
    ABSORPTION
        SALICYLATES, 1808
    INTESTINE, SMALL
        DISACCHARIDASES, 1094

ANTINEOPLASTIC AGENTS
    ABSORPTION
        NEOPLASMS, MALIGNANT, 3164
    BILE
        METABOLISM, 5825*
    CALCIUM
        ABSORPTION, 1799
    GASTROINTESTINAL SYSTEM
        NEOPLASMS, MALIGNANT, 1393*, 3164
    INTESTINES
        NEOPLASMS, MALIGNANT, 470
        NUCLEIC ACIDS, 188
    LIVER
        FIBRINOGEN, 43
        METABOLISM, 5824*
        NEOPLASMS, 7748*
    NEOPLASMS, MALIGNANT
        GASTROINTESTINAL SYSTEM, 771

ANTIOXIDANTS
    LIVER
        NEOPLASMS, 7425*

ANTISPASMODICS
    SEE ALSO PARASYMPATHOLYTICS
    LIVER
        PERFUSION, 2947
    PANCREAS
        ENZYMES, 3742

ANTISPASMODICS (continued)
    PYLORUS
        STENOSIS, 241
    SHORT BOWEL SYNDROME
        DIARRHEA, 4125
    STOMACH
        ACID SECRETION, 102, 1145
        ULCER, 102, 1145

ANTITHYROID AGENTS
    SEE THYROID ANTAGONISTS

ANTITRYPSIN
    SEE TRYPSIN INHIBITORS

ANTITRYPSIN, ALPHA
    SEE ALPHA 1 ANTITRYPSIN

ANTRECTOMY
    ACID SECRETION
        PENTAGASTRIN, 1885*
    DUODENUM
        ULCER, PEPTIC, 7576
    GASTRIN, 4856
    GASTRITIS
        ETIOLOGY, 3176
    HEIDENHAIN POUCH
        ACID SECRETION, 1885*
    INTESTINE, SMALL
        ESOPHAGUS, 6030
    STOMACH
        ACID SECRETION, 2683*, 5366*
        ULTRASTRUCTURE, 2683*
    ULCER
        GASTRIN, 6278

ANTRUM
    ACID SECRETION
        DISTENTION, 2285*
        NERVOUS CONTROL, 71*
        POUCH STUDY, 71*
        ULCER, PEPTIC, 6261*
    ANOMALY
        RADIOLOGY, 1331
    BILE
        TOXICITY, 3701
    CELLS
        MITOSIS, 1753*
    CHOLECYSTOKININ
        RADIOIMMUNOASSAY, 3592
    CIRCULATION
        HEMORRHAGE, 4703*
        STRESS, 4703*
    DISTENTION
        GASTRIN, 7971
    DUMPING SYNDROME
        ETIOLOGY, 337
    DUODENUM
        REFLUX, 2278
    ELECTROPHYSIOLOGY
        HORMONES, GASTROINTESTINAL, 945
    ESOPHAGUS
        PRESSURE STUDY, 4518*
    GALLBLADDER
        MOTILITY, 3729
    GASTRIN, 3697
        ACID SECRETION, 1232
        ADENOSINE CYCLIC 3',5'
            MONOPHOSPHATE, 4556*

- **ANTRUM** (continued)
  - GASTRIN (continued)
    - ANALYSIS, 1754*
    - CELL CULTURE, 1891
    - CELLS, 2681*, 3139*, 3593, 4496
    - ELECTRICAL CONTROL, 1863
    - ESOPHAGITIS, 5177*
    - GASTRITIS, 5177*
    - GASTROINTESTINAL DISEASES, 5177*
    - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 4556*
    - LIVER EXTRACTS, 2780
    - ORGAN CULTURE, 2803
    - RADIOIMMUNOASSAY, 3592
    - SECRETION, 3668*
    - SERUM, 3139*
    - SURGERY, 2353, 3670*
    - SYNTHESIS, 2803, 4554*
    - ULCER, 4834*
    - ULCER, PEPTIC, 6261*
    - ZOLLINGER-ELLISON SYNDROME, 5177*
  - GASTRITIS
    - BIOPSY, 247
    - DRUG THERAPY, 3178
    - ENDOSCOPY, 3178
    - HEARTBURN, 4061
    - HISTOCHEMISTRY, 3178
    - IMMUNOLOGY, 3178
    - MORPHOLOGY, 3178
  - HORMONES
    - MORPHOLOGY, 2274
    - SURGERY, 2274
  - HYPERCHLORHYDRIA
    - GASTRIN, 2257
  - HYPERPLASIA
    - DIAGNOSIS, 2256
    - GASTRIN, 2257
  - INTESTINES
    - HYPERTROPHY, 197
  - ION TRANSPORT, 1871*
    - ACIDITY, 4570*
    - BICARBONATE SECRETION, 5285*
  - LYSOSOMES
    - BILE, 1917
    - ULCER, 1917
  - MORPHOLOGY
    - ULCER, PEPTIC, 8165*
  - MOTILITY
    - ELECTROPHYSIOLOGY, 4541
    - NERVOUS CONTROL, 8120
  - NERVOUS CONTROL
    - VAGOTOMY, 8120
  - PANCREAS
    - SECRETION, 3729
  - PEPTIDES
    - ENKEPHALINS, 4701*
  - PERMEABILITY, 1871*
  - PLASMA
    - DISTENTION, 2285*
  - POLYPS, 348
    - ANEMIA, 3541
    - GASTRIN, 3541
  - PRESSURE STUDY, 4518*
  - PYLOROPLASTY
    - GASTRIN, 2238*
  - SECRETION
    - BILE, 3701
    - GASTRIN, 1334*, 4554*, 4556*, 6261*, 7349*, 7350*

- ANTRUM (continued)
  - SECRETION (continued)
    - MORPHOLOGY, 2274
    - SURGERY, 2274
    - ULCER, PEPTIC, 6261*
  - SOMATOSTATIN, 4863
  - STOMACH
    - ACID SECRETION, 556, 1892
    - GASTRIN, 3139*
    - ORGAN CULTURE, 4554*
    - SECRETION, 104
  - STOMACH DISEASES
    - BIOPSY, 247
  - SURGERY
    - COMPLICATIONS, 2286*
    - GASTRIN, 3674*
  - ULCER
    - BIOPSY, 3993
    - DIAGNOSIS, 3993
    - ENDOSCOPY, 3993
    - GASTRIN, 8181*
    - RADIOLOGY, 3993
  - ULCER, PEPTIC
    - EPITHELIUM, 2286*
    - HYPERPLASIA, 2256
    - MORPHOLOGY, 2286*
    - SURGERY, 2286*
  - ULTRASTRUCTURE
    - TECHNIQUES, 2681*
  - VAGOTOMY
    - GASTRIN, 2238*, 3719
    - ULCER, 6274

- ANUS
  - SEE ALSO ANORECTUM, RECTUM
  - AMEBIASIS
    - DIAGNOSIS, 3564
    - REVIEW, 3564
    - THERAPY, 3564
  - ANGIOGRAPHY, 4189
  - COLON
    - NEOPLASMS, 7019
  - CROHN'S DISEASE
    - COMPLICATIONS, 1733*, 4474*
    - ELECTROPHYSIOLOGY, 8508*
    - EROSIONS, 1733*
    - FISTULA, 4474*, 5981*
    - NEOPLASMS, 5981*
    - PROCTITIS, 4474*
  - CYSTS
    - SURGERY, 7055
  - DISEASE
    - COMPLICATIONS, 4165, 4166
    - CONTRACEPTIVES, ORAL, 4165
    - ETIOLOGY, 4164, 4165
    - METABOLISM, 3286
    - PREGNANCY, 4165
    - REVIEW, 4165
    - SEX FACTORS, 4165
  - FISSURE, 7672
    - ETIOLOGY, 4165, 4948
    - PSYCHOLOGICAL FACTORS, 4184
    - REVIEW, 4165
    - SEX FACTORS, 4165
  - FISTULA
    - CROHN'S DISEASE, 8514
    - REVIEW, 491
  - HEMORRHAGE, 4166
  - HEMOSTASIS, 4166

NUS (continued)
  IMPERFORATION
    SURGERY, 1431
  INCONTINENCE
    DEFECATION, 1430
    MORPHOLOGY, 1432
    REVIEW, 1433
  INTEGUMENTARY SYSTEM
    NEOPLASMS, 7011
  MANOMETRY
    DISEASE, 252
    PARAPLEGIA, 5930*
    TECHNIQUES, 5930*
  MORPHOLOGY, 4189, 4191, 4192
  MOTILITY
    PARAPLEGIA, 5930*
  NEOPLASMS, MALIGNANT, 7673
    DIAGNOSIS, 477
    THERAPY, 477, 5750
  PAGET'S DISEASE, 7020
  PARASITES AND PARASITIC DISEASES
    DIAGNOSIS, 3564
    REVIEW, 3564
    THERAPY, 3564
  PATHOLOGY, 5746
  PRESSURE STUDY
    PARAPLEGIA, 5930*
    TECHNIQUES, 5930*
  PSORIASIS
    PROGNOSIS, 2392
  SPHINCTER
    DEFECATION, 861
    INFLAMMATION, 4954
    MANOMETRY, 5930*
    MORPHOLOGY, 861
    MOTILITY, 5930*
    PARAPLEGIA, 5930*
    PRESSURE STUDY, 5930*
    SURGERY, 7033

AORTA
  ANEURYSM
    PERFORATION, 7556

APLASIA
  GALLBLADDER, 8438

APPENDECTOMY
  CECUM
    ANOMALY, 6337*
  COMPLICATIONS, 4898, 6344
    APPENDICITIS, 1401
    HERNIA, 7685
  ENDOSCOPY
    SURGERY, 1402
  PERFORATION
    APPENDICITIS, 1401
  PERITONITIS
    COMPLICATIONS, 502
  REVIEW
    TECHNIQUES, 467

APPENDICITIS
  APPENDECTOMY
    COMPLICATIONS, 1401
    PERFORATION, 1401
  APPENDIX
    GASES, 7036

APPENDICITIS (continued)
  CECUM
    NEOPLASMS, BENIGN, 7034
  CHILD, 6342, 6347
    DIAGNOSIS, 1405, 6340
    DYSENTERY, 6338
  COLON
    PNEUMATOSIS, 4168
  COMPLICATIONS, 6344
    BACTERIAL INFECTIONS, 7699
    PERFORATION, 7699, 7701
  DIAGNOSIS, 7701
    BIOPSY, 1403
    CHILD, 7666
    COMPLICATIONS, 6340
    LAPAROSCOPY, 7700
    TECHNIQUES, 5745, 8251
  EPIDEMIOLOGY
    AGE FACTORS, 4939
  FAMILIAL FACTORS, 5753
  ILEUM
    NEOPLASMS, MALIGNANT, 408
  INFANT, 6347
  LAPAROTOMY
    CROHN'S DISEASE, 7277
  PREGNANCY
    DIAGNOSIS, 6194
  RADIOLOGY
    CHILD, 1196, 7666
  SCHISTOSOMIASIS, 3287
  STOMACH
    MOTILITY, 326
  SURVIVAL
    AGE FACTORS, 7699
    EPIDEMIOLOGY, 4939

APPENDIX
  ABDOMEN
    ANOMALY, 1407
  ABSCESS
    PARASITES AND PARASITIC DISEASES, 5962
  BACTERIAL INFECTIONS
    YERSINIA, 3247
  CALCIFICATION
    REVIEW, 468
  CARCINOID TUMOR
    CHILD, 7678
    PROGNOSIS, 3272*
    SECRETION, 6327*
    THERAPY, 3272*
  ENZYMES
    HIRSCHSPRUNG'S DISEASE, 454*
  GASES
    APPENDICITIS, 7036
  INFLAMMATION
    THERAPY, 1404
  INTESTINE, LARGE
    ENEMA, 8239
    RADIOLOGY, 8239
  INTESTINES, 2667
  NEOPLASMS, 5741
  NEOPLASMS, BENIGN
    NEOPLASMS, MALIGNANT, 1408
    POLYPS, 1409
  NEOPLASMS, MALIGNANT
    SURVIVAL, 2380
  NERVOUS SYSTEM
    HIRSCHSPRUNG'S DISEASE, 454*

APPENDIX (continued)
    PARASITES AND PARASITIC DISEASES, 2667
    PERFORATION, 1407
        BACTERIA, 1406
    POLYPS, 503
    THERAPY, 6341

APPETITE DISORDERS
    PARASITES AND PARASITIC DISEASES
        BODY COMPOSITION, 5246

ARTERIES
    ABDOMEN
        ANEURYSM, 2609
        ANGIOGRAPHY, 1707
        ANOMALY, 7886
        EMBRYOLOGY, 1105
        STENOSIS, 1707, 1708
    ANEURYSM
        PANCREAS, 2433*
        RUPTURE, 5832
    BILE DUCTS
        ANGIOGRAPHY, 725
        MORPHOLOGY, 725
    CHEMICAL COMPOSITION
        GASES, 6418*
    ENDOSCOPY
        GASES, 4758
    GASTROINTESTINAL SYSTEM
        ENDOSCOPY, 4758
    HEMORRHOIDS
        MORPHOLOGY, 3587*
    HYPERTENSION, PORTAL
        SPLEEN, 6534*
    INTESTINE, LARGE
        ANEURYSM, 7686
    LIVER
        ANOMALY, 1466
        CIRCULATION, 3864*
        LIVER CIRRHOSIS, 3470*
        MORPHOLOGY, 3923, 7293
        REVIEW, 7293
        VASOCONSTRICTOR AGENTS, 1175
    LIVER DISEASES
        GASES, 6418*
    PANCREAS
        RADIOISOTOPES, 3899
        SCANNING, SCINTILLATION, 3899
    PANCREATITIS
        ANEURYSM, 2433*
    PRIMATES
        VASOPRESSIN, 2118
    STENOSIS
        ANGIOGRAPHY, 1209
        LIVER, 1209
    STOMACH
        PARASYMPATHOMIMETICS, 1139
    WOUNDS AND INJURIES
        ANESTHESIA, 1469
        LIVER, 1469

ARTERIOGRAPHY
    DIVERTICULUM
        BLEEDING, 5687
    LIVER
        WOUNDS AND INJURIES, 4773
    PANCREAS
        PSEUDOCYSTS, 5521*

ASCARIASIS
    ABDOMEN
        PSEUDOTUMORS, 8505
    ANCYLOSTOMIASIS, 6644*
    BILIARY TRACT, 7894
    CHILD
        DIET, 6654
        NUTRITION DISORDERS, 6654
        THERAPY, 6654
    DRUG THERAPY, 6644*, 8503
    EPIDEMIOLOGY, 8502
    INTESTINES
        IMMUNITY, 6149
    LIVER, 7895
    PREVENTION, 8503
    PSEUDOTUMORS
        ABSCESS, 8505
    VATER'S AMPULLA
        STENOSIS, 7894
    VITAMIN A
        ABSORPTION, 2663

ASCITES
    ABSORPTION
        LYMPHATIC SYSTEM, 1562
    ACID-BASE BALANCE
        THERAPY, 4335*
    ALCOHOLISM
        DRUG THERAPY, 6506*
    DIURETICS
        COMPLICATIONS, 6506*
    DRUG THERAPY
        DIURETICS, 6506*
    ESOPHAGUS
        PRESSURE STUDY, 3474*
    LAPAROSCOPY
        DIAGNOSIS, 8410
    LIVER
        RADIOLOGY, 3043*
    LIVER CIRRHOSIS
        ACID-BASE BALANCE, 4335*
        BACTERIAL INFECTIONS, 5127*
        COMPLICATIONS, 5125*, 6537*
        DIURESIS, 2554, 4346
        DIURETICS, 3481*
        DRUG THERAPY, 5903*
        EDEMA, 5903*
        ENDOTOXINS, 6530*
        ESTROGENS, 2551
        PERITONITIS, 6507*
        POTASSIUM, 2558
        PROLACTIN, 5124*
        PROTEINS, 3487
        REVIEW, 7819
        SODIUM, 3481*
        SURVIVAL, 5127*, 8394
        THERAPY, 3481*, 3487, 6531*, 7179*
    LIVER DISEASES, ALCOHOLIC
        ABSORPTION, 1562
        DRUG THERAPY, 6506*
        INDOCYANINE GREEN, 1561
        SHUNT, 7180*
    LYMPHANGIECTASIS
        STEATORRHEA, 4105*
    NEONATE
        DIAGNOSIS, 6529*
    PANCREAS
        ANTIGENS, 2412*
        CALCIFICATION, 5781

ASCITES (continued)
- PANCREAS (continued)
  - DIAGNOSIS, 3325*
  - ETIOLOGY, 7724*
  - NEOPLASMS, 7724*
  - PANCREATOGRAPHY, 3325*, 7724*
  - PSEUDOCYSTS, 3325*
- PANCREATITIS
  - AMYLASES, 4219*
- PANCREATITIS, CHRONIC
  - AMYLASES, 4219*
- PROTEIN-LOSING ENTEROPATHIES
  - MESENTERY, 436*
- PROTEINS
  - DIURESIS, 4346
- SHUNT
  - THERAPY, 7180*
- SIMULATION
  - DRUG EFFECTS ON, 2913

ASCORBIC ACID
- SEE VITAMIN C

ASPIRIN
- ABSORPTION
  - ACIDITY, 1772*
- BLEEDING
  - PROSTAGLANDINS, 2141
- DUODENUM
  - MORPHOLOGY, 6884
  - MOTILITY, 2730*
- EROSIONS
  - AMINO ACIDS, 2144
  - PREGNANCY, 2144
  - STOMACH, 2144
- GASTRITIS, 5488
  - DRUG-INDUCED, 3179
- GASTROINTESTINAL SYSTEM
  - BLEEDING, 4440
  - MOTILITY, 2730*
- HEMORRHAGE
  - DRUG-INDUCED, 2254, 3547
- HEPATITIS, TOXIC
  - DRUG-INDUCED, 5068*
- INTESTINE, SMALL
  - WOUNDS AND INJURIES, 2324
- JEJUNUM
  - WOUNDS AND INJURIES, 2324
- LIVER
  - CHILD, 6442*
  - TOXICITY, 2479*, 6442*
  - ULTRASTRUCTURE, 2479*
  - WOUNDS AND INJURIES, 2479*
- LIVER CIRRHOSIS
  - BLEEDING, 2563
- METABOLISM, 7512*
- MITOCHONDRIA
  - OXIDATIVE PHOSPHORYLATION, 1879*
- STOMACH
  - ABSORPTION, 1772*
  - ACIDITY, 1772*
  - ANALGESICS AND ANTIPYRETICS, 6045
  - DRUG EFFECTS ON, 1281*, 2786*, 6045
  - DYSPLASIA, 1915
  - ELECTROPHYSIOLOGY, 3659, 7333, 7334
  - ENZYMES, 6042*
  - EROSIONS, 1315

ASPIRIN (continued)
- STOMACH (continued)
  - GLUCAGON, 2269
  - INFLAMMATION, 2143
  - MORPHOLOGY, 6884
  - MOTILITY, 2730*
  - NUCLEOTIDES, 3663*
  - PERMEABILITY, 1916
  - PHOSPHOLIPIDS, 3663*
  - REFLUX, 2730*
  - TOXICITY, 1309
  - ULCER, 2146, 2263
  - ULCER, PEPTIC, 4847
  - WOUNDS AND INJURIES, 1281*, 1877*, 1916, 2269
- STRESS
  - ULCER, 2146
- SURGERY
  - OBESITY, 2324
- TOXICITY
  - CHILD, 6442*
- ULCER
  - BLEEDING, 2145
  - DRUG-INDUCED, 1877*, 2820
  - PREVENTION, 1878*, 2812, 2813
  - SIMULATION, 2145
  - STOMACH, 5371
  - STRESS, 979, 2812, 2820, 5371
- ULCER, PEPTIC
  - DRUG-INDUCED, 2827
- WOUNDS AND INJURIES
  - BURNS, CHEMICAL, 5610
  - GASTRITIS, 5610

ATRESIA
- BILE ACIDS AND SALTS
  - BILIARY TRACT, 1603
  - METABOLISM, 1603
- BILE DUCTS
  - BILE ACIDS AND SALTS, 3368*
  - DIAGNOSIS, 3368*
  - INFANT, 3112
  - LIVER CIRRHOSIS, OBSTRUCTIVE, 3482*
  - NEOPLASMS, MALIGNANT, 3482*
- BILIARY TRACT
  - DIAGNOSIS, 1639, 5142*
  - ETIOLOGY, 6460*
  - INFANT, 1639, 5142*
  - MORPHOLOGY, 2569*
  - SURGERY, 5142*
  - THERAPY, 1639
  - ULTRASTRUCTURE, 8421*
- CHILD
  - ANTIBODIES, 5102*
  - AUSTRALIA ANTIGEN, 5102*
  - IMMUNOGLOBULINS, 5102*
- COLON, 7037
- DUODENUM
  - ALPHA FETOPROTEIN, 411
  - FETUS, 411
- ENTEROCOLITIS, NECROTIZING
  - COLON, 2374
- ESOPHAGUS
  - CLASSIFICATION, 2226
  - FISTULA, 1267
  - MOTILITY, 4790*
  - NEONATE, 6211
  - SIMULATION, 6211

- ATRESIA (continued)
  - ESOPHAGUS (continued)
    - SURGERY, 304, 4790*, 7555
    - SURVIVAL, 304
  - INTESTINE, SMALL
    - EPIDEMIOLOGY, 4098*
  - INTESTINES
    - FISSURE, 7015
  - NEONATE
    - INTESTINE, SMALL, 4867*
    - PROGNOSIS, 4867*
  - STOMACH
    - FISSURE, 7015

- ATROPHY
  - CHILD
    - PROTEIN-LOSING ENTEROPATHIES, 3257*
    - VILLI, 3257*
  - GASTRECTOMY
    - PANCREAS, 2288*
  - INTESTINE, SMALL
    - GALLBLADDER, 6061
    - GASTRIN, 4685*
    - HORMONE EFFECTS ON, 4685*
    - HORMONES, 6061
    - PANCREAS, 6061
    - PARENTERAL ALIMENTATION, 6061
    - VILLI, 8099*
  - JEJUNUM
    - GASTRIN, 4685*
    - HORMONE EFFECTS ON, 4685*
  - PANCREAS, 6749
  - PANCREATIC DUCT
    - TECHNIQUES, 4584*
  - SALIVARY GLANDS
    - MORPHOLOGY, 3597
    - ULTRASTRUCTURE, 3597
  - VILLI
    - ANTIGENS, 4914
    - DISEASES ASSOCIATED WITH, 4914
    - HYPERSENSITIVITY, 4914

- ATROPINE
  - CALCIUM
    - ACID SECRETION, 2307
    - ENZYMES, 995
  - DUODENUM
    - ULCER, 4073*
  - ESOPHAGUS
    - GASTRIN, 4540
    - SPHINCTER, 1841
  - GASTRIN
    - PROTEINS, 5634
  - HORMONES, GASTROINTESTINAL
    - DRUG EFFECTS ON, 3738
  - INTESTINES
    - SECRETIN, 2978
  - PANCREAS
    - BICARBONATE SECRETION, 8182
  - SECRETION
    - GASTRIN, 7967*
  - SERUM
    - GASTRIN, 2307, 5623*
  - STOMACH
    - ACID SECRETION, 1893, 2785*, 2787*, 5624*, 6729*, 7962*, 7967*, 8183
    - GASTRIN, 7967*
    - PEPSIN, 6729*
    - SECRETION, 1296, 2787*, 6729*

- ATROPINE (continued)
  - ULCER
    - CLASSIFICATION, 6266
    - DUODENUM, 5634

- AUSTRALIA ANTIGEN
  - ACRODERMATITIS
    - CHILD, 2497*, 3442
  - ANALYSIS, 1534
    - TECHNIQUES, 1532
  - ANTIBODIES
    - CIRCULATION, 5866*
    - EPIDEMIOLOGY, 6477*
    - ETHNIC FACTORS, 6476*
    - RADIOIMMUNOASSAY, 7785*
    - SOCIOECONOMIC FACTORS, 6476*
  - ATRESIA
    - CHILD, 5102*
  - BLOOD
    - METALS, 4302
    - TRANSMISSION, 8361
    - ULTRASTRUCTURE, 4302
  - CARBOHYDRATES
    - CHROMATOGRAPHY, 8121
  - CARRIER STATE, 8358*
    - BLOOD GROUPS, 7787*
    - DRUG THERAPY, 2487*
    - ETHNIC FACTORS, 6476*
    - GENETIC FACTORS, 5856*
    - SEQUELAE, 2509
    - SOCIOECONOMIC FACTORS, 6476*
    - TRANSMISSION, 5857*
  - CHILD
    - HEPATITIS, INFECTIOUS, 4283*
    - INFECTION, 5082*
  - CHOLESTASIS
    - IMMUNITY, 7151*
  - CIRCULATION
    - TECHNIQUES, 5866*
  - DENTISTRY
    - EPIDEMIOLOGY, 4285*
  - ELECTROPHORESIS, 8379
  - EPIDEMIOLOGY, 4286, 5080*, 6477*, 7792
    - IMMUNOLOGY, 2505
  - FAMILIAL FACTORS
    - CARRIER STATE, 658
  - HEMODIALYSIS
    - OCCUPATIONAL FACTORS, 8363
  - HEPATITIS, 3437, 3438
    - CARRIER STATE, 6475*, 7788*
    - CELLS, 3439
    - DIAGNOSIS, 7789*
    - HEPATITIS, INFECTIOUS, 659
    - IMMUNITY, 3441
    - IMMUNOLOGY, 6474*
    - LIVER, 6470*
    - PLASMAPHERESIS, 643*
    - SERUM, 3439, 6470*
    - TRANSFUSION, 2525*
  - HEPATITIS, CHRONIC, 3438
    - ANALYSIS, 1519*
    - ANTIGENS, 5864*
    - BIOPSY, 1519*, 7152*
    - CARRIER STATE, 2523*
    - CELLS, 3439
    - CHILD, 6499*
    - DANE PARTICLES, 5864*
    - EPIDEMIOLOGY, 2496*
    - ETIOLOGY, 2524*

AUSTRALIA ANTIGEN (continued)

- HEPATITIS, CHRONIC (continued)
  - HEMODIALYSIS, 5868*
  - IMMUNITY, 3441, 5868*, 7151*
  - IMMUNOGLOBULINS, 4309*
  - IMMUNOLOGY, 685, 4310*
  - LIVER, 6470*
  - LIVER CIRRHOSIS, 6499*
  - PATHOLOGY, 6500*
  - PROGNOSIS, 6501*
  - SERUM, 3439, 6470*
  - TRANSFUSION, 2525*
  - VIROLOGY, 5864*
- HEPATITIS, INFECTIOUS, 1535, 1536, 2506, 3429*, 3437, 3446, 5081*
  - ANTIBODIES, 5083*
  - ANTIGENS, 5863*
  - BIOCHEMISTRY, 2513
  - BIOPSY, 7152*, 7156*
  - BLOOD, 7150*
  - BLOOD GROUPS, 8352*
  - CARRIER STATE, 652
  - CELLS, 3439
  - CEREBROSPINAL FLUID, 662
  - CHILD, 4779, 7161, 8380
  - DANE PARTICLES, 5863*
  - DIAGNOSIS, 4779, 7150*, 7789*, 8378
  - DIALYSIS, 2513
  - DRUG THERAPY, 2487*
  - EPIDEMIOLOGY, 647, 657, 2017, 2496*, 3445, 6491, 7162, 7163, 8352*, 8364
  - HEPATITIS, CHRONIC, 7156*
  - IMMUNITY, 3427*, 3440
  - IMMUNOGLOBULINS, 4309*
  - IMMUNOLOGY, 644, 645, 665, 5084*, 5104*, 7164
  - INFANT, 2492*, 2495*
  - LIVER, 6470*, 7150*
  - NEONATE, 2492*, 2495*
  - PREGNANCY, 2492*, 3423*
  - PROGNOSIS, 8378, 8380
  - RADIOIMMUNOASSAY, 5083*
  - REVIEW, 2495*, 2503, 6490, 7164
  - SALIVA, 660
  - SERUM, 3439, 6470*
  - SEX FACTORS, 3419*
  - STATISTICAL STUDY, 6492
  - TRANSFUSION, 2498*
  - TRANSMISSION, 652, 2490*, 2492*, 5077*, 7164
  - ULTRASTRUCTURE, 4289*, 5083*
  - VACCINES, 1537
  - VIROLOGY, 5863*
- HEPATITIS, SERUM
  - CHILD, 8380
  - DIAGNOSIS, 5093
  - PROGNOSIS, 8380
- HEPATOCYTES
  - HEPATITIS, INFECTIOUS, 4289*
  - MEMBRANES, 5094
  - ULTRASTRUCTURE, 4288*, 4289*
- HISTOCHEMISTRY
  - TECHNIQUES, 7154*
- IMMUNITY
  - CARRIER STATE, 2018
  - CIRCULATION, 5866*
  - HEPATITIS, INFECTIOUS, 8354*

AUSTRALIA ANTIGEN (continued)

- IMMUNOGLOBULINS
  - HEPATOCYTES, 626
- IMMUNOLOGY, 2864*, 8379
- INFANT
  - TRANSMISSION, 5858*
- INSECTS, 6473*
- LIVER
  - ANALYSIS, 1519*
  - BIOPSY, 1519*, 2523*
  - CARRIER STATE, 661
  - HEPATITIS, INFECTIOUS, 625
  - HISTOCHEMISTRY, 7154*
  - MORPHOLOGY, 8357*
  - NEOPLASMS, 3391, 7151*
  - NEOPLASMS, MALIGNANT, 675, 3369*, 3392, 6434, 7762
  - PATHOLOGY, 661, 3443, 6475*
  - ULTRASTRUCTURE, 3443, 8357*
- LIVER CIRRHOSIS, 3392, 3438, 4313
  - BIOPSY, 7152*
  - CHILD, 6499*
  - IMMUNITY, 7151*
  - IMMUNOGLOBULINS, 3476*, 4309*
  - IMMUNOLOGY, 3476*, 4310*
  - LIVER, 6470*
  - NEONATE, 5102*
  - NEOPLASMS, 4347
  - SERUM, 6470*
- LIVER DIESASES
  - TECHNIQUES, 3426*
- LIVER DISEASES, 2506, 3392, 3438, 5081*, 5095
  - ANTIBODIES, 3371*
  - BIOPSY, 7152*
  - CELLS, 3439
  - CHILD, 5102*
  - EPIDEMIOLOGY, 2496*
  - HEPATOCYTES, 5861*
  - IMMUNITY, 3441
  - IMMUNOLOGY, 686, 3452*, 5084*
  - SERUM, 3439, 6470*
  - THERAPY, 4296*
- LIVER DISEASES, ALCOHOLIC, 3392
- LIVER FUNCTION TESTS
  - DRUG DEPENDENCE, 2500
- LIVER INJURY
  - CARRIER STATE, 6475*
- OCCUPATIONAL FACTORS
  - EPIDEMIOLOGY, 7155
- PREGNANCY
  - HEPATITIS, INFECTIOUS, 4283*
- RADIOIMMUNOASSAY, 1533, 8379
  - TECHNIQUES, 7785*
- REVIEW, 650, 7784
- SERUM
  - HEPATITIS, CHRONIC, 3430*
- SOCIOECONOMIC FACTORS
  - EPIDEMIOLOGY, 2668
- TECHNIQUES, 2211
- TRANSFUSION
  - DOWN'S SYNDROME, 655
  - TRANSMISSION, 8362
- TRANSMISSION
  - DENTISTRY, 5079*
  - PREGNANCY, 7153*
  - RISK FACTORS, 8361
- ULTRASTRUCTURE
  - HEPATOCYTES, 4290*

AUSTRALIA ANTIGEN (continued)
  ULTRASTRUCTURE (continued)
    IMMUNOLOGY, 654
    METALS, 4302
  UROGENITAL SYSTEM
    GEOGRAPHICAL FACTORS, 649

AUTOIMMUNE DISEASES
  CHOLESTASIS
    ANTIBODIES, 4252*
  COLITIS, ULCERATIVE
    IMMUNOLOGY, 1104*
  HEPATITIS, 3461*
  HEPATITIS, CHRONIC
    ANTIBODIES, 4252*
    TOXICITY, 2528
  LIVER
    LYMPHOCYTES, 1659
    SJOGREN'S SYNDROME, 590
  LIVER CIRRHOSIS
    ANTIBODIES, 4252*
    SCLERODERMA, 2544*
    THYROID GLAND, 2544*
    TOXICITY, 2528
  LYMPHOCYTES
    TOXICITY, 2528
  MARKER STUDY, 4315

AUTOLYSIS
  INTESTINE, SMALL
    TECHNIQUES, 175

AUTORADIOGRAPHY
  COLON
    NEOPLASMS, MALIGNANT, 4929*
  ENTERECTOMY
    ILEUM, 4709*
  LIVER
    DRUGS, 1983
  RECTUM
    NEOPLASMS, MALIGNANT, 4929*
  STOMACH
    EPITHELIUM, 1102*

BACTERIA
  ADENYL CYCLASE
    ENTEROTOXINS, 1091
  APPENDIX
    PERFORATION, 1406
  BILE ACIDS AND SALTS
    CYSTIC FIBROSIS, 7750*
    INTESTINES, 1116, 7440*
    METABOLISM, 5242*, 5512*
  BILIARY TRACT, 7834
  CECUM, 6680*
    ACIDITY, 7509*
    OXIDATION, 7509*
    SALMONELLOSIS, 2132
  CHOLECYSTECTOMY
    MORPHOLOGY, 7200*
  CHOLELITHIASIS
    BILE, 5147*
  CHOLIC ACID
    INTESTINES, 7440*
    METABOLISM, 2156, 4446
  COLITIS
    ANTIBIOTICS, 5718*
    DRUG EFFECTS ON, 7720

BACTERIA (continued)
  COLITIS, ULCERATIVE
    ENTERECTOMY, 4970
  COLON, 455
    ANTIGENS, 1644*, 4715*
    GENETIC FACTORS, 1644*
    NEOPLASMS, 8234*
  COLONIC DISEASES
    COLONOSCOPY, 4147*
    FECES, 455
    INTESTINE, LARGE, 4147*
  CROHN'S DISEASE
    ENTERECTOMY, 4970
    THERAPY, 6356
  DIARRHEA
    ACHLORHYDRIA, 2312*
    DIAGNOSIS, 2590*
    ETIOLOGY, 5170*
    INTESTINE, SMALL, 1353, 5169*
    NUTRITION DISORDERS, 1353
  DUODENUM, 7834
  FECES, 7510*
    CHOLESTEROL, 185
    DIETARY FACTORS, 5188, 6713*
    NEONATE, 185
  FOOD POISONING
    DIAGNOSIS, 1677
  GASTROENTERITIS
    ETIOLOGY, 5170*, 5206
    INFANT, 6612
  GASTROINTESTINAL SYSTEM, 4434, 5466*
    ANTIBODIES, 4702*
  GIARDIASIS
    STEATORRHEA, 5242*
  ILEOSTOMY
    METABOLISM, 2323
  ILEUM, 8464
    ION TRANSPORT, 34
  INFLAMMATORY BOWEL DISEASES, 4719
  INTESTINE, LARGE
    TOXINS, 5699*
  INTESTINE, SMALL, 8464
    ANTIBIOTICS, 8454*
    ANTIGENS, 8454*
    BREATH TEST, 1198, 5649*
    DIARRHEA, 7653
    DRUG EFFECTS ON, 3544
    GASTRECTOMY, 1117
    LIVER CIRRHOSIS, 6520*
    MALABSORPTION SYNDROMES, 399
    REVIEW, 7653
  INTESTINES, 6840, 6841
    ANTIBIOTICS, 813, 3530
    BACTERIAL INFECTIONS, 1670
    BILE ACIDS AND SALTS, 6074*, 7389*
    BREATH TEST, 2194
    CHILD, 3542
    DIETARY FACTORS, 6589*
    DRUG THERAPY, 1670
    GNOTOBIOTICS, 1671
    INFANT, 7253
    INFLAMMATORY BOWEL DISEASES, 4970
    LEUKOCYTES, 813
    PREMATURITY, 1670
    REVIEW, 2375
    TEMPERATURE, 211
    ULCER, 8102*

BACTERIA (continued)
- JEJUNUM, 4114
  - ELECTROPHYSIOLOGY, 7323
  - LIVER CIRRHOSIS, 6520*
  - MALABSORPTION SYNDROMES, 4113
- LIPODYSTROPHY, INTESTINAL
  - ETIOLOGY, 5705*
  - IMMUNITY, 5705*
- LIVER
  - ABSCESS, 2449*
  - CARBON TETRACHLORIDE, 2041
  - CARDIOVASCULAR SYSTEM, 6540*
  - LIPOPOLYSACCHARIDES, 2041
  - NECROSIS, 7465
  - THROMBOSIS, 7465
- LIVER CIRRHOSIS
  - ANTIBODIES, 3475*
  - BLOOD, 4337*
- LIVER DISEASES
  - ANTIBODIES, 1470
- LYMPHOMA
  - MALABSORPTION SYNDROMES, 6309*
- MALABSORPTION SYNDROMES
  - INTESTINE, SMALL, 7653
  - VITAMIN B12, 2367
- NEOPLASMS, 7465
- SALMONELLOSIS, 7522
- STOMACH
  - TEMPERATURE, 211
- ULCER
  - ACID SECRETION, 6732

BACTERIAL INFECTIONS
- ABSCESS
  - IMMUNITY, 2648
- ABSORPTION
  - ANTIBACTERIALS, 1675
- APPENDICITIS
  - COMPLICATIONS, 7699
- BILE
  - HISTOCHEMISTRY, 4386
- BILE DUCTS, 4722
- BILIARY TRACT
  - ANTIBIOTICS, 7202*
  - CHOLECYSTITIS, 3503*
  - CHOLELITHIASIS, 3503*
  - COMMON BILE DUCT CALCULI, 3503*
  - HISTOCHEMISTRY, 4386
  - PREVENTION, 7202*
  - SURGERY, 4386, 6554*, 7202*
- BILIARY TRACT DISEASES
  - ANTIBIOTICS, 5140*
  - DRUG THERAPY, 5140*
- CHOLERA
  - SIMULATION, 2658
  - TOXICOLOGY, 2658
- COLON
  - SURGERY, 5710*
- COLONOSCOPY, 7553
- CROHN'S DISEASE
  - ETIOLOGY, 4480
  - HYPERSENSITIVITY, 4481
  - TRANSMISSION, 4481
- DIAGNOSIS, 4306
- DIARRHEA
  - ANTIBIOTICS, 4421
  - REVIEW, 784
  - TOXINS, 3525*

BACTERIAL INFECTIONS (continued)
- ENTERITIS
  - REVIEW, 795
  - YERSINIA, 4900
- ENTEROCOLITIS, NECROTIZING
  - ESCHERICHIA COLI, 4432
  - NEONATE, 4432
- ESOPHAGUS
  - DILATATION, 5560*
  - ENDOSCOPY, 5560*, 4388*
- ETIOLOGY, 4306
- FOOD POISONING
  - CLOSTRIDIUM, 3524
- GASTROENTERITIS
  - INFANT, 3538
- GASTROINTESTINAL SYSTEM
  - ENDOSCOPY, 4388*
  - YERSINIA, 8203
- HEPATITIS
  - VENEREAL DISEASES, 8054
- ILEUM
  - YERSINIA, 5665
- IMMUNITY
  - HOST FACTORS, 5948
- INTESTINE, LARGE
  - SURGERY, 1672
- INTESTINE, SMALL
  - MORPHOLOGY, 4695
- INTESTINES
  - BACTERIA, 1670
  - BILE ACIDS AND SALTS, 5931*
  - ELECTROLYTES, 1364
  - EPIDEMIOLOGY, 817
  - PNEUMATOSIS, 4193
  - SOCIOECONOMIC FACTORS, 817
  - TRANQUILIZING AGENTS, 1364
  - YERSINIA, 3246
- IRON
  - IMMUNITY, 5948
- LIVER
  - ABSCESS, 2470, 6666, 7757
  - CIRCULATION, 1426
  - PATHOLOGY, 4736
  - PSEUDOTUMORS, 1509*
  - SYNERGY, 6666
- LIVER CIRRHOSIS
  - ASCITES, 5127*
  - SURVIVAL, 1694, 5127*
- LIVER DISEASES, ALCOHOLIC
  - PREVENTION, 5115
- MALABSORPTION SYNDROMES, 7642
  - ETIOLOGY, 3256*
  - VITAMIN B12, 4924
- PANCREATITIS
  - COMPLICATIONS, 4236
- PERIHEPATITIS
  - VENEREAL DISEASES, 8054
- PERITONITIS, 1698
- PREVENTION
  - HOST FACTORS, 5948
  - IRON, 5948
- PROTEINS
  - DIETARY FACTORS, 2646
- RECTUM
  - NEOPLASMS, MALIGNANT, 1426
- SALMONELLOSIS
  - DIAGNOSIS, 6630
- STOMACH
  - ENDOSCOPY, 4388*

BACTERIAL INFECTIONS (continued)
- YERSINIA
  - APPENDIX, 3247
  - COMPLICATIONS, 3245
  - DIAGNOSIS, 3246, 3247
  - EPIDEMIOLOGY, 3246
  - FECES, 3247
  - SEPSIS, 3245

BARIUM
- CECUM
  - PERITONITIS, 7039
- COLON
  - COMPLICATIONS, 2190
  - ENEMA, 2190, 2396
  - NEOPLASMS, 8256
  - POLYPS, 7002*
- DIAGNOSIS
  - ULCER, 4742*
- DUODENUM
  - DYSPEPSIA, 6260
  - TECHNIQUES, 2193
- DYSPEPSIA
  - DIAGNOSIS, 5539
  - ENDOSCOPY, 6257
- ENDOSCOPY
  - DIAGNOSIS, 4742*
  - TECHNIQUES, 2193
- ENEMA
  - COMPLICATIONS, 2200, 2396
  - PROGNOSIS, 1178*
  - TECHNIQUES, 1178*, 4925*
- ESOPHAGUS
  - DYSPEPSIA, 6260
  - PRESSURE STUDY, 914*
  - SPHINCTER, 914*
  - TECHNIQUES, 2193
  - VARICES, 5231
- GASTROINTESTINAL DISEASES
  - DIAGNOSIS, 1241
  - ENDOSCOPY, 1241
  - TECHNIQUES, 1241
- GASTROINTESTINAL SYSTEM
  - RADIOLOGY, 49
  - TECHNIQUES, 49
- HIATAL HERNIA
  - ESOPHAGEAL REFLUX, 5577
- ILEUM
  - CECUM, 7054
  - ENEMA, 6851*
- INTESTINE, LARGE
  - ENDOSCOPY, 1240
  - ENEMA, 1240, 8239
- INTESTINE, SMALL
  - INFARCTION, 7606*
  - RADIOLOGY, 6829*
  - TECHNIQUES, 3598*
- LIVER
  - CIRCULATION, 2200
- PERITONEUM
  - TOXICOLOGY, 219
- POLYPS
  - ENEMA, 7002*
- RECTUM
  - PERITONITIS, 7039
  - RADIOLOGY, 1253
  - TECHNIQUES, 1253

BARIUM (continued)
- SCLERODERMA
  - COMPLICATIONS, 4417
  - GASTROINTESTINAL SYSTEM, 4417
- STOMACH
  - ACID SECRETION, 6731
  - COMPLICATIONS, 4761
  - DYSPEPSIA, 6260
  - MOTILITY, 7953
  - PERITONITIS, 7039
  - PRESSURE STUDY, 914*
  - RADIOLOGY, 4761, 5536, 6829*
  - SPHINCTER, 914*
  - SURGERY, 5536
  - TECHNIQUES, 2193

BARRETT'S SYNDROME
- ESOPHAGUS
  - DISEASES ASSOCIATED WITH, 6862*
  - NEOPLASMS, MALIGNANT, 6862*
  - RADIOLOGY, 5561*

BEHCET'S SYNDROME
- ANTIGENS
  - CHROMOSOMES, 5167*
- MOUTH
  - REVIEW, 8465

BEZOARS
- ENDOSCOPY
  - THERAPY, 346
- ESOPHAGUS
  - STOMACH, 2235
- ILEUM
  - DIAGNOSIS, 347
- STOMACH, 6237
  - DIAGNOSIS, 347
  - JAUNDICE, OBSTRUCTIVE, 3159
  - THERAPY, 346

BICARBONATE SECRETION
- SEE ALSO ACID SECRETION, HYPERCHLORHYDRIA, SECRETION
- ABSORPTION
  - VITAMIN B12, 1441*
- ALCOHOLS
  - HORMONE EFFECTS ON, 1931*
- ANESTHESIA, 3727*
- ANTRUM
  - ION TRANSPORT, 5285*
- BILE DUCTS
  - OBSTRUCTION, 1978*
- CELIAC DISEASE
  - SECRETION, 2357
- CERULEIN
  - PANCREATIC DISEASES, 3938*
  - SECRETIN, 3938*
- DUODENUM
  - SECRETIN, 2287*
- GASTRECTOMY
  - PANCREAS FUNCTION TESTS, 2288*
- GLUCAGON
  - PANCREAS, 2855
- PANCREAS, 1942, 2836*
  - ACIDITY, 1933, 1939, 1949, 5387*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 114

BICARBONATE SECRETION (continued)
    PANCREAS (continued)
        ALCOHOLS, 1931*, 4683*, 7368*
        ANESTHETICS, 7372*
        ATROPINE, 8182
        CERULEIN, 4234
        CHOLAGOGUES AND CHOLERETICS, 6753
        CHOLECYSTOKININ, 4234
        DIETARY FACTORS, 5387*
        DIURETICS, 4590*
        DOPAMINE, 3740
        DRUG EFFECTS ON, 3740, 3749*, 4590*, 4683*, 5390*, 6753, 7368*, 7372*, 7731
        FATS, 5358*
        FOOD, 1939
        GASTRIN, 1922
        HORMONE EFFECTS ON, 4234, 4588*, 4593*, 5386*, 6060*
        HORMONES, GASTROINTESTINAL, 4593*, 5388*
        HYPERGLYCEMIA, 7380
        MUSCLE RELAXANTS, 5390*
        NEOPLASMS, MALIGNANT, 5773*
        PARASYMPATHOMIMETICS, 4594*
        PARENTERAL ALIMENTATION, 1940
        PEPTIDES, 4592*
        RADIATION EFFECTS ON, 983*
        SECRETIN, 986, 3860, 4593*, 5386*, 5388*
        SOMATOSTATIN, 1949, 6060*
        THYROCALCITONIN, 4588*
        ULCER, PEPTIC, 8182
        VAGOTOMY, 2287*
    PANCREATITIS, CHRONIC
        CERULEIN, 2850
        DRUG EFFECTS ON, 7731
        SECRETIN, 2850
        TECHNIQUES, 2850
    SECRETIN
        TECHNIQUES, 3725*
    STOMACH
        REVIEW, 3616
    ULCER
        H2 RECEPTOR ANTAGONISTS, 4832*
        SECRETIN, 2287*
    ULCER, PEPTIC
        ACIDITY, 1336*, 1337*
        DUODENUM, 1341*

BICARBONATES
    BILE
        DEFICIENCY, 2027
    ESOPHAGUS
        MOTILITY, 50
    STOMACH
        ELECTRICAL CONTROL, 1862
        ELECTROPHYSIOLOGY, 3699
        ULCER, 105

BILE
    ABSCESS
        PERITONITIS, 634
    ACIDS
        ULCER, 1917
    ADENOSINE TRIPHOSPHATASE
        SECRETION, 4645
    ADENOSINE TRIPHOSPHATE
        NERVOUS CONTROL, 6106

BILE (continued)
    ALCOHOLS
        BILE ACIDS AND SALTS, 3783
        SECRETION, 1017*
    AMINO ACIDS, 6069*
    ANTINEOPLASTIC AGENTS
        METABOLISM, 5825*
    ANTRUM
        LYSOSOMES, 1917
        SECRETION, 3701
        TOXICITY, 3701
    BACTERIAL INFECTIONS
        HISTOCHEMISTRY, 4386
    BICARBONATES
        DEFICIENCY, 2027
    BILE ACIDS AND SALTS
        DIETARY FACTORS, 7998*
        FATS, 7998*
        TRANSPORT, 1003*
    BILIARY TRACT
        FEEDING, 1636
        PHYSICAL FACTORS, 1636
        SECRETION, 2887*, 7390*
        THYROCALCITONIN, 126
    BILIARY TRACT DISEASES
        DIAGNOSIS, 6581*
        FATS, 5139*
    BILIRUBIN
        DRUG EFFECTS ON, 6099
        SEROTONIN, 6099
    BIOCHEMISTRY
        DIURETICS, 4628*
        DRUG EFFECTS ON, 4628*
    BLOOD
        ENZYMES, 7407*
    CALCIUM
        CHEMICAL COMPOSITION, 8427*
        GALLSTONES, 8420*
    CALCULI
        CHEMICAL COMPOSITION, 1612
        GALLBLADDER DISEASES, 1612
    CANNULATION
        TECHNIQUES, 6071*
    CHEMICAL COMPOSITION
        BILE ACIDS AND SALTS, 8419*
        CHOLECYSTITIS, 750
        DRUG EFFECTS ON, 8419*
        ETHNIC FACTORS, 7388*
        FISTULA, 4370*
        JAUNDICE, OBSTRUCTIVE, 4370*
        NEONATE, 1638
    CHENODEOXYCHOLIC ACID
        CHOLESTEROL, 2927
        DIETARY FACTORS, 2927
        LIPIDS, 3497*
        METABOLISM, 1969*
        TRACER STUDY, 1969*
    CHOLAGOGUES AND CHOLERETICS
        METABOLISM, 6097
    CHOLECYSTECTOMY
        PHOSPHORUS, 6543*
    CHOLECYSTITIS
        CHEMICAL COMPOSITION, 757
        CHILD, 757
    CHOLELITHIASIS, 5004*
        BACTERIA, 5147*
        BILE ACIDS AND SALTS, 7437*
        CHEMICAL COMPOSITION, 7437*
        CHENODEOXYCHOLIC ACID, 7212*

- BILE (continued)
  - CHOLELITHIASIS (continued)
    - CHOLESTEROL, 7437*
    - PHOSPHORUS, 6543*
  - CHOLERESIS
    - TRANQUILIZING AGENTS, 7414*
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 7105*
    - EXCRETION, 567
    - GENETIC FACTORS, 567
    - TRANSPORT, 2049
  - CHOLESTEROL, 6085*
    - CHOLELITHIASIS, 2031
    - CONTRAST MEDIA, 8069
    - ESTROGENS, 3778
    - PHOSPHOLIPIDS, 7398*
    - PROSTAGLANDINS, 2890*
  - CHROMATOGRAPHY
    - BILIRUBIN, 1009*
    - CHENODEOXYCHOLIC ACID, 1579*
    - CHOLELITHIASIS, 1579*
    - THERAPY, 1579*
  - CIRCULATION
    - ESTROGENS, 4650
  - COMMON BILE DUCT
    - ACIDITY, 3493*
  - COMMON BILE DUCT CALCULI
    - CHOLECYSTECTOMY, 2571*
  - CONTRAST MEDIA, 5432*
  - COPPER
    - BINDING, 6072*
    - TECHNIQUES, 4621*
    - WILSON'S DISEASE, 6072*
  - CROHN'S DISEASE
    - BILE ACIDS AND SALTS, 7280
  - CYSTIC FIBROSIS
    - CHEMICAL COMPOSITION, 2583
    - LIPIDS, 2583
  - DIARRHEA
    - DIET, 1485
  - DRAINAGE
    - TECHNIQUES, 3912
  - DRUG EFFECTS ON, 4356*
    - DIURETICS, 4647
  - ENZYMES
    - NERVOUS CONTROL, 6106
  - ESOPHAGITIS
    - REFLUX, 3134
  - ESTROGENS
    - METABOLISM, 7463
  - EXCRETION
    - DRUG-INDUCED, 156
    - PHYSICAL FACTORS, 907
  - FOOD
    - DIGESTION, 2967
  - GALLBLADDER
    - ACIDITY, 3493*
    - ANTIGENS, 4357*
    - CHEMICAL COMPOSITION, 7388*
  - GALLBLADDER DISEASES
    - BIOCHEMISTRY, 8420*
    - IMMUNOGLOBULINS, 5047
  - GASTRITIS
    - ETIOLOGY, 3176
    - REFLUX, 3134
  - HEPATITIS
    - BILE ACIDS AND SALTS, 7105*
  - HEPATOCYTES
    - SYNTHESIS, 1004*

- BILE (continued)
  - HYPERSENSITIVITY
    - THERAPY, 6093
  - ILEUM
    - ABSORPTION, 412
    - ENZYMES, 4688
    - GROWTH SUBSTANCES, 5443*
    - MOTILITY, 6093
    - NUCLEIC ACIDS, 4688
    - PROTEINS, 4688
    - SUCRASE, 4688
  - INTESTINE, SMALL
    - HYPEREMIA, 3767
    - LACTATION, 5293*
    - MORPHOLOGY, 3585*
    - MOTILITY, 6093
    - PANCREAS, 5293*
  - JAUNDICE, OBSTRUCTIVE
    - INTESTINE, SMALL, 6579*
    - REFLUX, 2054
  - JEJUNUM
    - ENZYMES, 4688
    - NUCLEIC ACIDS, 4688
    - PROTEINS, 4688
    - SUCRASE, 4688
  - KIDNEYS
    - ANTIGENS, 4357*
  - LIPIDS
    - CHOLAGOGUES AND CHOLERETICS, 4633*
    - DRUG EFFECTS ON, 4633*, 6397*
    - ETHNIC FACTORS, 7835
    - METABOLISM, 2943, 6397*
    - PHENOBARBITAL, 6397*
    - PROSTAGLANDINS, 2890*
    - SORBITOL, 2943
  - LIPOPROTEINS
    - ELECTROPHORESIS, 6775*
  - LIVER
    - ADENOSINE TRIPHOSPHATASE, 2909
    - CHENODEOXYCHOLIC ACID, 1576*
    - CHOLIC ACID, 1576*
    - CLEARANCE STUDY, 1576*
    - ENDOTOXINS, 7996*
    - ENZYMES, 2929
    - EXCRETION, 567, 2954
    - METABOLISM, 2929
    - SULFOBROMOPHTHALEIN, 2954
    - SYNTHESIS, 7384*, 7470, 7996*, 8062
    - TRANSPLANTATION, 3909
    - TRANSPORT, 910, 2027
  - LIVER DISEASES
    - BILE ACIDS AND SALTS, 7280
    - IMMUNOGLOBULINS, 5047
  - LYSOSOMES
    - ULCER, 1917
  - MUSCLES
    - ANTIGENS, 4357*
  - OBSTRUCTION
    - HEPATOCYTES, 2677*
  - ODDI'S SPHINCTER
    - SECRETION, 2021
  - OXIDOREDUCTASES
    - NERVOUS CONTROL, 6106
  - PANCREAS
    - ENZYMES, 2419
  - PANCREATITIS
    - REFLUX, 2444

BILE (continued)
- PROTEINS
  - BINDING, 2419
- RADIOPROTECTIVE AGENTS
  - LIVER, 1786
- REFLUX
  - DYSPEPSIA, 2248
  - PROSTAGLANDINS, 4564*
  - THERAPY, 4564*
- RESPIRATORY SYSTEM
  - EXCRETION, 2954
- SECRETION
  - ADENOSINE TRIPHOSPHATASE, 5427*
  - BILE ACIDS AND SALTS, 2866*
  - CALCIUM, 1990
  - CERULEIN, 6095
  - CHOLAGOGUES AND CHOLERETICS, 4633*, 6092, 6096
  - CHOLESTEROL, 2866*
  - COPPER, 4621*
  - DIETARY FACTORS, 1076
  - DIURETICS, 4628*
  - DRUG EFFECTS ON, 4628*, 4633*, 4647, 6092, 6095, 6096, 6099
  - DUODENUM, 141
  - FEEDING, 605
  - INSULIN, 6092
  - LIPIDS, 2866*
  - LIVER, 1990
  - MARKER STUDY, 248
  - MICELLES, 2866*
  - MORPHOLOGY, 1989
  - OBSTRUCTION, 5419*
  - PHOSPHOLIPIDS, 2866*
  - PROSTAGLANDINS, 6745*
  - SEROTONIN, 6099
  - TECHNIQUES, 3725*
- SODIUM
  - HORMONES, ADRENAL CORTEX, 1070
- STOMACH
  - ACID SECRETION, 7390*
  - MOTILITY, 1076
  - SECRETION, 3701
  - TOXICITY, 3701
- SURGERY
  - DUODENUM, 141
- SYNTHESIS
  - ADENOSINE TRIPHOSPHATASE, 3775
  - BILE ACIDS AND SALTS, 1003*
  - CALCIUM, 7384*
  - CHOLAGOGUES AND CHOLERETICS, 7449
  - ISCHEMIA, 7470
  - REVIEW, 8062
  - WATER, 1003*
- THYROID GLAND
  - ADENOSINE TRIPHOSPHATASE, 2909
  - HORMONES, 2111
  - PHENOBARBITAL, 2909
- TRANQUILIZING AGENTS
  - ENZYMES, 2008
  - SECRETION, 7414*
- TRANSPORT
  - VITAMIN K, 7314
  - WATER, 1003*
- ULCER
  - REFLUX, 1878*
- VITAMIN B12
  - BINDING, 2419

BILE ACIDS AND SALTS
- ABSORPTION, 3754*
  - DIET, 6693*
  - EXCRETION, 5424*
  - MICROORGANISMS, 6693*
- ACID SECRETION
  - TRANSPORT, 776
- ALCOHOLS
  - BILE, 3783
- AMINO ACIDS, 2874*
  - CIRCULATION, 1968*
- ANTACIDS
  - BINDING, 6070*
- ATRESIA
  - BILIARY TRACT, 1603
  - METABOLISM, 1603
- BACTERIA
  - CYSTIC FIBROSIS, 7750*
  - INTESTINES, 7440*
  - METABOLISM, 5242*
- BILE
  - CHEMICAL COMPOSITION, 8419*
  - DIETARY FACTORS, 7998*
  - FATS, 7998*
  - SECRETION, 2866*
  - SYNTHESIS, 1003*
  - TRANSPORT, 1003*
- BILE CANALICULI
  - SECRETION, 2925
- BILE DUCTS
  - ATRESIA, 3368*
  - CALCULI, 8425*
  - CHOLECYSTECTOMY, 7394*
  - OBSTRUCTION, 1978*
  - STARVATION, 7394*
- BILIARY TRACT
  - EXCRETION, 38
  - MEMBRANES, 1065
  - SECRETION, 1069, 2887*, 2926, 5420*, 8004*
  - SOLUBILITY, 1065
  - TRANSPORT, 4615*, 5420*
- BILIARY TRACT DISEASES
  - SERUM, 606
  - TECHNIQUES, 4751*
- BILIRUBIN
  - CHOLERESIS, 2928
- CALCULI
  - SOLUBILITY, 1608
- CATHARTICS
  - METABOLISM, 2072
- CECUM
  - CHOLECYSTECTOMY, 7394*
  - DIET, 4714*
  - MICROORGANISMS, 4714*
  - STARVATION, 7394*
- CHEMICAL COMPOSITION
  - CHOLIC ACID, 2875*
  - TECHNIQUES, 3089
- CHEMICAL PROPERTIES, 7479
- CHENODEOXYCHOLIC ACID, 3497*
- CHOLECYSTECTOMY, 1052
  - STARVATION, 7394*
- CHOLECYSTOKININ
  - DYES, 1965*
- CHOLELITHIASIS, 761, 1052, 4662
  - BILE, 7437*
  - CHEMICAL COMPOSITION, 3498*
  - CHOLESTEROL, 6572*, 6788

BILE ACIDS AND SALTS (continued)
  CHOLELITHIASIS (continued)
    CIRCULATION, 4363*
    PREGNANCY, 5238
    THERAPY, 5919*, 6567*, 6788, 7824*
  CHOLERESIS, 2877*
    HEPATOCYTES, 570
    VAGOTOMY, 8108*
  CHOLESTASIS, 2877*, 6111
    BILE, 7105*
    CIRCULATION, 6523*
    DIAGNOSIS, 4751*
    ESTROGENS, 7399*
    ETIOLOGY, 2450*, 7443*
    EXCRETION, 2046, 6523*
    GLUCURONIDASE, 2046
    INFANT, 7105*
    INTEGUMENTARY SYSTEM, 1600
    LYMPH, 2054
    METABOLISM, 2577*, 6445*, 8432*
    MICELLES, 5421*
    MONOAMINE OXIDASE, 6086*
    PLASMA, 2054
    PREGNANCY, 6565*
    PREVENTION, 5421*
    SERUM, 7105*
    SIMULATION, 2048
    SOLUBILITY, 1004*
    TECHNIQUES, 7393*
    URINE, 2577*
  CHOLESTEROL
    BREATH TEST, 3087, 3777
    METABOLISM, 1992, 3756*, 7400*,
      7413*
    MICELLES, 3772
    OXIDATION, 3777
    PRIMATES, 3777
    RADIOISOTOPES, 3087
    SYNTHESIS, 3087, 4618*
  CHROMATOGRAPHY
    TECHNIQUES, 7391*
  CIRCULATION, 2983*
    DRUG EFFECTS ON, 4643
    INTESTINAL ABSORPTION, 6523*
    KINETICS, 1968*
  COLITIS
    ETIOLOGY, 4180
  COLITIS, ULCERATIVE
    FECES, 7717*
    METABOLISM, 7717*
  COLON
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 2060*
    ADENOSINE TRIPHOSPHATASE, 6816*
    ADENYL CYCLASE, 2074
    DIARRHEA, 5302
    ION TRANSPORT, 4506*, 6816*
    NEOPLASMS, 7659*
    NEOPLASMS, MALIGNANT, 8103*
    PERMEABILITY, 26
    POLYPS, 1395*
  COMMON BILE DUCT CALCULI
    DRUG THERAPY, 8425*
    THERAPY, 8425*
  CROHN'S DISEASE
    BILE, 7280
    METABOLISM, 4467*
    WATER, ELECTROLYTE BALANCE, 3577*

BILE ACIDS AND SALTS (continued)
  CYSTIC FIBROSIS
    ABSORPTION, 4909*
  DEFICIENCY
    LIVER DISEASES, 1625
    REVIEW, 1625
    THERAPY, 4915
  DIARRHEA
    ETIOLOGY, 4180, 6816*, 7854*
    INFANT, 5198
    MALABSORPTION SYNDROMES, 3250*
    METABOLISM, 4467*
  DIETARY FACTORS
    FATS, 7998*
    REVIEW, 7459
  DRUG EFFECTS ON
    DIURETICS, 4647
  DRUG THERAPY
    CHILD, 7765
    INTESTINAL OBSTRUCTION, 7765
  DUODENUM
    AMINO ACIDS, 3601*
    ANALYSIS, 2186
    CHELATING AGENTS, 812
  ELECTROPHYSIOLOGY
    PERMEABILITY, 888
  ENTERITIS, REGIONAL
    WATER, ELECTROLYTE BALANCE, 3577*
  ESOPHAGUS
    HYDROGEN, 7301*
  EXCRETION
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 1597
    FECES, 3755*
    GLUCURONIDASE, 2046
    KINETICS, 7430*
    LIVER, 3774
  FATS
    MALABSORPTION SYNDROMES, 3249*
  FECES
    CATHARTICS, 2403
    CYSTIC FIBROSIS, 7750*
    DIETARY FACTORS, 7998*
    FATS, 7998*
    METABOLISM, 1116
    MICROORGANISMS, 3755*
  FETUS
    AMNIOTIC FLUID, 5007*
  FIBERS
    BINDING, 143
    DIETARY FACTORS, 143
    FUNGI, 143
  GALLBLADDER
    FETUS, 7396*
    KINETICS, 1637
    METABOLISM, 7396*
    NEONATE, 7396*
  GALLSTONES, 1976*, 4651
  GASTRIN, 2826
  GASTROINTESTINAL DISEASES
    CHILD, 7756
    DIAGNOSIS, 7756
    METABOLISM, 6947, 7756
  GLUCOSE
    ABSORPTION, 28
  HEPATECTOMY
    CECUM, 7448*
    GALLBLADDER, 7448*

BILE ACIDS AND SALTS (continued)
  HEPATECTOMY (continued)
    INTESTINE, SMALL, 7448*
    LIVER, 7448*
  HEPATITIS
    BILE, 7105*
    DIAGNOSIS, 3380, 4751*
    INFANT, 3368*, 7105*
    SERUM, 7105*
    TECHNIQUES, 3380
  HEPATOCYTES
    MEMBRANES, 7392*
    METABOLISM, 1007*
    TOXICITY, 4641
    TRANSPORT, 1007*, 7443*
  ILEAL DISEASES
    DUODENUM, 2311*
  ILEOSTOMY
    METABOLISM, 2323, 4877*
  ILEUM
    ABSORPTION, 849, 3606*, 5425*
    ION TRANSPORT, 4499*
    LACTOSE, 3606*
    METABOLISM, 5425*
    PHENOBARBITAL, 2721
    SURGERY, 5663
    TRANSPORT, 2720, 2721, 7915*
  INTESTINAL ABSORPTION
    AMINO ACIDS, 7911*
    LACTOSE, 6005*
  INTESTINAL OBSTRUCTION
    BREATH TEST, 5670
    DRUG-INDUCED, 7765
    METABOLISM, 5670
    TRANSPORT, 870*
  INTESTINE, SMALL
    ABSORPTION, 400, 1775*, 5425*
    BINDING, 7485*
    CHOLECYSTECTOMY, 7394*
    ELECTROPHYSIOLOGY, 1794
    ION TRANSPORT, 1794, 6689*
    METABOLISM, 5425*
    PHENOBARBITAL, 2721
    PHOSPHOLIPIDS, 1775*
    STARVATION, 7394*
    TRANSPORT, 2720, 2721
  INTESTINES
    ANTIBIOTICS, 7389*
    BACTERIA, 1116, 6074*, 7389*
    BACTERIAL INFECTIONS, 5931*
    DIARRHEA, 3799
    DISEASE, 7280
    FECES, 3799
    FETUS, 7396*
    METABOLISM, 3013, 7396*
    MICROORGANISMS, 3013
    MOTILITY, 3799
    NEONATE, 7396*
    TRANSPORT, 1793
  ISOLATION
    TECHNIQUES, 7520
  JAUNDICE
    INFANT, 3368*
  JAUNDICE, OBSTRUCTIVE
    ENDOTOXINS, 2579*
  JEJUNUM
    ABSORPTION, 5425*
    ION TRANSPORT, 6689*
    METABOLISM, 5425*

BILE ACIDS AND SALTS (continued)
  JEJUNUM (continued)
    PERMEABILITY, 888
    TRANSPORT, 2720, 4497*
  KIDNEYS
    EXCRETION, 3362*
    METABOLISM, 7831
    SULFATES, 2776
  KINETICS
    CHOLIC ACID, 2875*
  LIPIDS
    DIFFUSION, 7395*
    DIGESTION, 903
    SOLUBILITY, 7395*
  LIVER, 4615*, 5423*
    ABSORPTION, 38
    CHOLECYSTECTOMY, 7394*
    CHOLESTEROL, 7400*
    CIRCULATION, 1483
    CYSTIC FIBROSIS, 1483
    DIET, 4640
    DYES, 5422*
    FETUS, 1078
    INSULIN, 3771
    METABOLISM, 7831
    NECROSIS, 7092*
    NEOPLASMS, MALIGNANT, 4751*
    REFLUX, 1991
    STARVATION, 7394*
    SYNTHESIS, 7413*, 7424*
    TRANSPORT, 41, 42, 609
  LIVER CIRRHOSIS
    CHOLESTASIS, 6523*
    CIRCULATION, 6523*
    DIAGNOSIS, 3380
    LIVER FUNCTION TESTS, 2549
    METABOLISM, 2577*
    PORTACAVAL SHUNT, 5133
    RADIOIMMUNOASSAY, 2549, 6521*
    SECRETION, 2550, 8398*
    SERUM, 2549, 6521*
    TECHNIQUES, 3380
  LIVER CIRRHOSIS, OBSTRUCTIVE
    DIAGNOSIS, 3380
    TECHNIQUES, 3380
  LIVER DISEASES
    ASSAY, 7743*
    BILE, 7280
    CHROMATOGRAPHY, 7391*
    CLEARANCE STUDY, 7092*
    DIAGNOSIS, 1456*, 3380, 7092*, 7528*, 7743*
    INFLAMMATORY BOWEL DISEASES, 6348*
    METABOLISM, 6428
    PROGNOSIS, 7528*
    SERUM, 606, 7528*, 7743*
    TECHNIQUES, 3380, 4751*, 7393*
  LIVER DISEASES, ALCOHOLIC
    DIAGNOSIS, 4751*
    SECRETION, 8398*
  LIVER FUNCTION TESTS
    FEEDING, 608
    SULFOBROMOPHTHALEIN, 2955
  LIVER INJURY
    KIDNEYS, 2776
    SELENIUM, 3928
  MALABSORPTION SYNDROMES, 4911*
    CHILD, 7756
    DIAGNOSIS, 3249*, 7756

- BILE ACIDS AND SALTS (continued)
  - MALABSORPTION SYNDROMES (continued)
    - DIARRHEA, 4910*
    - DUODENUM, 3249*
    - METABOLISM, 7756
    - STEATORRHEA, 3249*
  - METABOLISM, 5931*, 7399*
    - BACTERIA, 5512*
    - CHILD, 7756
    - CHOLIC ACID, 1007*
    - CHROMATOGRAPHY, 5512*
    - COLITIS, ULCERATIVE, 4963*
    - DIETARY FACTORS, 7459
    - HEMOLYSIS, 6090*
    - LIVER CIRRHOSIS, 6090*
    - MICROORGANISMS, 3013
    - OBESITY, 7459
    - REVIEW, 2924, 7459
    - SHUNT, INTESTINAL, 4878*
    - SURGERY, 5663
  - MICELLES, 7445*
    - KINETICS, 3772
  - MICROORGANISMS
    - LACTOSE, 2876*
    - METABOLISM, 2876*
  - MINERALS
    - BINDING, 2604
  - MOTILITY
    - INTESTINES, 1467
    - METABOLISM, 1467
  - OBESITY
    - SHUNT, INTESTINAL, 4108*, 4878*
    - SURGERY, 6942*
  - ODDI'S SPHINCTER
    - SECRETION, 2021
  - OXIDOREDUCTASES
    - ANALYSIS, 607
  - PANCREAS
    - PROTEINS, 1963
  - PANCREATIC DISEASES
    - ABSORPTION, 4909*
  - PANCREATITIS, CHRONIC, 2446
  - PHOSPHOLIPIDS
    - LIPIDS, 4617*
  - PLASMA
    - CHOLELITHIASIS, 4670
    - KINETICS, 4670
    - LIVER DISEASES, 4670
  - POLYPS
    - CHOLESTEROL, 7659*
    - ETIOLOGY, 7659*
  - PREGNANCY
    - METABOLISM, 1156
  - RADIOIMMUNOASSAY
    - TECHNIQUES, 3753*, 5426*
  - SECRETIN
    - VAGOTOMY, 8108*
  - SECRETION
    - DRUG EFFECTS ON, 4646, 4647
    - ESTROGENS, 8004*
    - HORMONE EFFECTS ON, 8004*
    - OBSTRUCTION, 5419*
    - REVIEW, 6784
  - SERUM
    - ANALGESICS AND ANTIPYRETICS, 8339*
    - ASSAY, 3088
    - CHOLESTASIS, 3362*
    - DRUG EFFECTS ON, 8339*

- BILE ACIDS AND SALTS (continued)
  - SERUM (continued)
    - FEEDING, 635
    - ISOLATION, 7520
    - TECHNIQUES, 7997*
  - SHUNT, INTESTINAL
    - METABOLISM, 1652, 4108*
  - STEROIDS
    - CIRCULATION, 1968*
  - STOMACH, 8104*
    - BLEEDING, 4564*
    - CIRCULATION, 2807
    - EROSIONS, 2807
    - ION TRANSPORT, 974
    - PATHOLOGY, 975
    - PERMEABILITY, 35, 37
  - STOMACH DISEASES
    - PERMEABILITY, 6054
    - REFLUX, 6054
  - SULFATES
    - CHOLESTASIS, 3362*
    - ENZYMES, 1006*
    - SERUM, 3362*
    - SULFHYDRYL COMPOUNDS, 1006*
    - URINE, 3362*
  - SULFOBROMOPHTHALEIN
    - TRANSPORT, 906, 2607
  - SYNTHESIS, 3359*, 4616
    - CHOLESTEROL, 7413*
    - ENTERECTOMY, 6762*
  - TRACER STUDY
    - TECHNIQUES, 3773
  - TRANSPORT, 7399*
    - CHOLIC ACID, 1007*
    - DEFICIENCY, 4642
    - DIET, 6693*
    - ENTERECTOMY, 7915*
    - LIVER, 40, 908, 909
    - MICROORGANISMS, 6693*
    - SODIUM, 908, 909
    - TECHNIQUES, 5420*
  - URINE
    - CHOLESTASIS, 3362*
    - EXCRETION, 2577*
    - OXALATES, 5658*
  - VAGOTOMY
    - DIARRHEA, 7854*
    - METABOLISM, 4842
  - VITAMIN B12
    - COLITIS, ULCERATIVE, 4963*

- BILE CANALICULI
  - CHOLERESIS
    - ULTRASTRUCTURE, 2877*
  - CHOLESTASIS
    - ULTRASTRUCTURE, 2877*
  - SECRETION
    - BILE ACIDS AND SALTS, 2925

- BILE DUCTS
  - AGE FACTORS
    - SURGERY, 5141*
  - ANOMALY
    - VEINS, 8440
  - ARTERIES
    - ANGIOGRAPHY, 725
    - MORPHOLOGY, 725

BILE DUCTS (continued)
- ATRESIA
  - BILE ACIDS AND SALTS, 3368*
  - DIAGNOSIS, 3368*
  - INFANT, 3112
  - LIVER CIRRHOSIS, OBSTRUCTIVE, 3482*
  - NEOPLASMS, MALIGNANT, 3482*
- BACTERIAL INFECTIONS, 4722
- BILE ACIDS AND SALTS
  - CHOLECYSTECTOMY, 7394*
  - STARVATION, 7394*
- CALCULI
  - BILE ACIDS AND SALTS, 8425*
  - DIAGNOSIS, 729
  - DISEASES ASSOCIATED WITH, 3513
  - DRAINAGE, 745
  - DRUG THERAPY, 8425*
  - EPIDEMIOLOGY, 742
  - HEPARIN, 8425*
  - NEOPLASMS, MALIGNANT, 3513
  - SURGERY, 745, 1606, 7840
  - TECHNIQUES, 729
  - THERAPY, 8425*
  - ULTRASOUND, 7224
- CANNULATION
  - TECHNIQUES, 6071*
- CELLS
  - MORPHOLOGY, 1765, 5264*
  - OBSTRUCTION, 5264*
- CHOLANGIOGRAPHY
  - DIAGNOSIS, 6861
  - DILATATION, 4013
  - OBSTRUCTION, 3102
  - PANCREATOGRAPHY, 4013
  - TECHNIQUES, 2207, 3967, 7196*
- CHOLANGITIS
  - REVIEW, 4374
- CHOLECYSTECTOMY
  - TECHNIQUES, 8443
- CHOLELITHIASIS
  - DIAGNOSIS, 3968
  - PROGNOSIS, 7207*
- COMMON BILE DUCT CALCULI
  - REVIEW, 4374
- COMPRESSION
  - JAUNDICE, OBSTRUCTIVE, 5160*
- CYSTS, 3494*
  - CLASSIFICATION, 7849
  - DISEASE, 5914*
  - DISEASES ASSOCIATED WITH, 5053
  - GENETIC FACTORS, 5053
  - NEOPLASMS, MALIGNANT, 7849
  - SURGERY, 7849
- DILATATION
  - CHOLANGIOGRAPHY, 6548*
  - CHOLECYSTOGRAPHY, 3941*
  - CHOLELITHIASIS, 7207*
  - DIAGNOSIS, 3941*, 5915, 6410*
  - ENDOSCOPY, 2581*
  - SIMULATION, 5546
  - TOMOGRAPHY, 5546
  - ULTRASONOGRAPHY, 6410*, 6548*
  - VEINS, 5546
- DISEASE
  - ENZYMES, 6557
  - REVIEW, 4374

BILE DUCTS (continued)
- DIVERTICULUM
  - CHOLANGIOGRAPHY, 1626
  - DIAGNOSIS, 3044*
  - RADIOLOGY, 3044*
  - SCANNING, SCINTILLATION, 3044*
- DRAINAGE
  - TECHNIQUES, 8442
- DUODENUM
  - DIVERTICULUM, 523
- ELECTROLYTES
  - SURGERY, 736
- ENDOSCOPY
  - CHOLANGIOGRAPHY, 6860
  - CHOLANGIOPANCREATOSCOPY, 3115
  - DIAGNOSIS, 6860
  - LAPAROTOMY, 3115
- FISTULA
  - CHOLELITHIASIS, 765
  - TECHNIQUES, 1973*
- GALLBLADDER
  - CONTRAST MEDIA, 748
- HAMARTOMA
  - JAUNDICE, 1622
- HYPERTENSION, PORTAL
  - OBSTRUCTION, 3905
- HYPOPLASIA
  - ANOMALY, 581
  - CHILD, 4259*
  - COMPLICATIONS, 4259*
  - ENDOCRINE DISEASES, 4259*
  - GROWTH FACTORS, 4259*
  - INFANT, 3112
- INTESTINE, SMALL
  - OBSTRUCTION, 5433*
- JAUNDICE, OBSTRUCTIVE
  - NEOPLASMS, 2579*
  - NEOPLASMS, BENIGN, 7218*
  - RADIOLOGY, 4772
- LIVER
  - BIOCHEMISTRY, 863
  - MORPHOLOGY, 863, 1988
  - NEOPLASMS, MALIGNANT, 5020*
  - TRANSPLANTATION, 4656
  - ULTRASTRUCTURE, 862
- LIVER CIRRHOSIS
  - REVIEW, 4374
- LIVER DISEASES
  - IMMUNOLOGY, 627
- MALACOPLAKIA
  - CHILD, 4371*
- MANOMETRY
  - CHOLANGIOGRAPHY, 7198*
  - PRESSURE STUDY, 5519*
  - SURGERY, 7198*
  - TECHNIQUES, 7198*
- MORPHOLOGY
  - CHOLECYSTITIS, 8071
- MOTILITY
  - CHOLECYSTOGRAPHY, 70
- NEOPLASMS
  - GALLBLADDER, 1624
  - NERVOUS SYSTEM, 1624
  - SURGERY, 1624
- NEOPLASMS, BENIGN
  - REVIEW, 4374

- BILE DUCTS (continued)
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 6190
    - DISEASES ASSOCIATED WITH, 5053
    - INTESTINE, SMALL, 562
    - RADIOLOGY, 6190
    - SURGERY, 4376, 7825*
  - OBSTRUCTION, 2889*, 5419*
    - BICARBONATE SECRETION, 1978*
    - BILE ACIDS AND SALTS, 1978*
    - BILIRUBIN, 1978*
    - CHOLECYSTECTOMY, 8443
    - CLEARANCE STUDY, 1978*
    - DRAINAGE, 6580*
    - FASCIOLIASIS, 3568
    - FISTULA, 766
    - MORPHOMETRY, 6847
    - SIMULATION, 1978*, 6847
    - ULTRASTRUCTURE, 6847
  - ODDI'S SPHINCTER
    - SURGERY, 733
  - PANCREAS
    - OBSTRUCTION, 5433*
  - PANCREATITIS, CHRONIC
    - MORPHOLOGY, 4989*
  - PARASITES AND PARASITIC DISEASES
    - REVIEW, 4374
  - PERFORATION, 7220*
    - INFANT, 3506*
    - REVIEW, 3506*
  - RADIOLOGY, 4387
    - CERULEIN, 4752*
  - STRICTURE
    - DILATATION, 2581*
    - REVIEW, 4374
  - SURGERY
    - GLUTATHIONE, 6555*
    - IATROGENESIS, 7216
    - REVIEW, 5151
    - TECHNIQUES, 7825*
  - ULCER
    - SURGERY, 1878*
  - ULTRASONOGRAPHY
    - TECHNIQUES, 3968

- BILE PIGMENTS
  - ULCER, PEPTIC
    - ACIDITY, 1337*

- BILE SALTS
  - SEE BILE ACIDS AND SALTS

- BILIARY CIRRHOSIS
  - SEE LIVER CIRRHOSIS, OBSTRUCTIVE

- BILIARY TRACT
  - ABSCESS
    - RADIOLOGY, 5137*
  - ADOLESCENCE
    - ULCER, PEPTIC, 6268
  - ANOMALY, 7843
    - RADIOLOGY, 5137*
  - ASCARIASIS, 7894
  - ATRESIA
    - BILE ACIDS AND SALTS, 1603
    - DIAGNOSIS, 1639, 5142*
    - ETIOLOGY, 6460*
    - INFANT, 1639, 5142*
    - MORPHOLOGY, 2569*

- BILIARY TRACT (continued)
  - ATRESIA (continued)
    - SURGERY, 5142*
    - THERAPY, 1639
    - ULTRASTRUCTURE, 8421*
  - BACTERIA, 7834
  - BACTERIAL INFECTIONS
    - ANTIBIOTICS, 7202*
    - CHOLECYSTITIS, 3503*
    - CHOLELITHIASIS, 3503*
    - COMMON BILE DUCT CALCULI, 3503*
    - HISTOCHEMISTRY, 4386
    - PREVENTION, 7202*
  - BILE
    - FEEDING, 1636
    - PHYSICAL FACTORS, 1636
    - THYROCALCITONIN, 126
  - BILE ACIDS AND SALTS
    - MEMBRANES, 1065
    - SOLUBILITY, 1065
    - TRANSPORT, 4615*
  - CADMIUM
    - EXCRETION, 6066
  - CALCULI
    - BILIRUBIN, 5148*
    - CHOLANGIOGRAPHY, 1618
    - CHOLESTEROL, 3495*
    - ENDOSCOPY, 8437
    - INTESTINAL OBSTRUCTION, 767
    - SURGERY, 1618
  - CHILD
    - ULCER, PEPTIC, 6268
  - CHOLANGIOGRAPHY
    - ENDOSCOPY, 282
    - TECHNIQUES, 1629, 2568*
  - CHOLESTASIS, 4255*
  - CHOLESTEROL
    - CALCULI, 1583
    - OBESITY, 1583
  - COMMON BILE DUCT
    - STENOSIS, 5153*
  - CONTRAST MEDIA
    - AMINO ACIDS, 5525
    - CHEMICAL COMPOSITION, 5525
  - CYSTS
    - CHOLANGIOGRAPHY, 7841
    - CLASSIFICATION, 7849
    - DIAGNOSIS, 7841
    - NEOPLASMS, MALIGNANT, 7849
    - RADIOLOGY, 5137*, 7841
    - SURGERY, 7849
  - DIAGNOSIS
    - TECHNIQUES, 4748*
  - DRAINAGE
    - SEQUELAE, 735
    - SURGERY, 735
  - DRUG EFFECTS ON
    - ADRENERGIC RECEPTOR AGONISTS, 3791
    - ADRENERGIC RECEPTOR BLOCKADERS, 3791
  - DRUG METABOLISM, 7848
  - ENDOSCOPY
    - REVIEW, 1223
    - TECHNIQUES, 265, 5524
  - EXCRETION
    - BILE ACIDS AND SALTS, 38
    - DRUGS, 4355*

BILIARY TRACT (continued)
- FISTULA, 7828
  - DIAGNOSIS, 4358*
  - SURGERY, 8441
  - THERAPY, 4358*
- GASTROINTESTINAL SYSTEM
  - SHUNT, 5955
  - SURGERY, 5955
- HELMINTHIASIS
  - PATHOLOGY, 5487
- INFECTION
  - DRUG THERAPY, 2582
- INFLAMMATION
  - CHOLELITHIASIS, 7847
  - ODDI'S SPHINCTER, 728
  - SURGERY, 728
- ION TRANSPORT
  - DRUG EFFECTS ON, 4646
- JAUNDICE
  - RADIOLOGY, 726
- JAUNDICE, OBSTRUCTIVE
  - PRESSURE STUDY, 1157
- LIPIDS
  - CALCULI, 1583
  - CHENODEOXYCHOLIC ACID, 3496*
  - CHOLESTEROL, 3496*
  - OBESITY, 1583
  - TRANSPORT, 2006
- LIVER
  - MORPHOLOGY, 1212
  - TRANSPLANTATION, 5803*
  - ULTRASONOGRAPHY, 1212
- MANOMETRY
  - RADIOLOGY, 4748*
- MARKER STUDY
  - SULFOBROMOPHTHALEIN, 7420*
  - TECHNIQUES, 7420*
- MOVEMENT DISORDERS
  - DRUG THERAPY, 4369*
- NEOPLASMS
  - CHOLANGIOGRAPHY, 3948*
  - DIAGNOSIS, 3948*
  - DRUG-INDUCED, 6797
  - ENDOSCOPY, 5524
  - RADIOLOGY, 5137*
- NEOPLASMS, MALIGNANT
  - CYSTS, 6561*
  - DISEASES ASSOCIATED WITH, 6561*
- NERVOUS CONTROL, 3791
- NERVOUS SYSTEM
  - EMBRYOLOGY, 140
- OBSTRUCTION
  - CHOLELITHIASIS, 7847
  - CHOLESTASIS, 1601
  - DIAGNOSIS, 542*, 768, 7823*
  - ETIOLOGY, 3973
  - LIPOPROTEINS, 1063
  - REGENERATION, 153
  - SEDATIVES, 2003
  - SIMULATION, 1601
  - SLEEP, 2003
  - SURGERY, 768
  - SURVIVAL, 153, 768
  - THERAPY, 3973
  - ULTRASONOGRAPHY, 7823*, 7845
- PANCREATIC DUCT
  - GASES, 522
- PANCREATITIS, CHRONIC
  - COMPLICATIONS, 8274*

BILIARY TRACT (continued)
- PARASITES AND PARASITIC DISEASES, 820
- PERFORATION
  - CHILD, 7843
- RADIOLOGY
  - CHOLANGIOGRAPHY, 4353*
- SCANNING, SCINTILLATION
  - FOOD, 7844
  - RADIONUCLIDES, 3944*, 3945*
- SECRETION, 8113
  - AMINO ACIDS, 4677*
  - BILE, 2887*, 7390*
  - BILE ACIDS AND SALTS, 1069, 2887*, 2926, 5420*, 8004*
  - CHENODEOXYCHOLIC ACID, 2926
  - CHOLESTEROL, 8004*
  - CHOLIC ACID, 2926
  - CONTRAST MEDIA, 4644
  - DIETARY FACTORS, 144
  - DIURETICS, 3814
  - DRUG EFFECTS ON, 3794, 3814, 4644, 4646
  - FATS, 7390*
  - HYPERALIMENTATION, 989, 2844
  - LIPIDS, 144, 2926, 4661
  - OBSTRUCTION, 5419*
  - PHOSPHOLIPIDS, 7398*
  - SECRETIN, 127
  - STEROIDS, 3794
- SHUNT
  - TECHNIQUES, 5955
- STASIS
  - ETIOLOGY, 4651
- STRICTURE
  - PANCREATITIS, CHRONIC, 8274*
- SULFOBROMOPHTHALEIN
  - ABSORPTION, 1966*
  - CHOLESTASIS, 1966*
  - SCANNING, SCINTILLATION, 4245*
- SURGERY
  - ABSCESS, 8459
  - BACTERIAL INFECTIONS, 4386, 6554*, 7202*
  - CHOLESTASIS, 1599
  - COMPLICATIONS, 3492*, 5164, 6554*, 6582, 8213, 8459
  - HEMATOBILIA, 6582
  - IATROGENESIS, 5164
  - INTESTINAL OBSTRUCTION, 8213
  - STENOSIS, 5153*
  - TECHNIQUES, 6558*, 8435
- TRANSPORT
  - BILE ACIDS AND SALTS, 5420*

BILIARY TRACT DISEASES
- ACID SECRETION
  - CHILD, 621
- ALKALINE PHOSPHATASE
  - ISOENZYMES, 4249*
- ANGIOGRAPHY
  - CHOLANGIOGRAPHY, 2202
- BACTERIAL INFECTIONS
  - ANTIBIOTICS, 5140*
  - DRUG THERAPY, 5140*
- BILE ACIDS AND SALTS
  - SERUM, 606
  - TECHNIQUES, 4751*
- BLOOD
  - PHOSPHOLIPIDS, 4250*

BILIARY TRACT DISEASES (continued)
- CALCULI
    - REVIEW, 1616
- CHILD
    - DIAGNOSIS, 1203, 5929
    - MONOSACCHARIDES, 6425
- CHOLANGIOGRAPHY
    - ENDOSCOPY, 283
    - PANCREATOGRAPHY, 5154*
    - PROGNOSIS, 5154*
    - TECHNIQUES, 1211, 4354*
- CHOLECYSTOGRAPHY
    - REVIEW, 8423*
- CHOLELITHIASIS
    - AGE FACTORS, 724
- DIAGNOSIS
    - BILE, 6581*
    - CHOLANGIOGRAPHY, 3049*, 3943*, 6581*, 7071, 7839
    - CHOLECYSTOGRAPHY, 3943*, 8423*
    - CHOLESTEROL, 4375
    - DRAINAGE, 8431*
    - ENDOSCOPY, 3049*, 7071
    - INDOCYANINE GREEN, 3974
    - RADIOLOGY, 6544*
    - REVIEW, 1573*, 2476, 8423*
    - SURGERY, 5045
    - ULTRASONOGRAPHY, 3943*, 6575*, 7823*, 8132
- DUODENOSCOPY
    - DIAGNOSIS, 8439
    - THERAPY, 8439
- DUODENUM
    - RADIOLOGY, 6169
- ENDOSCOPY
    - REVIEW, 4018
- ENZYMES
    - CHILD, 621
- ERYTHROCYTES
    - MEMBRANES, 613
    - METABOLISM, 7758
    - PHOSPHOLIPIDS, 630
- FATS
    - BILE, 5139*
- HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 8376
- INFLAMMATION
    - IMMUNOGLOBULINS, 3383
- LACTOSE INTOLERANCE, 6318
- LIPOPROTEINS
    - DIAGNOSIS, 275
    - SYNTHESIS, 603
- LIVER
    - CHILD, 746
    - CIRCULATION, 746
    - ENZYMES, 1575*
    - SCANNING, SCINTILLATION, 264
    - UREA, 730
- LIVER CIRRHOSIS, OBSTRUCTIVE
    - LIVER FUNCTION TESTS, 1559
- LIVER DISEASES
    - CHOLANGITIS, 276
- LYSOZYMES
    - PATHOLOGY, 6426
- MALABSORPTION SYNDROMES
    - LACTOSE, 6318
- MONOSACCHARIDES
    - EXCRETION, 6425

BILIARY TRACT DISEASES (continued)
- OBSTRUCTION
    - ALKALINE PHOSPHATASE, 4249*
- PANCREAS
    - ENDOSCOPY, 283
- PANCREATITIS
    - PROGNOSIS, 4986*
    - SURGERY, 4986*
    - THERAPY, 4986*
- PATHOLOGY
    - REVIEW, 5022*
- PEPTIDASE
    - DIAGNOSIS, 4251*
- REVIEW, 1635
- SCANNING, SCINTILLATION
    - BIOPSY, 3095
- SEQUELAE
    - REVIEW, 1577
- SERUM
    - ENZYMES, 1575*
- STATISTICAL STUDY
    - DIAGNOSIS, 5009*
- STOMACH
    - RADIOLOGY, 6169
- SURGERY
    - CHOLANGIOGRAPHY, 1632
    - COMPLICATIONS, 5149*
    - PROGNOSIS, 5149*
    - REVIEW, 7830
    - TECHNIQUES, 6558*
- THERAPY
    - ENDOSCOPY, 3049*
    - REVIEW, 2476
- ULTRASONOGRAPHY
    - REVIEW, 5156*

BILIRUBIN
- ALBUMINS
    - BINDING, 6764*
- ALCOHOLISM
    - SERUM, 6505*
- BILE
    - DRUG EFFECTS ON, 6099
    - SEROTONIN, 6099
- BILE ACIDS AND SALTS
    - CHOLERESIS, 2928
- BILE DUCTS
    - OBSTRUCTION, 1978*
- BILIARY TRACT
    - CALCULI, 5148*
- CHOLELITHIASIS
    - DEFICIENCY, 5148*
    - ENZYMES, 5148*
- CHOLERESIS
    - SIMULATION, 1054
- CHOLESTASIS
    - DIAGNOSIS, 6566*
    - LYMPH, 2054
    - PLASMA, 2054
- CHROMATOGRAPHY
    - BILE, 1009*
- CRIGLER-NAJJAR SYNDROME
    - METABOLISM, 7135
- FATTY ACIDS
    - ALBUMINS, 6764*, 7771*
    - BINDING, 7771*
- FETUS
    - LIVER, 3776

- BILIRUBIN (continued)
  - GALLSTONES
    - CHOLESTEROL, 5143*
    - PIGMENTS, 5143*
  - GILBERT'S DISEASE
    - CLEARANCE STUDY, 3412
    - HEMOLYSIS, 1218
  - HEPATITIS
    - ETIOLOGY, 3425*
    - HEMOLYSIS, 545*
  - HEPATITIS, CHRONIC
    - METABOLISM, 7801, 8385*
  - HEPATITIS, INFECTIOUS
    - DIAGNOSIS, 6465*
    - DIALYSIS, 4305
    - METABOLISM, 5089*
  - HYPERBILIRUBINEMIA
    - DRUG-INDUCED, 5072*
    - ETIOLOGY, 3425*
    - GLUCURONIDES, 3425*
  - HYPOLIPEMIC AGENTS
    - GLUCURONYLTRANSFERASE, 3811
    - PROTEINS, 3811
  - JAUNDICE
    - BLOOD, 5063*
    - CLEARANCE STUDY, 5064*, 5089*
    - ETIOLOGY, 3425*
    - METABOLISM, 5089*
    - NEONATE, 6435*
    - PLASMA, 5064*
    - URINE, 5063*, 5064*
  - JAUNDICE, OBSTRUCTIVE
    - DIALYSIS, 4305
  - KINETICS
    - LIVER CIRRHOSIS, 707
  - LIVER
    - ALCOHOLS, 3608
    - CLEARANCE STUDY, 3793
    - DRUG EFFECTS ON, 3509
    - DRUG METABOLISM, 1030
    - ENZYMES, 683, 5148*, 7999*
    - FEEDING, 1053
    - GLUCURONIDASE, 3776
    - INFANT, 7999*
    - METABOLISM, 3808, 6094
    - SECRETION, 6094
    - TRANSPORT, 609
  - LIVER CIRRHOSIS
    - ETIOLOGY, 3425*
    - HEMOLYSIS, 545*
    - METABOLISM, 7801, 8399*
  - LIVER DISEASES
    - CLEARANCE STUDY, 3961
    - METABOLISM, 5089*
  - METABOLISM
    - DRUG EFFECTS ON, 8385*
    - ESTROGENS, 8077
    - HORMONE EFFECTS ON, 8077, 8385*
    - HORMONES, ADRENAL CORTEX, 8385*
    - KINETICS, 8399*
    - NEONATE, 7135
  - NEONATE, 2878*
  - ODDI'S SPHINCTER
    - EXCRETION, 2021
  - PARENTERAL ALIMENTATION
    - METABOLISM, 5184
  - SECRETION, 6147
  - SERUM
    - ALCOHOLISM, 5110*

- BILIRUBIN (continued)
  - TRANSPORT
    - BINDING, 39
    - LIVER, 39
    - PROTEINS, 39

- BILIRUBIN ENCEPHALOPATHY
  - SEE KERNICTERUS

- BIRTH
  - SEE PREGNANCY

- BLADDER
  - SEE UROGENITAL SYSTEM

- BLEEDING
  - SEE ALSO HEMORRHAGE
  - ANGIOGRAPHY
    - DIAGNOSIS, 4038*
    - THERAPY, 4038*
    - ULCER, 2252
  - ANOMALY
    - RECTUM, 6322*
  - ASPIRIN
    - PROSTAGLANDINS, 2141
  - CECUM
    - HEMANGIOMA, 2195
  - CIRCULATION
    - SHOCK, 2119
  - COLON
    - DIVERTICULUM, 1391*, 4934*
    - HEMANGIOMA, 3073
  - COLONIC DISEASES
    - RADIOLOGY, 1201
    - TECHNIQUES, 1201
  - COLOSTOMY
    - LIVER CIRRHOSIS, 1565
    - VARICES, 1565
  - DIVERTICULUM
    - ARTERIOGRAPHY, 5687
    - DIAGNOSIS, 5533, 5687
    - EMBOLIZATION, 3278*
    - PANCREATITIS, 5662
    - PERFORATION, 5662
    - RADIOLOGY, 5533
    - THERAPY, 3278*
  - DRUG-INDUCED
    - PROSTAGLANDINS, 2141
    - STOMACH, 2141
  - DUODENUM
    - DIVERTICULUM, 1367
    - ISCHEMIA, 4720
    - ULCER, 355
    - VARICES, 6900
  - EMBOLIZATION
    - TECHNIQUES, 3278*
  - ENDOSCOPY
    - ANALYSIS, 5555
    - CLOTTING, 2280*
    - GASTROINTESTINAL SYSTEM, 2589*
    - SURVIVAL, 2589*
  - EROSIONS
    - HEALING, 82
    - STOMACH, 82
  - ESOPHAGUS
    - SCLEROSIS, 4025*
    - STENOSIS, 7556
    - VARICES, 798, 3474*, 5568*, 7558
    - ZENKER'S DIVERTICULUM, 2228

- BLEEDING (continued)
  - GASTROINTESTINAL SYSTEM
    - ANGIOGRAPHY, 2180, 4038*, 4435
    - ANTI-INFLAMMATORY AGENTS, 4440, 6593
    - ASPIRIN, 4440
    - CHILD, 1669, 4441
    - CLOTTING, 2280*
    - DIAGNOSIS, 1390*, 2185, 2253, 3985, 4435, 5230, 6159, 6198*
    - DRUG EFFECTS ON, 801
    - DRUG-INDUCED, 6593
    - DRUG THERAPY, 2253
    - ENDOSCOPY, 233, 1191, 1213, 2180, 2280*, 2614, 3056, 3985, 4437, 4438, 4439, 4756, 6159, 6198*, 6212, 6734, 6899
    - HYPERTENSION, PORTAL, 1213
    - INFANT, 1669
    - LIVER CIRRHOSIS, 5902*
    - RADIOLOGY, 232, 2614, 3056, 6198*, 6899
    - REVIEW, 4441
    - RISK FACTORS, 6212
    - SURGERY, 343
    - THERAPY, 2280*, 4438, 4439, 5230, 5902*, 6734
    - TISSUE ADHESIVES, 6734
    - VASOPRESSIN, 5902*
    - WOUNDS AND INJURIES, 343
  - HEMATOBILIA
    - ANEURYSM, 7129
  - HEPATITIS, INFECTIOUS
    - CLOTTING, 1528
  - HYPERTENSION, PORTAL
    - VARICES, 4352
  - ILEOSTOMY
    - LIVER CIRRHOSIS, 1565
    - VARICES, 1565
  - INTESTINE, LARGE
    - DIAGNOSIS, 5230
    - THERAPY, 5230
  - INTESTINE, SMALL
    - DIAGNOSIS, 3985
    - ENDOSCOPY, 3985
    - SCANNING, SCINTILLATION, 6959
  - LIVER
    - BIOPSY, 5799*
    - COLLAGEN, 7109*
    - EMBOLIZATION, 1455*
    - NEOPLASMS, 7118
    - THERAPY, 1455*, 7109*
  - LIVER CIRRHOSIS
    - ASPIRIN, 2563
    - ESOPHAGUS, 3483*
    - PORTACAVAL SHUNT, 1566
    - STRESS, 2563
    - SURGERY, 1566
    - SURVIVAL, 1566
    - ULCER, 2563, 3483*
    - VARICES, 2563, 3483*, 7185*
  - LIVER DISEASES
    - CLOTTING, 614
    - H2 RECEPTOR ANTAGONISTS, 2471
    - STRESS, 3483*
    - TECHNIQUES, 614
  - LIVER DISEASES, ALCOHOLIC
    - PORTACAVAL SHUNT, 2533

- BLEEDING (continued)
  - MALLORY-WEISS SYNDROME
    - DIAGNOSIS, 2185
  - NEOPLASMS, MALIGNANT
    - RUPTURE, 1480
  - PANCREAS
    - PSEUDOCYSTS, 1444
  - PANCREATIC DUCT
    - DIAGNOSIS, 2219
  - PANCREATITIS
    - DUODENUM, 5662
    - PANCREATECTOMY, 2161
    - SIMULATION, 2161
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 1452
  - PROCTOCOLITIS
    - IMMUNOLOGY, 4181
  - RECTUM
    - ANGIOGRAPHY, 4149*
    - DIAGNOSIS, 5230
    - ENDOSCOPY, 4006
    - POLYPECTOMY, 4150*
    - SURGERY, 4150*
    - THERAPY, 4150*, 5230
  - STOMACH
    - ACIDS, 4564*
    - ANGIOGRAPHY, 8128
    - BILE ACIDS AND SALTS, 4564*
    - CLOTTING, 6146*
    - DIAGNOSIS, 3985, 8128
    - EMBOLIZATION, 2255
    - ENDOSCOPY, 3985
    - HYPERALIMENTATION, 5502
    - INFANT, 8128
    - LASER, 6146*
    - PREVENTION, 5502
    - PROSTAGLANDINS, 4564*
    - THERAPY, 6146*, 6733
    - THROMBOSIS, 4720
    - TISSUE ADHESIVES, 6733
    - ULCER, 5478*, 6733
    - VARICES, 5568*, 6900
  - STRESS
    - DUODENUM, 343
    - STOMACH, 343
  - THYROID GLAND
    - NEOPLASMS, 798
  - ULCER
    - ASPIRIN, 2145
    - DRUG THERAPY, 2290
    - DUODENUM, 2290
    - REVIEW, 2290
    - SIMULATION, 2145
    - THERAPY, 5478*, 6733
    - TISSUE ADHESIVES, 6733
  - ULCER, PEPTIC
    - H2 RECEPTOR ANTAGONISTS, 5638
    - HEMODIALYSIS, 5638
    - SIMULATION, 2281*
  - VARICES
    - DUODENUM, 4126
    - ESOPHAGUS, 311, 4802
    - PROSTHESIS, 4802
    - SURGERY, 4126
    - THERAPY, 311

- BLIND LOOP SYNDROME
  - BIOCHEMISTRY
    - MORPHOLOGY, 1133
    - SIMULATION, 1133

- BLIND LOOP SYNDROME (continued)
  - PROTEIN-LOSING ENTEROPATHIES
    - AMINO ACIDS, 1134
    - BREATH TEST, 1134
    - SIMULATION, 1134

- BLOOD
  - ALCOHOLS
    - ALCOHOLISM, 5899
  - AMMONIA
    - UREMIA, 4734
  - AMYLASES, 6822
  - AUSTRALIA ANTIGEN
    - METALS, 4302
    - TRANSMISSION, 8361
    - ULTRASTRUCTURE, 4302
  - BILE
    - ENZYMES, 7407*
  - CALCIUM
    - ACIDITY, 950*
  - CHEMICAL COMPOSITION
    - GASES, 6418*
  - COLITIS, ULCERATIVE
    - CHEMOTAXIS, 4202*
  - DISEASE
    - COMPLICATIONS, 4164
  - DUMPING SYNDROME
    - KININS, 5477*
  - FATTY LIVER
    - LIPOPROTEINS, 2534
  - FECES
    - ANALYSIS, 1194
    - TECHNIQUES, 1186*, 2164*
    - TRACER STUDY, 2164*
  - GASTRECTOMY
    - PROTEINS, 3151
  - HEPATITIS, CHRONIC
    - COMPLEMENT, 8382*
    - DRUG THERAPY, 8387
  - HEPATITIS, INFECTIOUS
    - ANTIGENS, 7150*
    - AUSTRALIA ANTIGEN, 7150*
    - TRANSMISSION, 8361
  - INTESTINE, SMALL
    - PERFUSION, 7489*
  - JAUNDICE
    - BILIRUBIN, 5063*
  - LIPASE, 6822
  - LIPIDS
    - ALCOHOLS, 7515*
    - DIETARY FACTORS, 792
    - ENTERITIS, 792
    - INFANT, 792
  - LIVER
    - ENZYMES, 2933
  - LIVER CIRRHOSIS
    - BACTERIA, 4337*
    - DRUG THERAPY, 8387
    - ENDOTOXINS, 4337*
  - LIVER DISEASES
    - CHEMICAL COMPOSITION, 6418*
    - CLOTTING, 552, 3395
  - LIVER DISEASES, ALCOHOLIC
    - ALCOHOLS, 5899
  - LIVER INJURY
    - CELLS, 3366*
    - ELECTROLYTES, 3366*
  - NARCOTICS, 5462

- BLOOD (continued)
  - NEOPLASMS, MALIGNANT
    - CLOTTING, 8326
    - FECES, 1193
  - PANCREAS
    - ELECTROPHYSIOLOGY, 1224
  - PANCREATITIS
    - FIBRINOLYSIS, 532
  - PERFUSION
    - BIOCHEMISTRY, 1163
    - ENZYMES, 1163
    - LIVER, 1163
  - PHOSPHOLIPIDS
    - BILIARY TRACT DISEASES, 4250*
    - LIVER DISEASES, 4250*
  - POLYPS
    - COLON, 1193
  - PYLORUS
    - STENOSIS, 4096
  - STEROIDS
    - SOUND, 970
  - STOMACH
    - NEOPLASMS, 4055
    - PERFUSION, 47*

- BLOOD FLOW
  - SEE CIRCULATION

- BLOOD GROUPS
  - AUSTRALIA ANTIGEN
    - CARRIER STATE, 7787*
  - COLON
    - ANTIGENS, 1644*, 4715*
  - DUODENUM
    - ULCER, 369
  - DYSPEPSIA
    - ULCER, 369
  - HEPATITIS, INFECTIOUS
    - AUSTRALIA ANTIGEN, 8352*
  - INTESTINE, SMALL
    - ENTEROKINASE, 7490*
    - INFARCTION, 5656*
    - ISCHEMIA, 5656*
  - STOMACH
    - ULCER, 369

- BLOOD PLATELETS
  - HYPERTENSION, PORTAL, 6400*
  - LIVER
    - NUCLEOTIDES, 1164
  - LIVER CIRRHOSIS, 6400*
    - DEFICIENCY, 3472*
    - ENZYMES, 7814*
    - HEMORRHAGE, 719
    - HYPERTENSION, PORTAL, 718
    - MONOAMINE OXIDASE, 7814*
  - LIVER COMA, 6413*
    - AMINES, 6510*
    - NOREPINEPHRINE, 6510*
  - LIVER DISEASES, 6400*
    - HEMORRHAGE, 3395
  - LIVER INJURY, 6413*

- BLOOD SUBSTITUTES
  - SEE PLASMA SUBSTITUTES

- BOMBESIN
  - SEE HORMONES, GASTROINTESTINAL

- BONES
  - CALCIUM
    - ABSORPTION, 5498
    - PLASMA, 5498
  - COLON
    - NEOPLASM METASTASIS, 7006
  - CROHN'S DISEASE
    - GRANULOMA, 1741
  - GASTRECTOMY
    - VITAMIN D, 6254
  - LACTOSE INTOLERANCE
    - CALCIUM, 6988
    - MINERALS, 6988
  - MALABSORPTION SYNDROMES
    - LACTOSE, 5702*
  - NEOPLASM METASTASIS
    - RADIONUCLIDES, 6998*
    - SCANNING, SCINTILLATION, 6998*
  - PANCREATITIS
    - DISEASES ASSOCIATED WITH, 6392
    - ISCHEMIA, 6392
    - NECROSIS, 6392
  - RECTUM
    - NEOPLASM METASTASIS, 7006
  - VAGOTOMY
    - DISEASE, 4853

- BRADYKININ
  - ILEUM
    - MOTILITY, 936
  - INTESTINES
    - ENDOTOXINS, 5454
    - SHOCK, 5454
  - MOTILITY
    - HORMONES, 2758
    - ILEUM, 2758
    - SEX FACTORS, 2758
  - PROSTAGLANDINS
    - MOTILITY, 936

- BREAST FEEDING
  - ENTEROCOLITIS, NECROTIZING
    - INFANT, 8469
  - GASTROENTERITIS
    - CHILD, 5202
  - JAUNDICE
    - FATTY ACIDS, 7771*

- BRUCELLOSIS
  - DIAGNOSIS
    - CLEARANCE STUDY, 3961

- BUDD-CHIARI SYNDROME
  - SEE ALSO HEPATIC VEIN THROMBOSIS
  - CALCIFICATION
    - CONTRACEPTIVES, ORAL, 5039*
  - CONTRACEPTIVES, ORAL, 5807*
  - DIAGNOSIS
    - REVIEW, 7095
  - RADIOLOGY
    - ETIOLOGY, 8315

- BURNS
  - CHILD
    - THERAPY, 5229
  - DUODENITIS, 415
  - DUODENUM
    - ULCER, 415

- BURNS (continued)
  - ESOPHAGUS
    - HEMORRHAGE, 5229
    - SURGERY, 4791*
    - THERAPY, 4791*
    - WOUNDS AND INJURIES, 4791*
  - ESOPHAGUS, ARTIFICIAL
    - COLON, 6209
  - GASTROINTESTINAL DISEASES
    - ACID SECRETION, 818
  - GASTROINTESTINAL SYSTEM
    - HEMORRHAGE, 5229
  - HYPERCHLORHYDRIA
    - ULCER, PEPTIC, 3142*
  - INTESTINE, SMALL
    - HEMORRHAGE, 5229
  - LIVER
    - BIOCHEMISTRY, 2892
  - STOMACH
    - HEMORRHAGE, 5229
    - PATHOLOGY, 1318
    - PERMEABILITY, 1318
  - ULCER, PEPTIC
    - ETIOLOGY, 3142*

- BURNS, CHEMICAL
  - ASPIRIN
    - WOUNDS AND INJURIES, 5610
  - ESOPHAGUS
    - PATHOLOGY, 1280
    - STENOSIS, 8152
    - THERAPY, 4724
  - STOMACH
    - WOUNDS AND INJURIES, 6233
  - THERAPY
    - HORMONES, 4724
    - STEROIDS, 4724

- CADMIUM
  - BILIARY TRACT
    - EXCRETION, 6066
  - CALCIUM
    - PERMEABILITY, 5337
  - DUODENUM
    - CALCIUM, 5337
    - ENZYMES, 7507
    - METALS, 7507
    - PERMEABILITY, 5337
    - PROTEINS, 7507
  - INTESTINAL ABSORPTION
    - NEONATE, 7299*
  - INTESTINE, SMALL
    - ENZYMES, 184, 7507
    - METALS, 7507
    - PROTEINS, 7507
  - INTESTINES
    - ABSORPTION, 1797
  - PANCREAS
    - EXCRETION, 6066

- CAFFEINE
  - ABSORPTION
    - WATER, 6025
  - ACID SECRETION
    - H2 RECEPTOR ANTAGONISTS, 357*
  - DUODENUM
    - ULCER, 3667*
  - ILEUM
    - MUSCLES, 4530*

- CAFFEINE (continued)
  - INTESTINE, SMALL
    - DRUG EFFECTS ON, 4684*
    - SECRETION, 4684*
    - TRANSPORT, 4684*

- CALCIFICATION
  - APPENDIX
    - REVIEW, 468
  - BUDD-CHIARI SYNDROME
    - CONTRACEPTIVES, ORAL, 5039*
  - DUODENITIS
    - GALLBLADDER, 3507*
  - HEPATIC VEIN THROMBOSIS
    - CONTRACEPTIVES, ORAL, 5039*
  - PANCREAS
    - ASCITES, 5781
  - PANCREATITIS, 5794
    - ALCOHOLISM, 537
  - STOMACH
    - NEOPLASMS, 332

- CALCITONIN
  - SEE THYROCALCITONIN

- CALCIUM
  - ABSORPTION
    - FATS, 6003*
    - GROWTH FACTORS, 6014
    - HORMONE EFFECTS ON, 1801
    - HORMONES, ADRENAL CORTEX, 1362
    - INTESTINE, SMALL, 2606
    - INTESTINES, 1362, 2605
    - KIDNEY DISEASES, 2605, 2606
    - MARKER STUDY, 1798
    - PHOSPHONATES, 5498
    - PROSTAGLANDINS, 7919*
    - VITAMIN D, 1362
  - ACID SECRETION
    - SERUM, 6047
  - ACIDITY
    - BLOOD, 950*
    - SECRETION, 950*
  - ADENOSINE TRIPHOSPHATE
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
    - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
  - AMYLASES
    - SECRETION, 4547
  - ANTINEOPLASTIC AGENTS
    - ABSORPTION, 1799
  - ATROPINE
    - ACID SECRETION, 2307
    - ENZYMES, 995
  - BILE
    - CHEMICAL COMPOSITION, 8427*
    - GALLSTONES, 8420*
    - SECRETION, 1990
    - SYNTHESIS, 7384*
  - BINDING
    - PROTEINS, 5447, 5451
  - BONES
    - ABSORPTION, 5498
    - PLASMA, 5498
  - CADMIUM
    - PERMEABILITY, 5337

- CALCIUM (continued)
  - CECUM
    - ABSORPTION, 1770*
    - DIETARY FACTORS, 1770*
    - HOMEOSTASIS, 1770*
    - TRANSPORT, 220, 1788, 6016
  - COLON
    - ABSORPTION, 1770*
    - DIETARY FACTORS, 1770*
    - HOMEOSTASIS, 1770*
    - ION TRANSPORT, 5441*
    - TRANSPORT, 220, 1788, 6016
  - CONSTIPATION
    - REVIEW, 5193
  - DUODENUM
    - ABSORPTION, 2700*, 2974
    - BINDING, 2974
    - CADMIUM, 5337
    - FECES, 2700*
    - PROTEINS, 2974
    - TRANSPORT, 2722
    - ULCER, 3086
    - ULTRASTRUCTURE, 6129*
  - ESOPHAGUS
    - MOTILITY, 4449
  - EXCRETION
    - MARKER STUDY, 1798
  - FATTY ACIDS
    - DUODENUM, 2700*
  - GALLBLADDER
    - ELECTRICAL CONTROL, 912*
  - GALLSTONES
    - CHEMICAL COMPOSITION, 8427*
  - GASTROINTESTINAL SYSTEM
    - ELECTROPHYSIOLOGY, 5306*
    - MOTILITY, 5306*
    - MUSCLES, 5306*
  - HISTAMINE
    - ULCER, 230
  - HORMONE EFFECTS ON
    - PARATHYROID GLANDS, 5347
  - ILEUM
    - ABSORPTION, 2702*, 6014
    - GLYCOSIDES, 5315*
    - SECRETION, 2078
    - TRANSPORT, 2722, 6014
  - INFANT
    - ABSORPTION, 1798
    - EXCRETION, 1798
    - MARKER STUDY, 5192
  - INTESTINAL ABSORPTION
    - TECHNIQUES, 2724
  - INTESTINE, LARGE
    - HOMEOSTASIS, 1770*
    - TRANSPORT, 2723, 6016
  - INTESTINE, SMALL
    - ABSORPTION, 2702*, 5287*, 6014
    - CARBOHYDRATES, 5288*
    - ION TRANSPORT, 2078
    - MITOCHONDRIA, 2701*
    - SECRETION, 2078, 2084
    - TRANSPORT, 881, 882, 5287*, 5288*, 6014
    - ULTRASTRUCTURE, 6129*
    - WATER, ELECTROLYTE BALANCE, 2078
  - INTESTINES
    - ABSORPTION, 1799, 1801
    - ELECTROPHYSIOLOGY, 5306*
    - MOTILITY, 5306*

- CALCIUM (continued)
  - INTESTINES (continued)
    - MUSCLES, 5306*
    - SECRETION, 5453
    - TRANSPORT, 880, 2722
  - ION TRANSPORT
    - CECUM, 5495
    - COLON, 5495
    - DEFICIENCY, 5495
  - JEJUNUM
    - ABSORPTION, 2702*, 6014
    - FATS, 6003*
    - TRANSPORT, 6014
  - KWASHIORKOR
    - SERUM, 6316
  - LACTOSE INTOLERANCE
    - BONES, 6988
  - LIVER
    - GLYCOGENOLYSIS, 2940
    - PERFUSION, 15
  - MAGNESIUM
    - ENZYMES, 995
  - MALABSORPTION SYNDROMES
    - SERUM, 6316
  - MARASMUS
    - SERUM, 6316
  - MENETRIER'S DISEASE
    - MALABSORPTION SYNDROMES, 3181
  - METABOLISM
    - PAROTID GLAND, 2774
  - MICROSOMES
    - SECRETION, 1800
  - PANCREAS, 4585*
    - CHOLECYSTOKININ, 1941
    - ENZYMES, 110, 111, 995
    - IONOPHORES, 1958
    - SECRETION, 112, 113, 988
    - SYMPATHOMIMETICS, 7369*
  - PANCREATITIS
    - SERUM, 5789*
  - PARASYMPATHOMIMETICS
    - ABSORPTION, 2999
  - PARATHYROID GLANDS
    - GASTRIN, 4443
  - PLASMA
    - PHOSPHONATES, 5498
  - PROTEINS
    - BINDING, 1124, 2079, 2080, 2081
    - DUODENUM, 1124
    - INTESTINES, 2080
    - RADIOIMMUNOASSAY, 5447
  - SALIVARY GLANDS
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6034
    - ADRENERGIC RECEPTOR AGONISTS, 7340
    - ENZYMES, 1868
    - ION TRANSPORT, 7340
    - IONOPHORES, 7341
    - MEMBRANES, 75
    - METABOLISM, 948
    - PERMEABILITY, 7340
    - PROTEINS, 6034
    - SECRETION, 7341
    - TRANSPORT, 7340
  - SERUM
    - GASTRIN, 3669*, 5357*
  - STOMACH
    - ACID SECRETION, 3086, 3669*, 5357*
    - ELECTROPHYSIOLOGY, 5306*

- CALCIUM (continued)
  - STOMACH (continued)
    - HYPERCHLORHYDRIA, 3669*
    - MOTILITY, 5306*
    - MUSCLES, 5306*
    - ULCER, 230
  - STRESS
    - ULCER, 230
  - TRANSPORT
    - ADRENERGIC RECEPTOR AGONISTS, 7340
    - BINDING, 1802
    - DIURETICS, 883
    - DRUG EFFECTS ON, 45
    - DUODENUM, 5288*
    - ENZYMES, 45
    - GROWTH FACTORS, 6014
    - ILEUM, 5288*
    - JEJUNUM, 883, 5288*
    - PANCREAS, 45
    - SECRETAGOGUES, 45
    - STARVATION, 1788
    - VITAMIN D, 1802, 6016
  - ULCER
    - ACID SECRETION, 3086
  - URINE
    - OXALATES, 5658*
  - VITAMIN D
    - BINDING, 5451
  - ZOLLINGER-ELLISON SYNDROME
    - GASTRIN, 1192

- CALCULI
  - SEE ALSO COMMON BILE DUCT CALCULI
  - BILE
    - CHEMICAL COMPOSITION, 1612
    - GALLBLADDER DISEASES, 1612
  - BILE ACIDS AND SALTS
    - SOLUBILITY, 1608
  - BILE DUCTS
    - BILE ACIDS AND SALTS, 8425*
    - DIAGNOSIS, 729
    - DISEASES ASSOCIATED WITH, 3513
    - DRAINAGE, 745
    - DRUG THERAPY, 8425*
    - EPIDEMIOLOGY, 742
    - HEPARIN, 8425*
    - NEOPLASMS, MALIGNANT, 3513
    - SURGERY, 745, 1606, 7840
    - TECHNIQUES, 729
    - THERAPY, 8425*
    - ULTRASOUND, 7224
  - BILIARY TRACT
    - BILIRUBIN, 5148*
    - CHOLANGIOGRAPHY, 1618
    - CHOLESTEROL, 1583
    - ENDOSCOPY, 8437
    - INTESTINAL OBSTRUCTION, 767
    - LIPIDS, 1583
    - SURGERY, 1618
  - BILIARY TRACT DISEASES
    - REVIEW, 1616
  - CHEMICAL COMPOSITION
    - ETIOLOGY, 4361
  - CHENODEOXYCHOLIC ACID
    - CHOLESTEROL, 1607, 1611
    - ENZYMES, 1611
    - REVIEW, 1610
    - THERAPY, 751, 1610, 1611

CALCULI (continued)
  CHOLANGIOGRAPHY
    DIAGNOSIS, 6547*
  CHOLECYSTITIS
    CHOLESTEROL, 764
    FAMILIAL FACTORS, 727
    SURGERY, 764
  CHOLECYSTOGRAPHY
    DIAGNOSIS, 1180*
  CHOLESTEROL
    BILIARY TRACT, 3495*
    REVIEW, 3495*
  COMMON BILE DUCT
    DILATATION, 7225
  CROHN'S DISEASE
    URINARY SYSTEM, 4475*
  CYSTIC DUCT
    EVOLUTION, 1596
    STATISTICAL STUDY, 1596
  DRUG THERAPY
    SOLUBILITY, 762
  DUODENUM
    ENDOSCOPY, 3512
    PERFORATION, 428
    PYLORUS, 427
    RADIOLOGY, 3512
  GALLBLADDER
    CHILD, 744
    CHOLESTEROL, 5152*
    CYSTIC DUCT, 1596
    EVOLUTION, 1596
    INFUNDIBULUM, 1596
    STATISTICAL STUDY, 1596
  GLYCOGENOSIS
    GALLBLADDER, 5162*
    SURVIVAL, 5162*
  HEMATOBILIA
    ETIOLOGY, 8446
  ILEAL DISEASES
    OXALATES, 8227*
  INFUNDIBULUM
    EVOLUTION, 1596
    STATISTICAL STUDY, 1596
  INTESTINAL OBSTRUCTION
    RADIOLOGY, 1613
  LIVER
    DIAGNOSIS, 3401
    ENDOSCOPY, 6571*
    THERAPY, 3401
  MANOMETRY
    SURGERY, 7198*
  PANCREAS
    NEOPLASMS, 1706
    PANCREATITIS, CHRONIC, 7078*
  PANCREATIC DISEASES
    CHEMICAL COMPOSITION, 2428
  SHUNT, INTESTINAL
    OXALATES, 8227*
  ULTRASONOGRAPHY
    CHOLECYSTOGRAPHY, 1180*
    DIAGNOSIS, 1180*
  VATER'S AMPULLA
    ENDOSCOPY, 3512
    RADIOLOGY, 3512

CANCER
  SEE NEOPLASMS

CARBOHYDRATES
  ABSORPTION, 5340
    CELIAC DISEASE, 4132*
    CHILD, 6993
    DRUG EFFECTS ON, 7931
    INTESTINE, SMALL, 1811
    IRON, 885
    KINETICS, 1811
    LACTOSE INTOLERANCE, 4132*
    PANCREAS, 7933
    REVIEW, 6986
  ALCOHOLS
    LIVER, 148
    METABOLISM, 148
  ANEMIA
    DIETARY FACTORS, 7868
  AUSTRALIA ANTIGEN
    CHROMATOGRAPHY, 8121
  CALCIUM
    INTESTINE, SMALL, 5288*
  CELIAC DISEASE
    DIETARY FACTORS, 2354
  CHILD
    REVIEW, 6993
  CROHN'S DISEASE
    DIETARY FACTORS, 850
  DIARRHEA
    ABSORPTION, 3537
  DIET
    DISACCHARIDASES, 74
  DIGESTION
    CHILD, 6993
    ELECTROPHYSIOLOGY, 6699
    PANCREAS, 7933
    REVIEW, 6986
  DUMPING SYNDROME
    PREVENTION, 5598*
  FETUS
    LIVER, 2910
    METABOLISM, 2910
  HEMOCHROMATOSIS
    GENETICS, 7815*
  HEPATITIS, INFECTIOUS, 5877
    ENZYMES, 2603
  HORMONE CONTROL
    REVIEW, 8019*
  INTESTINE, SMALL
    ABSORPTION, 2725, 2726, 3830*,
      4406, 7931
    DIGESTION, 2725
    ELECTROPHYSIOLOGY, 29
    HYDROLYSIS, 4406
    ION TRANSPORT, 6009
    METABOLISM, 3830*
    TRANSPORT, 4513, 7920*
  INTESTINES
    HYPERLIPOPROTEINEMIA, 3857
  JEJUNUM
    ABSORPTION, 6010
    ENZYMES, 3829*
  LIVER
    ENZYMES, 7409*
    ESTROGENS, 8008*
    HORMONE CONTROL, 8019*
    HORMONES, ADRENAL CORTEX, 3784
    HYPOLIPEMIC AGENTS, 1039
    METABOLISM, 1039, 3784, 6104
    PROTEINS, 6761*

- CARBOHYDRATES (continued)
  - LIVER CIRRHOSIS
    - ENZYMES, 2603
    - ERYTHROCYTES, 7812*
  - LIVER DISEASES
    - METABOLISM, 7793, 8335
  - MALABSORPTION SYNDROMES
    - ENTEROCOLITIS, NECROTIZING, 1384
  - METABOLISM, 6948
    - ENZYMES, 7986*
    - HORMONE CONTROL, 8019*
    - LITHIUM, 2916
    - LIVER, 2916
    - MOTILIN, 4858
    - SHUNT, INTESTINAL, 7630
  - MOUTH
    - ABSORPTION, 7931
  - PHENOBARBITAL
    - LIVER, 2910
    - METABOLISM, 2910
  - RESPIRATORY SYSTEM
    - ALCOHOLISM, 4546
    - METABOLISM, 4546
  - SALIVARY GLANDS
    - CYTOLOGY, 6717*
    - HISTOCHEMISTRY, 6717*
    - SECRETION, 6717*
    - ULTRASTRUCTURE, 6717*
  - STOMACH
    - CELLS, 2682*
    - METABOLISM, 6264
    - MUCUS, 4566*
    - SECRETION, 7969*
  - TRIGLYCERIDES
    - LIVER DISEASES, 578
  - ULCER, PEPTIC
    - METABOLISM, 6264

- CARBON DIOXIDE
  - BREATH TEST
    - TECHNIQUES, 7552
  - CYSTIC FIBROSIS
    - BREATH TEST, 4909*
  - PANCREATIC DISEASES
    - BREATH TEST, 4909*

- CARBON TETRACHLORIDE
  - ALPHA FETOPROTEIN
    - LIVER, 2154
  - AMINO TRANSFERASES
    - CELL CULTURE, 8024*
  - HEPATITIS, TOXIC, 4671
    - DRUG EFFECTS ON, 3763*
    - HEMATOPOIESIS, 7480
  - HEPATOCYTES
    - LIPIDS, 8021*
    - MORPHOLOGY, 8021*
  - LIPIDS
    - PEROXIDATION, 5416*
  - LIVER
    - ALBUMINS, 76
    - ALPHA FETOPROTEIN, 3751*
    - BACTERIA, 2041
    - CYTOCHROMES, 8022*
    - ENZYMES, 145
    - EXCRETION, 145
    - FIBROSIS, 1013*
    - OXIDOREDUCTASES, 7406*
    - PHOSPHOLIPIDS, 1064

- CARBON TETRACHLORIDE (continued)
  - LIVER CIRRHOSIS
    - DRUG-INDUCED, 4664
  - LIVER INJURY, 8076
    - ALPHA FETOPROTEIN, 6114, 8345
    - COLLAGEN, 8023*
    - CONNECTIVE TISSUE, 5402*
    - DRUG EFFECTS ON, 2914
    - DRUG-INDUCED, 5416*
    - ENZYMES, 1080, 1081
    - HEMATOPOIESIS, 7480
    - LIPIDS, 121*
    - LIPOPROTEINS, 3786
    - LYSOSOMES, 7468
    - NECROSIS, 5402*
    - NUCLEIC ACIDS, 6115
    - PREVENTION, 6087*
    - SELENIUM, 3928
    - TRANQUILIZING AGENTS, 7468
    - TRIGLYCERIDES, 641
    - ZINC, 6087*
  - NITROSAMINES
    - CARCINOGENS, 152

- CARBONIC ANHYDRASE
  - STOMACH
    - ENZYMES, 3588*
    - FEEDING, 108
    - HISTAMINE, 108
    - HISTOCHEMISTRY, 3588*

- CARBOXYLASES
  - ACID SECRETION
    - PARKINSON'S DISEASE, 1498
  - FATTY LIVER
    - ALCOHOLS, 5116
  - LIVER
    - PORPHYRINS, 2949
  - LIVER FUNCTION TESTS
    - PARKINSON'S DISEASE, 1498
  - STOMACH
    - H2 RECEPTOR ANTAGONISTS, 1881*

- CARBOXYPEPTIDASES
  - PANCREAS
    - SECRETION, 1959

- CARCINOEMBRYONIC ANTIGEN
  - ANTIGENS
    - GASTROINTESTINAL DISEASES, 5006*
    - NEOPLASMS, 5006*
    - SERUM, 5006*
  - COLITIS, ULCERATIVE
    - NEOPLASMS, MALIGNANT, 460
  - COLON
    - NEOPLASMS, 7049, 8252
    - NEOPLASMS, MALIGNANT, 5713*, 5715*
    - TECHNIQUES, 5715*
  - DIAGNOSIS
    - PANCREATIC DISEASES, 1440*
  - ESOPHAGUS
    - STOMACH, 5557*
  - GASTROINTESTINAL DISEASES
    - DIAGNOSIS, 1238
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, MALIGNANT, 8126
  - INTESTINE, LARGE
    - NEOPLASMS, MALIGNANT, 460

CARCINOEMBRYONIC ANTIGEN (continued)
- LIVER, 4777
  - NEOPLASM METASTASIS, 5549
- LIVER CIRRHOSIS
  - LIVER DISEASES, ALCOHOLIC, 5113*
- LIVER DISEASES, ALCOHOLIC
  - SERUM, 5113*
- NEOPLASMS
  - RADIOIMMUNOASSAY, 5588*
- NEOPLASMS, MALIGNANT
  - EVOLUTION, 452*
  - INTESTINE, LARGE, 452*
- PANCREAS
  - NEOPLASMS, 1440*, 5779
  - NEOPLASMS, MALIGNANT, 5773*
  - PANCREATITIS, 1440*
  - PLASMA, 1440*
- PLASMA
  - PANCREATITIS, 1440*
- RECTUM
  - NEOPLASM METASTASIS, 5549
  - NEOPLASMS, 8252
  - NEOPLASMS, MALIGNANT, 5713*
- STOMACH, 6883
  - NEOPLASMS, 5557*, 5588*
  - RADIOIMMUNOASSAY, 3935*
  - SECRETION, 3058

CARCINOGENS
- CARBON TETRACHLORIDE
  - NITROSAMINES, 152
- COLON
  - DIETARY FACTORS, 2379
  - LIPIDS, 2379
  - NEOPLASMS, MALIGNANT, 222, 5474*
  - SIMULATION, 2379
- HEPATECTOMY
  - NITROSAMINES, 152
- HYPERTENSION, PORTAL
  - LIVER INJURY, 6453*
- INTESTINE, SMALL
  - ABSORPTION, 5336
- LIPIDS
  - PEROXIDATION, 2038
- LIVER
  - BIOCHEMISTRY, 2153
  - DRUG EFFECTS ON, 2912
  - ENZYMES, 1478
  - HYPERPLASIA, 2151
  - METABOLISM, 2912, 2918
  - NEOPLASM METASTASIS, 5474*
  - NEOPLASMS, 2029, 2150, 2938, 6801, 7100*, 7425*
  - NEOPLASMS, MALIGNANT, 2153
  - PATHOLOGY, 1478
  - PRECANCEROUS CONDITIONS, 2151, 2152, 2153
  - REVIEW, 2043
  - TOXICOLOGY, 1046
  - ULTRASTRUCTURE, 2152
- NEOPLASMS
  - DIETARY FACTORS, 1663
  - NUCLEIC ACIDS, 158
- PANCREAS
  - HYPERTROPHY, 3037
- STOMACH
  - ABSORPTION, 5336, 6022
  - ULTRASTRUCTURE, 1298

CARCINOID TUMOR
- ABSORPTION
  - FATS, 4100*
- APPENDIX
  - CHILD, 7678
  - PROGNOSIS, 3272*
  - SECRETION, 6327*
  - THERAPY, 3272*
- CECUM
  - DIAGNOSIS, 8249
  - REVIEW, 8249
- DUODENUM
  - PROGNOSIS, 3272*
  - THERAPY, 3272*
- FATS
  - METABOLISM, 4100*
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 4100*
  - ETIOLOGY, 4389*
  - REVIEW, 4389*
- INTESTINE, SMALL
  - ANGIOGRAPHY, 4101*
  - PROGNOSIS, 3272*
  - RADIOLOGY, 4101*
  - THERAPY, 3272*
- LIVER
  - NEOPLASM METASTASIS, 7102*
- RECTUM
  - RESPIRATORY SYSTEM, 3272*
  - THERAPY, 3272*
- RESPIRATORY SYSTEM
  - PROGNOSIS, 3272*
  - THERAPY, 3272*
- STEATORRHEA, 4100*
- STOMACH
  - HORMONES, ADRENAL CORTEX, 2239
  - POLYPS, 4042*
  - SURGERY, 2239
- VATER'S AMPULLA
  - RADIOLOGY, 740

CARDIOVASCULAR SYSTEM
- SEE ALSO CIRCULATION
- ANOMALY
  - DEGLUTITION DISORDERS, 3132
- ANOMALY, CONGENITAL
  - DEGLUTITION DISORDERS, 6873
- CONSTIPATION
  - DISEASES ASSOCIATED WITH, 4452
- HEMATEMESIS
  - DISEASES ASSOCIATED WITH, 4452
- HEPATITIS
  - CHILD, 6488
- HEPATITIS, INFECTIOUS
  - CHILD, 6488
- HEPATITIS, SERUM
  - CATECHOLAMINES, 4301
- INTESTINE, SMALL
  - TRANSPORT, 4507*
- LIVER, 8159
  - BACTERIA, 6540*
  - ENDOTOXINS, 6540*
  - PRESSURE STUDY, 6518*
- LIVER DISEASES
  - COMPLICATIONS, 4265
  - DISEASES ASSOCIATED WITH, 4265
- LIVER DISEASES, ALCOHOLIC
  - COMPLICATIONS, 4265
  - DISEASES ASSOCIATED WITH, 4265

CARDIOVASCULAR SYSTEM (continued)
  MALLORY-WEISS SYNDROME
    DISEASES ASSOCIATED WITH, 8149
  MELENA
    DISEASES ASSOCIATED WITH, 4452
  PANCREATITIS
    COMPLICATIONS, 4236
  TRANSFUSION
    HEPATITIS, INFECTIOUS, 611
  VOMITING
    DISEASES ASSOCIATED WITH, 4452

CASEIN
  PLASMA
    AMINO ACIDS, 5281*

CATALASE
  FATTY LIVER
    DRUG EFFECTS ON, 2881*
  LIVER
    SYNTHESIS, 8018*
  SYNTHESIS
    DRUG EFFECTS ON, 8018*
    HYPOLIPEMIC AGENTS, 8018*

CATECHOLAMINES
  COLON
    ION TRANSPORT, 6015
    MOTILITY, 7950
    PERISTALSIS, 7321*
  DUODENUM
    MOTILITY, 7950
  HEPATITIS, SERUM
    CARDIOVASCULAR SYSTEM, 4301
    METABOLISM, 4301
  ILEUM
    ION TRANSPORT, 34
    MUSCLES, 918
  PANCREAS
    DIGESTION, 218
    SECRETION, 3730
  SECRETION
    PEPSIN, 8171
    POTASSIUM, 7336*
  STOMACH
    ACID SECRETION, 8171
    CIRCULATION, 976
    SECRETION, 976

CATHARTICS
  ABSORPTION
    OXALATES, 6019
  BILE ACIDS AND SALTS
    METABOLISM, 2072
  COLON
    ABSORPTION, 3825*
    DRUG EFFECTS ON, 4160
    ION TRANSPORT, 4506*
    PERMEABILITY, 26
    RADIOLOGY, 6165
    SCANNING, SCINTILLATION, 7687
    SECRETION, 3825*
  CONSTIPATION
    PREGNANCY, 5195
    REVIEW, 2634
    THERAPY, 5194
  DIARRHEA, 4391*
    SECRETION, 1685
  FECES
    BILE ACIDS AND SALTS, 2403

CATHARTICS (continued)
  HEPATITIS, NONVIRAL, 7140*
  ILEUM
    TRANSPORT, 1784
  INTESTINE, SMALL
    ABSORPTION, 3611*, 3825*
    MORPHOLOGY, 7484*
    SECRETION, 3825*
    TOXICITY, 7484*
  INTESTINES
    ABSORPTION, 3825*
    PERMEABILITY, 1685
    SECRETION, 1685, 3825*
  LIPIDS
    DRUG THERAPY, 2643
  LIVER INJURY, 7140*
  PARASYMPATHOLYTICS, 3539
  RECTUM
    MORPHOLOGY, 4148*
  SERUM
    CHOLESTEROL, 2403
  VIRUSES
    ANTIBODIES, 632

CECUM
  SEE ALSO COLON, INTESTINE, LARGE
  ACIDITY
    DIET, 6139
    FEEDING, 6139
  ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    DRUG EFFECTS ON, 7947
  ALGAE
    ULCER, 3024
  AMINO ACIDS
    METABOLISM, 181
  ANOMALY
    APPENDECTOMY, 6337*
    DIAGNOSIS, 2373
    ENDOSCOPY, 2373
  BACTERIA, 6680*
    ACIDITY, 7509*
    OXIDATION, 7509*
  BARIUM
    PERITONITIS, 7039
  BILE ACIDS AND SALTS
    CHOLECYSTECTOMY, 7394*
    STARVATION, 7394*
  CALCIUM
    ABSORPTION, 1770*
    DIETARY FACTORS, 1770*
    HOMEOSTASIS, 1770*
    TRANSPORT, 220
  CARCINOID TUMOR
    DIAGNOSIS, 8249
    REVIEW, 8249
  CARRAGEENAN
    ULCER, 3024
  CHOLESTEROL
    METABOLISM, 3221*
  CHYMOTRYPSIN
    METABOLISM, 1929*
  COLONOSCOPY
    ILEUM, 5527
    TECHNIQUES, 5527
  DIET
    BILE ACIDS AND SALTS, 4714*
    DISTENTION, 4714*
    MORPHOLOGY, 6140
    MOTILITY, 6140

CECUM (continued)
- DISEASE, 3240
- DIVERTICULITIS, 6343
  - SURGERY, 488
- DUPLICATION
  - COMPLICATIONS, 2227
- DYSPLASIA
  - COLONOSCOPY, 2371*
  - DIAGNOSIS, 2371*
  - HEMORRHAGE, 2371*
- ELECTROPHYSIOLOGY
  - TECHNIQUES, 2757
- ENZYMES
  - METABOLISM, 1929*
- ESOPHAGUS, ARTIFICIAL, 8160
- FATTY ACIDS
  - METABOLISM, 2772*
  - TRANSPORT, 5283*
- GANGRENE
  - PSEUDO-OBSTRUCTION, 8236*
- HEMANGIOMA
  - BLEEDING, 2195
- HEMORRHAGE
  - DYSPLASIA, 7657*
- HEPATECTOMY
  - BILE ACIDS AND SALTS, 7448*
- ILEUM
  - BARIUM, 7054
  - NEOPLASMS, 6294
  - PROLAPSE, 5667
  - TUBERCULOSIS, 434
- INFLAMMATION
  - CHILD, 7044
  - LEUKEMIA, 7044
- INTESTINAL OBSTRUCTION
  - COMPLICATIONS, 7709
  - DISTENTION, 7709
  - ISCHEMIA, 7709
- ION TRANSPORT
  - CALCIUM, 5495
  - HYPERTROPHY, 1796
  - MAGNESIUM, 5495
- LACTATES
  - METABOLISM, 7339*
  - SYNTHESIS, 7339*
- MICROORGANISMS
  - AMINO ACIDS, 3834*
  - BILE ACIDS AND SALTS, 4714*
  - DISTENTION, 4714*
- MORPHOLOGY, 6680*
- MOTILITY
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7947
  - DRUG EFFECTS ON, 7947
  - HELMINTHIASIS, 1827*
- MUSCLES
  - DRUG EFFECTS ON, 7947
- NEOPLASMS
  - DIAGNOSIS, 4175, 6294, 7702
  - INFLAMMATION, 7702
  - MORPHOLOGY, 7702
  - RADIOLOGY, 4175, 6294, 7702
- NEOPLASMS, BENIGN
  - APPENDICITIS, 7034
- OBSTRUCTION
  - CYSTIC FIBROSIS, 6364*
  - DISEASES ASSOCIATED WITH, 6364*
  - SURGERY, 6364*

CECUM (continued)
- PERFORATION
  - FECES, 500
  - PSEUDO-OBSTRUCTION, 8236*
  - SURGERY, 8211
  - THERAPY, 8211
- PERMEABILITY
  - TECHNIQUES, 5277*
- RADIOLOGY
  - TECHNIQUES, 7054
- SALMONELLOSIS
  - BACTERIA, 2132
  - GNOTOBIOTICS, 2132
  - PATHOLOGY, 2132
- SURGERY
  - CHOLESTEROL, 3221*
- TRANSPORT
  - CALCIUM, 1788, 6016
  - STARVATION, 1788
- TRYPSIN
  - METABOLISM, 1929*
- ULCER
  - DRUG DEPENDENCE, 2372*
- ULTRASTRUCTURE, 6680*
- UROGENITAL SYSTEM
  - NEOPLASMS, 5728
- YERSINIA
  - PSEUDOTUMORS, 8223

CELIAC DISEASE
- ABSORPTION
  - TRANSPORT, 5704*
  - XYLOSE, 3251*
- ANGIOGRAPHY
  - TECHNIQUES, 1197
- ANTIBIOTICS
  - ABSORPTION, 7636*
  - DIAGNOSIS, 7636*
- ANTIBODIES
  - DIAGNOSIS, 2343*
- ANTIGENS, 3267
  - GEOGRAPHICAL FACTORS, 4906*
- BICARBONATE SECRETION
  - SECRETION, 2357
- BIOPSY, 4139
  - DIAGNOSIS, 4904*
  - DUODENUM, 2344*
- CARBOHYDRATES
  - ABSORPTION, 4132*
- CHILD
  - ANTIBODIES, 2343*, 6994
  - ANTIGENS, 4905*, 4906*
  - COLLAGEN, 6994
  - DIAGNOSIS, 2191, 6163
  - DIARRHEA, 1645*
  - DIETARY FACTORS, 1381
  - FAMILIAL FACTORS, 1381
  - LYMPHOCYTES, 2166*
  - PATHOLOGY, 451
  - REVIEW, 8228
  - XYLOSE, 4003
- COMPLICATIONS
  - LIVER INJURY, 6308*
- DERMATITIS HERPETIFORMIS
  - ANTIGENS, 1378*
  - EPIDEMIOLOGY, 1378*
  - PERFORATION, 3266

- CELIAC DISEASE (continued)
  - DIAGNOSIS, 4131*
    - CHILD, 7900
    - ELECTROPHORESIS, 7900
    - ENDOSCOPY, 4916
    - LYMPHOCYTES, 7900
    - TECHNIQUES, 2343*
    - XYLOSE, 6163
  - DIET
    - TOXICOLOGY, 1382
  - DIETARY FACTORS
    - CARBOHYDRATES, 2354
    - TOXICOLOGY, 1382, 2354
  - DUODENUM
    - EPITHELIUM, 3253*
    - HYPERPLASIA, 6979*
    - MORPHOLOGY, 3253*
  - ENDOSCOPY
    - DUODENUM, 2344*
  - ENTEROKINASE, 5700*
  - ESOPHAGUS
    - SURGERY, 2358
  - ETIOLOGY
    - GLUTAMYLTRANSPEPTIDASE, 6978*
    - TECHNIQUES, 4903*
  - FAMILIAL FACTORS, 446, 4131*
  - FOLIC ACID
    - ABSORPTION, 1383
    - DIGESTION, 1383
  - GLUTEN
    - ANTIBODIES, 2355
    - CHROMATOGRAPHY, 4917
    - DIAGNOSIS, 2191
    - DRUG THERAPY, 4141
    - ETIOLOGY, 445
    - FAMILIAL FACTORS, 2356
    - GENETICS, 2356
    - IMMUNOLOGY, 4918
    - INTEGUMENTARY SYSTEM, 4744*
    - THERAPY, 445
  - HYPERSENSITIVITY
    - DISEASES ASSOCIATED WITH, 2347*
    - GLIADIN, 4902*
  - IMMUNOGLOBULINS
    - ANTIBODIES, 4130*
    - CHILD, 447, 2345*
    - INTESTINE, SMALL, 4130*
    - JEJUNUM, 447
  - IMMUNOLOGY, 4920, 6995
    - ANTIGENS, 4919
    - LYMPHOCYTES, 4921, 4922
  - INTESTINAL OBSTRUCTION
    - DISEASES ASSOCIATED WITH, 437
  - INTESTINE, SMALL
    - BIOPSY, 4904*
    - CHILD, 1380
    - HYPERPLASIA, 6979*
    - IMMUNOGLOBULINS, 7634*
    - MORPHOLOGY, 6995
    - REVIEW, 5685
    - ULTRASTRUCTURE, 1380
  - INTESTINES
    - ABSORPTION, 450
    - NEOPLASMS, MALIGNANT, 3266
    - PATHOLOGY, 451
    - PERFORATION, 3266
    - TRYPSINOGEN, 448

- CELIAC DISEASE (continued)
  - JEJUNUM
    - EPITHELIUM, 3253*
    - IMMUNOGLOBULINS, 7634*
    - MORPHOLOGY, 3252*, 3253*
  - LACTOSE INTOLERANCE
    - GENETICS, 4905*
  - LYMPHOCYTES
    - CHILD, 1645*
  - MEGACOLON
    - DISEASES ASSOCIATED WITH, 2346*
  - MILK, 6317
  - NUCLEIC ACIDS
    - SYNTHESIS, 7635*
  - PANCREAS
    - SECRETION, 2357
  - PATHOLOGY, 3265
  - PEPTIDES, 4578
    - JEJUNUM, 2353
  - RADIOLOGY, 4139
  - RESPIRATORY SYSTEM
    - HYPERSENSITIVITY, 449
    - INFLAMMATION, 449
    - PATHOLOGY, 2359
  - SECRETIN, 4140
  - SEROTONIN
    - EXCRETION, 6996
    - URINE, 6996
  - STEATORRHEA
    - AGE FACTORS, 6311*
    - DIAGNOSIS, 6311*
  - TRANSPORT
    - OXALATES, 5704*
  - VAGOTOMY, 2358
  - VILLI
    - REGENERATION, 3252*

- CELL CULTURE
  - AMINO TRANSFERASES
    - CARBON TETRACHLORIDE, 8024*
  - ANTRUM
    - GASTRIN, 1891
  - GARDNER'S SYNDROME
    - FAMILIAL FACTORS, 5172*
  - HEPATITIS, INFECTIOUS
    - VIRUSES, 1540
  - HEPATOCYTES, 5400*
    - DRUG METABOLISM, 4611*
    - METABOLISM, 6101
    - MORPHOLOGY, 6101
    - NEONATE, 3802
    - TECHNIQUES, 2867*, 7992*
  - LIVER
    - ENZYMES, 1029
    - METABOLISM, 136
    - NEOPLASMS, 6081*
    - STEROIDS, 1068
  - LIVER INJURY
    - ANESTHETICS, 120*
  - PROTEINS
    - TOXICITY, 8477
  - SCHISTOSOMIASIS
    - TECHNIQUES, 6661

- CEREBROSPINAL FLUID
  - HEPATITIS, INFECTIOUS
    - AUSTRALIA ANTIGEN, 662
  - LIVER CIRRHOSIS
    - CHILD, 4344

- CERULEIN
  - AMYLASES
    - SECRETIN, 3938*
  - BICARBONATE SECRETION
    - SECRETIN, 3938*
  - BILE
    - SECRETION, 6095
  - BILE DUCTS
    - RADIOLOGY, 4752*
  - CHOLECYSTOGRAPHY, 6549*
    - GALLBLADDER, 4752*
  - ENZYMES
    - SECRETIN, 3938*
  - GALLBLADDER
    - MOTILITY, 69
    - SECRETION, 69
  - ODDI'S SPHINCTER
    - DRUG EFFECTS ON, 2747
    - ELECTROPHYSIOLOGY, 69
    - MANOMETRY, 3637*
  - PANCREAS
    - ADENYL CYCLASE, 1758
    - BICARBONATE SECRETION, 4234
    - BINDING, 1758, 4600
    - ENZYMES, 3742, 4234
  - PANCREATIC DISEASES
    - AMYLASES, 3938*
    - BICARBONATE SECRETION, 3938*
    - ENZYMES, 3938*
  - PANCREATITIS
    - DRUG-INDUCED, 4589*
    - SECRETION, 289
  - PANCREATITIS, CHRONIC
    - BICARBONATE SECRETION, 2850
  - STOMACH
    - ELECTROPHYSIOLOGY, 3632*
    - MANOMETRY, 3632*
    - MOTILITY, 6027
  - VILLI
    - DRUG EFFECTS ON, 2738*

- CERULOPLASMIN
  - INTESTINE, LARGE
    - NEOPLASMS, 5613
  - LIPODYSTROPHY, INTESTINAL
    - LIVER DISEASES, 2466*
  - LIVER DISEASES, 3375*
  - NEOPLASMS
    - SERUM, 5613
  - RESPIRATORY SYSTEM
    - NEOPLASMS, 5613
  - STOMACH
    - NEOPLASMS, 5613
  - WILSON'S DISEASE
    - FAMILIAL FACTORS, 3375*

- CHALONES
  - INTESTINES
    - BIOASSAY, 1114
  - LIVER
    - REGENERATION, 3924

- CHELATING AGENTS
  - ABSORPTION
    - LEAD, 21
  - DIARRHEA
    - ABSORPTION, 4425
  - DUODENUM
    - BILE ACIDS AND SALTS, 812

- CHELATING AGENTS *(continued)*
  - INTESTINES
    - SYNTHESIS, 3795
  - LIVER
    - DRUG METABOLISM, 8033*
    - SYNTHESIS, 3795

- CHEMICAL BURNS
  - SEE BURNS, CHEMICAL

- CHEMORECEPTORS
  - STOMACH
    - NEOPLASMS, 314*

- CHEMOTAXIS
  - COLITIS, ULCERATIVE
    - BLOOD, 4202*

- CHEMOTHERAPEUTIC AGENTS
  - SEE ANTINEOPLASTIC AGENTS

- CHEMOTHERAPY
  - SEE DRUG THERAPY

- CHENODEOXYCHOLIC ACID
  - ABSORPTION, 6542*
  - BILE
    - CHOLESTEROL, 2927
    - CHROMATOGRAPHY, 1579*
    - DIETARY FACTORS, 2927
    - LIPIDS, 3497*
    - METABOLISM, 1969*
    - TRACER STUDY, 1969*
  - BILE ACIDS AND SALTS, 3497*
  - BILIARY TRACT
    - LIPIDS, 3496*
    - SECRETION, 2926
  - BIOCHEMISTRY, 7436*
  - CALCULI
    - CHOLESTEROL, 1607, 1611
    - ENZYMES, 1611
    - REVIEW, 1610
    - THERAPY, 751, 1610, 1611
  - CHOLELITHIASIS
    - BILE, 7212*
    - CYTOCHROMES, 2587
    - DIAGNOSIS, 1579*
    - DIETARY FACTORS, 3496*
    - DRUG THERAPY, 3498*, 3514, 4364*, 4670, 5922*, 7824*, 8429*
    - KINETICS, 1486
    - PLASMA, 4670
    - REVIEW, 4364*
    - SOLUBILITY, 7212*
    - SURGERY, 7212*
    - THERAPY, 751, 1579*, 2587, 3497*, 3499*, 3500*, 7213*, 7824*
  - CHOLESTASIS
    - METABOLISM, 2577*
  - CHOLESTEROL
    - SYNTHESIS, 550*
  - CIRCULATION, 2983*
  - ENDOCRINE GLANDS
    - DRUG EFFECTS ON, 7401*
  - FECES
    - METABOLISM, 1969*
    - TRACER STUDY, 1969*
  - GALLSTONES
    - LIVER, 5921*

- CHENODEOXYCHOLIC ACID (continued)
  - GASTRIN, 2826
  - HEPATITIS, NONVIRAL, 6116
  - INTESTINES
    - ENZYMES, 1955
  - KIDNEYS
    - DRUG EFFECTS ON, 7401*
  - LIVER
    - BILE, 1576*
    - DRUG EFFECTS ON, 4614*, 7401*
    - TOXICITY, 4614*
    - ULTRASTRUCTURE, 4614*
  - LIVER CIRRHOSIS
    - DRUG THERAPY, 1555*
    - LIVER FUNCTION TESTS, 2549
    - RADIOIMMUNOASSAY, 2549
    - SERUM, 2549
  - LIVER INJURY
    - SEX FACTORS, 3769
  - METABOLISM, 6542*
  - PANCREAS
    - ENZYMES, 1955
  - PLASMA
    - LIVER DISEASES, 4670
  - SOLUBILITY, 7436*
  - SYNTHESIS, 3359*
  - TOXICITY, 6771*
  - TOXICOLOGY, 1056
    - PRIMATES, 1055
  - TRACER STUDY
    - METABOLISM, 1969*

- CHILD
  - ABDOMEN
    - COMPLICATIONS, 8290*
    - DIAGNOSIS, 8290*
    - PAIN, 2620
    - RADIONUCLIDES, 5531
    - ULTRASONOGRAPHY, 5531
  - ABSCESS
    - DIAGNOSIS, 6624
    - THERAPY, 6624
  - ABSORPTION
    - PROTEINS, 896
    - XYLOSE, 4511
  - ACID SECRETION
    - PENTAGASTRIN, 80
  - ACRODERMATITIS
    - AUSTRALIA ANTIGEN, 2497*, 3442
    - HEPATITIS, INFECTIOUS, 3442
    - ZINC, 465
  - AMEBIASIS
    - DYSENTERY, 6659
  - AMYLASES, 5786*
  - ANCYLOSTOMIASIS
    - DRUG THERAPY, 839
  - ANORECTUM
    - MANOMETRY, 7698
  - APPENDICITIS, 6342, 6347
    - DIAGNOSIS, 1405, 6340, 7666
    - RADIOLOGY, 1196, 7666
  - APPENDIX
    - CARCINOID TUMOR, 7678
  - ASCARIASIS
    - DIET, 6654
    - NUTRITION DISORDERS, 6654
    - THERAPY, 6654

- CHILD (continued)
  - ATRESIA
    - ANTIBODIES, 5102*
    - AUSTRALIA ANTIGEN, 5102*
    - IMMUNOGLOBULINS, 5102*
  - AUSTRALIA ANTIGEN
    - HEPATITIS, INFECTIOUS, 4283*
    - INFECTION, 5082*
  - BILE
    - CHOLECYSTITIS, 757
  - BILE ACIDS AND SALTS
    - METABOLISM, 7756
  - BILE DUCTS
    - HYPOPLASIA, 4259*
  - BILIARY TRACT
    - PERFORATION, 7843
    - ULCER, PEPTIC, 6268
  - BILIARY TRACT DISEASES
    - ACID SECRETION, 621
    - DIAGNOSIS, 1203, 5929
    - ENZYMES, 621
    - MONOSACCHARIDES, 6425
  - BURNS
    - THERAPY, 5229
  - CARBOHYDRATES
    - ABSORPTION, 6993
    - DIGESTION, 6993
    - REVIEW, 6993
  - CECUM
    - INFLAMMATION, 7044
  - CELIAC DISEASE
    - ANTIBODIES, 2343*, 6994
    - ANTIGENS, 4905*, 4906*
    - COLLAGEN, 6994
    - DIAGNOSIS, 2191, 6163, 7900
    - DIARRHEA, 1645*
    - DIETARY FACTORS, 1381
    - FAMILIAL FACTORS, 1381
    - IMMUNOGLOBULINS, 447
    - INTESTINE, SMALL, 1380
    - LYMPHOCYTES, 1645*, 2166*
    - PATHOLOGY, 451
    - REVIEW, 8228
    - XYLOSE, 4003
  - CHOLANGIOGRAPHY
    - DIAGNOSIS, 5911*
  - CHOLANGITIS
    - LIPIDS, 759
  - CHOLECYSTITIS
    - DIAGNOSIS, 6583
    - GANGRENE, 6584
    - LIPIDS, 759
  - CHOLECYSTOGRAPHY
    - DIAGNOSIS, 5911*
  - CHOLELITHIASIS
    - COMMON BILE DUCT CALCULI, 2574*
    - DIAGNOSIS, 2574*, 4366*
    - ETIOLOGY, 7208*
    - PROGNOSIS, 7208*
    - RADIOLOGY, 7208*
    - RESPIRATORY SYSTEM, 7221
    - SEX FACTORS, 2574*
    - STATISTICAL STUDY, 4366*
    - SURGERY, 7208*
  - CHOLESTASIS
    - FAMILIAL FACTORS, 2450*
  - COLITIS
    - ANTIBIOTICS, 7000*

CHILD (continued)
- COLITIS, ULCERATIVE
  - EPIDEMIOLOGY, 844
  - SURGERY, 5766, 8265
  - THERAPY, 4205
  - UREMIA, 519
- COLON
  - OBSTRUCTION, 508
  - POLYPS, 4194
- COLONOSCOPY
  - COMPLICATIONS, 3068
  - PROGNOSIS, 3068
- COMMON BILE DUCT
  - CYSTS, 5146*
- CONSTIPATION, 7698
  - ETIOLOGY, 3536
  - HIRSCHSPRUNG'S DISEASE, 3536
  - INTESTINAL OBSTRUCTION, 3536
  - MEGACOLON, 3536
  - THERAPY, 3536
- CROHN'S DISEASE, 4478
  - DIAGNOSIS, 7900
  - EPIDEMIOLOGY, 844
  - GROWTH FACTORS, 4466*
  - PARENTERAL ALIMENTATION, 4866*
  - PROGNOSIS, 4466*, 7275*
  - RECURRENCE, 7275*
  - SURGERY, 4466*, 7275*
- CYSTIC FIBROSIS
  - IRON, 7749*
- DEFECATION
  - REVIEW, 7879
- DIARRHEA
  - ANTIBODIES, 6167
  - ESCHERICHIA COLI, 4422
  - INFECTION, 7261
  - INTESTINE, SMALL, 5169*
  - LYMPHOCYTES, 2166*
  - PATHOLOGY, 5169*
  - POTASSIUM, 1683
  - REVIEW, 783, 6953
  - THERAPY, 2639
  - YERSINIA, 8202
- DRUG THERAPY
  - BILE ACIDS AND SALTS, 7765
- DUODENITIS
  - DIAGNOSIS, 8205
  - ENDOSCOPY, 8206
- DUODENUM
  - NEOPLASMS, MALIGNANT, 8198
  - OBSTRUCTION, 1195, 7611
  - RUPTURE, 6306
- DYSENTERY
  - ANTIBACTERIALS, 786
  - APPENDICITIS, 6338
  - DRUG THERAPY, 824, 6659
- ECHINOCOCCOSIS
  - SCANNING, SCINTILLATION, 2212
- ENDOSCOPY
  - GASTROINTESTINAL SYSTEM, 2169*
  - RADIOLOGY, 2169*
  - REVIEW, 6953
  - THERAPY, 1647
- ENTERECTOMY
  - SHORT BOWEL SYNDROME, 4891
- ENTERITIS
  - ANTIBACTERIALS, 787
- ESCHERICHIA COLI
  - ENTEROTOXINS, 1681

CHILD (continued)
- ESOPHAGEAL REFLUX
  - DIAGNOSIS, 5564*
  - STOMACH, 4801
- ESOPHAGUS
  - DISEASE, 5191
  - ENDOSCOPY, 1237
  - REFLUX, 4034, 4795*
  - VARICES, 8157
- FRUCTOSE
  - INTOLERANCE, 8229
- GALLBLADDER
  - CALCULI, 744
  - MOTILITY, 3510
  - POLYPS, 1593
- GASTROENTERITIS
  - BREAST FEEDING, 5202
  - COMPLICATIONS, 8483
  - DEHYDRATION, 5202
  - ETIOLOGY, 5205, 5206, 6637, 7871
  - REVIEW, 6637
  - SODIUM, 5202
  - STEROIDS, 669
  - THERAPY, 4431, 8483
  - VIRUS DISEASES, 7251
  - VIRUSES, 790, 791, 5935*, 7872
- GASTROINTESTINAL DISEASES
  - BILE ACIDS AND SALTS, 7756
  - DIET, 7883
  - NUTRITION, 7883
  - PSYCHOLOGICAL FACTORS, 7881
  - REVIEW, 5191
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 8109
  - BLEEDING, 1669, 4441
  - ENDOSCOPY, 4755
  - EOSINOPHILS, 2613
  - MOTILITY, 8109
  - NEOPLASMS, 7569
  - PSEUDOTUMORS, 7569
  - TRYPSIN, 6621
- GIARDIASIS
  - DIARRHEA, 1645*
  - DRUG THERAPY, 3569
  - EPIDEMIOLOGY, 3569
  - LYMPHOCYTES, 1645*, 2166*
- GLYCOGENOSIS
  - DIAGNOSIS, 8290*
- HARTNUP'S SYNDROME, 5208
- HELMINTHIASIS
  - DRUG THERAPY, 838
- HEMORRHAGE
  - DRUG-INDUCED, 2254
- HEPATITIS
  - ANGIOGRAPHY, 7086*
  - CARDIOVASCULAR SYSTEM, 6488
  - CIRCULATION, 6488
  - DIAGNOSIS, 6489
  - EPIDEMIOLOGY, 6484*, 6489
  - IMMUNITY, 6487
  - STEROIDS, 669
- HEPATITIS, CHRONIC
  - AMINO ACIDS, 8327
  - AUSTRALIA ANTIGEN, 6499*
  - DIAGNOSIS, 5883
  - DRUG THERAPY, 5883
  - HEPATOCYTES, 7166*
  - HYPERTENSION, PORTAL, 5893
  - IMMUNOGLOBULINS, 3457

CHILD (continued)
    HEPATITIS, CHRONIC (continued)
        IMMUNOLOGY, 5099*
        LIVER CIRRHOSIS, 6499*
        PROGNOSIS, 3457
        THALASSEMIA, 1544*
        THERAPY, 1545
        ULTRASTRUCTURE, 7166*
        VITAMIN B12, 5890
    HEPATITIS, INFECTIOUS
        AMINO ACIDS, 4780, 8370
        AUSTRALIA ANTIGEN, 4779, 7161, 8380
        CARDIOVASCULAR SYSTEM, 6488
        CIRCULATION, 6488
        DIAGNOSIS, 4779, 4780, 6489
        DRUG THERAPY, 668
        ENZYMES, 4780
        EPIDEMIOLOGY, 653, 2511, 4779, 6484*, 6489, 7161, 8352*
        HORMONES, ADRENAL CORTEX, 668
        IMMUNITY, 6487
        LIVER FUNCTION TESTS, 8370
        PREVENTION, 2491*
        PROGNOSIS, 4287*
        PROTEINS, 8373
        SEASONAL FACTORS, 8352*
        TRANSMISSION, 2491*, 8366
    HEPATITIS, SERUM
        AUSTRALIA ANTIGEN, 8380
    HIRSCHSPRUNG'S DISEASE
        DIAGNOSIS, 3309
        HISTOCHEMISTRY, 3309
        SURGERY, 3536
    HORMONES, ADRENAL CORTEX
        THERAPY, 6622
    HORMONES, GASTROINTESTINAL
        REVIEW, 6953
    HYPERTENSION, PORTAL
        DIAGNOSIS, 1250
        SCANNING, SCINTILLATION, 7094*
        SHUNT, 2565
    ILEOSTOMY
        ION TRANSPORT, 3224
    IMMUNOGLOBULINS
        CELIAC DISEASE, 2345*
        DUODENUM, 2345*
        ILEUM, 2345*
        INTESTINE, SMALL, 2345*
    INCONTINENCE
        DEFECATION, 1430
    INFLAMMATORY BOWEL DISEASES
        DIAGNOSIS, 7900
        ENDOCRINE DISEASES, 7287
        EPIDEMIOLOGY, 844
        REVIEW, 6953
    INTESTINAL ABSORPTION
        REVIEW, 6953
    INTESTINAL OBSTRUCTION
        COLON, 5735
        DRUG-INDUCED, 7765
    INTESTINE, SMALL
        BIOPSY, 394, 395
        COMPUTERS, 3062
        DIABETES, 5681
        DIGESTION, 6953
        DISEASE, 2166*
        ENDOSCOPY, 395
        GANGRENE, 5957*

CHILD (continued)
    INTESTINE, SMALL (continued)
        INFARCTION, 5957*
        LIPIDS, 5681
        LYMPHOCYTES, 2166*
        PARASITES AND PARASITIC DISEASES, 5957*
        RADIOLOGY, 3062
        REVIEW, 394
        RUPTURE, 6306
        ULTRASTRUCTURE, 5996
    INTESTINES
        BACTERIA, 3542
        DISEASE, 5191
        ENZYMES, 3261
        INFILTRATION, 397
        INTUSSUSCEPTION, 4953, 6331*
        LYMPHANGIECTASIS, 3241
        MALABSORPTION SYNDROMES, 3261
        PARASITES AND PARASITIC DISEASES, 822, 1711
        PATHOLOGY, 397
        POLYPS, 505
    INTUSSUSCEPTION, 496
        EPIDEMIOLOGY, 5671
        ETIOLOGY, 7042
        SURGERY, 425
        THERAPY, 1418, 5671, 7042
    JAUNDICE, OBSTRUCTIVE
        DIAGNOSIS, 6576*
        ETIOLOGY, 5024*
        PATHOLOGY, 5024*
        PROGNOSIS, 5024*
        SCANNING, SCINTILLATION, 7094*
    JEJUNUM
        PROTEIN-LOSING ENTEROPATHIES, 3257*
    KETOSIS
        STEROIDS, 669
    KWASHIORKOR
        ACID SECRETION, 6176
    LACTOSE INTOLERANCE
        ANTIGENS, 4905*
        LYMPHOCYTES, 2166*
        THERAPY, 3269
    LIVER
        ASPIRIN, 6442*
        BILIARY TRACT DISEASES, 746
        CHOLESTASIS, 5024*
        CIRCULATION, 1204
        CYSTS, 5031*
        HAMARTOMA, 5029*
        HEMANGIOMA, 5010*
        HYPERTROPHY, 1492, 5017*
        LIVER FUNCTION TESTS, 760
        MORPHOMETRY, 5795*
        NEOPLASMS, 1250, 5013*, 5014*, 5015*, 5037*, 7096*
        NEOPLASMS, BENIGN, 5011*
        NEOPLASMS, MALIGNANT, 3482*, 7103*
        PATHOLOGY, 1250
        PORPHYRIA, 5059
        ULCER, PEPTIC, 6268
    LIVER CIRRHOSIS
        AMINO ACIDS, 8327
        ANGIOGRAPHY, 7086*
        AUSTRALIA ANTIGEN, 6499*
        CEREBROSPINAL FLUID, 4344
        CIRCULATION, 708

CHILD (continued)

- LIVER CIRRHOSIS (continued)
  - DIAGNOSIS, 702
  - EPIDEMIOLOGY, 1560
  - MAGNESIUM, 4344
  - PARASITES AND PARASITIC DISEASES, 702
  - SCANNING, SCINTILLATION, 7094*
  - SEROTONIN, 706
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - NEOPLASMS, MALIGNANT, 3482*
- LIVER DISEASES
  - ACID SECRETION, 621
  - ANGIOGRAPHY, 7086*
  - ANTIBODIES, 5102*
  - AUSTRALIA ANTIGEN, 5102*
  - BIOPSY, 1471
  - DIAGNOSIS, 3959, 5929, 6431
  - ENZYMES, 621
  - IMMUNOGLOBULINS, 5102*
  - LYMPHOCYTES, 627
  - MONOSACCHARIDES, 6425
  - NEOPLASMS, 7086*
  - SCANNING, SCINTILLATION, 7094*
  - SHWACHMAN-DIAMOND SYNDROME, 2463*
  - STEROIDS, 691
  - THERMOGRAPHY, 4770
- LIVER INJURY
  - DIAGNOSIS, 8323
  - SCANNING, SCINTILLATION, 8324
- LYMPHATIC SYSTEM
  - NEOPLASMS, MALIGNANT, 774
- LYMPHOCYTES
  - INTESTINE, SMALL, 1645*
  - JEJUNUM, 2166*
- MALABSORPTION SYNDROMES
  - BILE ACIDS AND SALTS, 7756
  - REVIEW, 6992, 7654
  - VITAMIN B12, 6985
  - XYLOSE, 4003
- MALACOPLAKIA
  - BILE DUCTS, 4371*
- MANOMETRY
  - REVIEW, 6953
- NEOPLASM METASTASIS
  - LIVER, 5019*
  - NEOPLASMS, BENIGN, 5011*
- NEOPLASMS, BENIGN
  - DIAGNOSIS, 8290*
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 8290*
  - NEOPLASMS, BENIGN, 5011*
- NUTRITION DISORDERS
  - DIAGNOSIS, 7887
  - IMMUNOGLOBULINS, 4408
  - INTESTINES, 7262
  - PROTEINS, 441
  - SODIUM, 5947
  - WATER, ELECTROLYTE BALANCE, 5947
- OMPHALOCELE, 4445
- ORGAN CULTURE
  - REVIEW, 6953
- PANCREAS
  - CYSTIC FIBROSIS, 4214*
  - DISEASE, 5191
- PANCREATIC DISEASES
  - CYSTS, 5244*
  - DISEASES ASSOCIATED WITH, 2463*
  - LIVER DISEASES, 2463*

CHILD (continued)

- PANCREATITIS
  - AMYLASES, 5786*, 6387
  - COMPLICATIONS, 6384
  - ETIOLOGY, 5786*
  - JAUNDICE, 541
  - SURVIVAL, 5786*
  - THERAPY, 5786*
- PARENTERAL ALIMENTATION, 5946
  - DIARRHEA, 5946
  - INFECTION, 5946
  - INTESTINE, SMALL, 4866*
- PATHOLOGY
  - REVIEW, 6953
- PREGNANCY
  - HEPATITIS, INFECTIOUS, 4283*
- PROTEIN-LOSING ENTEROPATHIES
  - ATROPHY, 3257*
  - HYPOPROTEINEMIA, 3257*
- PSEUDO-OBSTRUCTION
  - PARENTERAL ALIMENTATION, 4866*
- RADIOLOGY
  - GASTROINTESTINAL SYSTEM, 2169*
- RECTUM
  - BIOPSY, 8133
  - MANOMETRY, 7698
- REVIEW
  - EXCRETION, 7879
- SALIVARY GLANDS
  - DISEASE, 7882
  - NEOPLASMS, 6600, 8485
- SALMONELLOSIS
  - EPIDEMIOLOGY, 1699
  - PERFORATION, 170
  - TRANSMISSION, 4448
- SCHISTOSOMIASIS
  - DRUG THERAPY, 1726
- SERUM
  - ACID SECRETION, 1890
  - AMYLASES, 6744*
  - GASTRIN, 1890, 5372
- SHIGELLOSIS
  - ANTIBIOTICS, 803
- SHORT BOWEL SYNDROME
  - PARENTERAL ALIMENTATION, 4866*
- SHWACHMAN-DIAMOND SYNDROME
  - DISEASES ASSOCIATED WITH, 2463*
- SPRUE
  - PARENTERAL ALIMENTATION, 4866*
- STEATORRHEA
  - DIAGNOSIS, 2197
- STOMACH
  - ACID SECRETION, 6176, 8171
  - ENDOSCOPY, 1237
  - ENZYMES, 621
  - HAMARTOMA, 1301
  - PANCREAS, 5191
  - SECRETION, 383, 1296
  - ULCER, 6279
- TOXICITY
  - ASPIRIN, 6442*
- ULCER
  - PSEUDOTUMORS, 6279
- ULCER, PEPTIC
  - FAMILIAL FACTORS, 6924
  - SURGERY, 8185
  - THERAPY, 8185
- URINE
  - AMYLASES, 6744*

CHILD (continued)
- VILLI
  - ATROPHY, 3257*
- VIRUS DISEASES
  - GASTROENTERITIS, 4392*, 8455*

CHLORIDES
- COLON
  - ION TRANSPORT, 6013
  - SECRETION, 5441*
- ILEUM
  - ABSORPTION, 412
- INTESTINE, SMALL
  - CELLS, 6690*
- ION TRANSPORT
  - ILEUM, 5284*
  - JEJUNUM, 5284*
- ULCER
  - DUODENUM, 3207
- ULCER, PEPTIC
  - SECRETION, 3207

CHOLAGOGUES AND CHOLERETICS
- ABSORPTION, 4627*
- BILE
  - LIPIDS, 4633*
  - METABOLISM, 6097
  - SECRETION, 4633*, 6096
  - SYNTHESIS, 7449
- CHEMICAL PROPERTIES, 6100
- CHOLANGIOGRAPHY
  - CONTRAST MEDIA, 2024
- CHOLECYSTITIS
  - DRUG THERAPY, 4365*
- CHOLERESIS
  - SIMULATION, 2045
- DRUG METABOLISM, 4630*
- ESOPHAGUS
  - SPHINCTER, 1830*
- INTESTINES
  - DRUG EFFECTS ON, 1008*
- LIVER
  - DRUG EFFECTS ON, 1016*
  - MITOCHONDRIA, 1016*
- MITOCHONDRIA
  - DRUG EFFECTS ON, 1016*
  - METABOLISM, 1016*
- MUSCLES
  - DRUG EFFECTS ON, 1008*
  - GALLBLADDER, 1008*
  - INTESTINES, 1008*
- PANCREAS
  - BICARBONATE SECRETION, 6753
- PLASMA
  - CHROMATOGRAPHY, 6098
  - METABOLISM, 6098
- PREGNANCY, 6849
- SECRETION
  - BILE, 6092
- STEROIDS
  - METABOLISM, 2952
- SYNTHESIS, 6100
- TOXICOLOGY, 4630*, 6849
- URINE
  - CHROMATOGRAPHY, 6098
  - METABOLISM, 6097, 6098

CHOLANGIOGRAPHY
- BILE DUCTS
  - DIAGNOSIS, 6861
  - DILATATION, 4013, 6548*
  - DIVERTICULUM, 1626
  - MANOMETRY, 7198*
  - OBSTRUCTION, 3102
  - TECHNIQUES, 2207, 3967, 7196*
- BILIARY TRACT
  - CALCULI, 1618
  - CYSTS, 7841
  - NEOPLASMS, 3948*
  - RADIOLOGY, 4353*
  - TECHNIQUES, 1629, 2568*
- BILIARY TRACT DISEASES
  - ANGIOGRAPHY, 2202
  - DIAGNOSIS, 3049*, 3943*, 6581*, 7071, 7839
  - ENDOSCOPY, 283
  - PROGNOSIS, 5154*
  - SURGERY, 1632
  - TECHNIQUES, 1211, 4354*
- CALCULI
  - DIAGNOSIS, 6547*
- CHILD
  - DIAGNOSIS, 5911*
- CHOLAGOGUES AND CHOLERETICS
  - CONTRAST MEDIA, 2024
- CHOLECYSTECTOMY
  - COMPLICATIONS, 4017
- CHOLECYSTITIS
  - DIAGNOSIS, 3943*
  - LAPAROSCOPY, 269
- CHOLECYSTOGRAPHY
  - CONTRAST MEDIA, 3490*
- CHOLELITHIASIS, 5163
  - COMMON BILE DUCT CALCULI, 743
  - COMPLICATIONS, 743
  - DIAGNOSIS, 3943*
- CHOLESTASIS
  - COLITIS, ULCERATIVE, 5763*
  - RADIOGRAPHY, 3949*
- COLON
  - NEOPLASM METASTASIS, 6997*
  - NEOPLASMS, MALIGNANT, 6997*
- COMMON BILE DUCT, 5163, 7832
  - ANOMALY, 3589*
  - SURGERY, 2177*
- COMMON BILE DUCT CALCULI, 5163
  - DIAGNOSIS, 3502*
- COMPLICATIONS, 4015, 5910*
  - LIVER INJURY, 5071*
  - TECHNIQUES, 1247
- CONTRAST MEDIA, 3915, 3952, 4014, 4015, 6188
  - ABSORPTION, 4612*
  - COMPLICATIONS, 2203
  - EXCRETION, 2023, 4612*
  - REVIEW, 1248
  - TECHNIQUES, 5542
  - TRANSPORT, 4612*
- CYSTS
  - DIAGNOSIS, 6547*
- DUODENOSCOPY
  - CONTRAST MEDIA, 3118
- DUODENUM
  - COMPLICATIONS, 2206
  - SURGERY, 2177*

CHOLANGIOGRAPHY (continued)
- ENDOSCOPY
  - BILE DUCTS, 6860
  - BILIARY TRACT, 282
  - COMPLICATIONS, 6545*, 7071, 7195*, 8142
  - PANCREATOGRAPHY, 3049*, 7539
  - REVIEW, 7539, 8142
  - TECHNIQUES, 3049*, 3113, 3114, 6186, 7195*
- EXCRETION
  - ENZYMES, 268
- GALLBLADDER, 2206, 5163
  - ANOMALY, 7852
  - MOTILITY, 3640
- GLUCAGON, 3102
- HYPERBILIRUBINEMIA
  - TECHNIQUES, 267
- JAUNDICE, 4782
  - DIAGNOSIS, 3047*, 3111, 3951, 4010, 4012, 4783, 6548*
  - TECHNIQUES, 279, 6546*
- JAUNDICE, CHOLESTATIC
  - TECHNIQUES, 3048*
- JAUNDICE, OBSTRUCTIVE
  - DIAGNOSIS, 4011, 4784, 5155*
  - NEOPLASM METASTASIS, 5926*
  - TECHNIQUES, 4354*, 5155*
- LIVER
  - HEALING, 5802*
  - STRESS, 5802*
  - TECHNIQUES, 6546*
- LIVER DISEASES
  - ANGIOGRAPHY, 2202
  - DIAGNOSIS, 1572*
  - TECHNIQUES, 267, 6546*
- MANOMETRY, 6188
  - SURGERY, 6185
- PAIN
  - PANCREATITIS, 2429*
- PANCREAS, 3950
  - CONTRAST MEDIA, 3118
  - SECRETION, 8267*
- PANCREATIC DISEASES
  - ENDOSCOPY, 283
- PANCREATITIS
  - DIAGNOSIS, 2429*
- PANCREATITIS, CHRONIC
  - DIAGNOSIS, 7083
- PANCREATOGRAPHY
  - BILE DUCTS, 4013
  - BILIARY TRACT DISEASES, 5154*
  - PANCREATIC DISEASES, 5154*
  - REVIEW, 1573*
- PERFUSION
  - TECHNIQUES, 3957
- PSEUDO-OBSTRUCTION
  - COMMON BILE DUCT, 7234
- REVIEW, 3511, 8138
- SERUM
  - LIPASE, 3947*
- STRICTURE
  - DIAGNOSIS, 6547*
- SURGERY, 6188
- TECHNIQUES, 4010, 4011, 4012, 4015, 4016, 4784, 4785, 4786, 5910*, 6187, 6188, 6538, 7839
  - COMPLICATIONS, 3047*
  - DIETARY FACTORS, 6191

CHOLANGIOGRAPHY (continued)
- TECHNIQUES (continued)
  - ENDOSCOPY, 281
  - REVIEW, 5517

CHOLANGITIS
- BILE DUCTS
  - REVIEW, 4374
- DIAGNOSIS
  - TECHNIQUES, 3106
- ENDOSCOPY
  - TECHNIQUES, 7201*
  - THERAPY, 7201*
- EPIDEMIOLOGY
  - AGE FACTORS, 723*
  - THERAPY, 723*
- JAUNDICE
  - DRAINAGE, 8422*
  - INTUBATION, 8422*
  - LAPAROTOMY, 8422*
- LIPIDS
  - ABSORPTION, 759
  - CHILD, 759
- LIVER
  - LIVER FUNCTION TESTS, 760
  - MORPHOLOGY, 4377
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - DIAGNOSIS, 5131
  - THERAPY, 5132
- LIVER DISEASES
  - BILIARY TRACT DISEASES, 276
- SCLEROSIS
  - DIAGNOSIS, 6562*, 7204*
  - DRUG THERAPY, 6562*
  - SURGERY, 6562*, 7204*
  - THERAPY, 6562*
- SURGERY
  - PROGNOSIS, 2580*
  - SURVIVAL, 2580*

CHOLECYSTECTOMY
- BACTERIA
  - MORPHOLOGY, 7200*
- BILE
  - PHOSPHORUS, 6543*
- BILE ACIDS AND SALTS, 1052
- BILE DUCTS
  - BILE ACIDS AND SALTS, 7394*
  - OBSTRUCTION, 8443
  - TECHNIQUES, 8443
- CECUM
  - BILE ACIDS AND SALTS, 7394*
- CHOLECYSTITIS
  - COMPLICATIONS, 7226
  - DRAINAGE, 7226
  - MORPHOLOGY, 7200*
- CHOLELITHIASIS
  - ABSORPTION, 2572*
  - AGE FACTORS, 5141*
  - COMPLICATIONS, 5149*, 7211*
  - DIAGNOSIS, 4367*
  - MORPHOLOGY, 2572*
  - PROGNOSIS, 5149*
  - STATISTICAL STUDY, 7211*
  - THERAPY, 6572*
- COLON
  - NEOPLASMS, MALIGNANT, 3765*

CHOLECYSTECTOMY (continued)
  COMMON BILE DUCT CALCULI
    BILE, 2571*
    ETIOLOGY, 2571*
    RECURRENCE, 7210*
    SEQUELAE, 2571*
  COMPLICATIONS
    CHOLANGIOGRAPHY, 4017
    DIAGNOSIS, 4017
    PANCREATOGRAPHY, 4017
    PREVENTION, 6553
    SEPSIS, 8430*
    THERAPY, 5150
  DRAINAGE, 7833
    TECHNIQUES, 7226
  GALLBLADDER
    NEOPLASMS, MALIGNANT, 7850
  GALLBLADDER DISEASES
    SEQUELAE, 8444
  GASTROINTESTINAL SYSTEM
    ELECTROPHYSIOLOGY, 1835
  INTESTINE, SMALL
    BILE ACIDS AND SALTS, 7394*
  INTESTINES
    MOTILITY, 6552*
  LIVER
    BILE ACIDS AND SALTS, 7394*
    CIRCULATION, 756
  MALACOPLAKIA
    SURVIVAL, 4371*
  RADIOLOGY, 7233
  SEPSIS
    PREVENTION, 8430*
  STARVATION
    BILE ACIDS AND SALTS, 7394*
  STOMACH
    ELECTROPHYSIOLOGY, 6552*
    MOTILITY, 6552*
  TECHNIQUES, 7833

CHOLECYSTITIS
  AMYLASES
    THERAPY, 747
  BILE
    CHEMICAL COMPOSITION, 750, 757
    CHILD, 757
  BILE DUCTS
    MORPHOLOGY, 8071
  BILIARY TRACT
    BACTERIAL INFECTIONS, 3503*
  CALCULI
    CHOLESTEROL, 764
    FAMILIAL FACTORS, 727
    SURGERY, 764
  CHILD
    DIAGNOSIS, 6583
  CHOLAGOGUES AND CHOLERETICS
    DRUG THERAPY, 4365*
  CHOLECYSTECTOMY
    COMPLICATIONS, 7226
    DRAINAGE, 7226
    MORPHOLOGY, 7200*
  CHOLECYSTOGRAPHY
    REVIEW, 8423*
  CHOLELITHIASIS
    DIAGNOSIS, 1584
    THERAPY, 1584
  CIRCULATION, 7857

CHOLECYSTITIS (continued)
  COMPLICATIONS, 3503*
    GANGRENE, 6584
  DIAGNOSIS
    CHOLANGIOGRAPHY, 3943*
    CHOLECYSTOGRAPHY, 3943*, 8423*
    DRAINAGE, 6152*
    RADIOLOGY, 4379
    REVIEW, 8423*
    THERMOGRAPHY, 6563*
    ULTRASONOGRAPHY, 3943*
  DISEASES ASSOCIATED WITH
    DUODENITIS, 4380
    GASTRITIS, 4380
  DRUG THERAPY
    ANTIBIOTICS, 1586
  DUODENUM
    DIVERTICULUM, 4380
    MOVEMENT DISORDERS, 4380
  ESOPHAGUS
    DIVERTICULUM, 4380
    MOVEMENT DISORDERS, 4380
    SPASM, 4380
  ETIOLOGY
    ANTIBIOTICS, 1977*
  GALLBLADDER
    CONTRAST MEDIA, 269
    EMPHYSEMA, 1590, 1591
    ULTRASTRUCTURE, 4368*
  GANGRENE
    CHILD, 6584
  GIARDIASIS
    DIAGNOSIS, 3570
    DUODENITIS, 5963
  HEMORRHAGE, 7857
  HORMONES
    ADRENAL GLANDS, 753
    HYPOTHALAMUS, 753
    PITUITARY GLAND, 753
  INFANT, 758
  JAUNDICE
    THERAPY, 747
  KIDNEYS
    ENZYMES, 4378
  LAPAROSCOPY
    CHOLANGIOGRAPHY, 269
    DIAGNOSIS, 269
  LIPIDS
    ABSORPTION, 759
    CHILD, 759
  LIVER
    DRUG-INDUCED, 1589
    DRUG THERAPY, 1589
    ENZYMES, 4378
    INFLAMMATION, 3503*
    LIVER FUNCTION TESTS, 760
    PATHOLOGY, 3503*
  LIVER FUNCTION TESTS
    BIOCHEMISTRY, 8450
  PANCREAS
    ENZYMES, 4378
  PARENTERAL ALIMENTATION, 752
    LIVER, 752
  PHOSPHOLIPIDS, 3491*
  PROSTAGLANDINS, 5916*
  PROTEINS
    SERUM, 755

- CHOLECYSTITIS (continued)
    - RADIOLOGY
        - DIAGNOSIS, 2570*
        - TECHNIQUES, 2570*
    - REVIEW, 1587
    - SERUM
        - ENZYMES, 4378
    - STOMACH
        - ION TRANSPORT, 754
    - SURGERY, 4378
        - COMPLICATIONS, 2585
        - PROGNOSIS, 8447
    - SURVIVAL, 752
    - THERAPY, 752, 1588, 4082, 4378
        - DIAGNOSIS, 749
        - SEQUELAE, 8449
    - TOMOGRAPHY
        - DIAGNOSIS, 2570*
    - ULTRASONOGRAPHY
        - CHOLECYSTOGRAPHY, 8123*

- CHOLECYSTOGRAPHY
    - BILE DUCTS
        - DILATATION, 3941*
        - MOTILITY, 70
    - BILIARY TRACT DISEASES
        - DIAGNOSIS, 3943*, 8423*
        - REVIEW, 8423*
    - CALCULI
        - DIAGNOSIS, 1180*
    - CERULEIN, 6549*
    - CHILD
        - DIAGNOSIS, 5911*
    - CHOLANGIOGRAPHY
        - CONTRAST MEDIA, 3490*
    - CHOLECYSTITIS
        - DIAGNOSIS, 3943*, 8423*
        - REVIEW, 8423*
        - ULTRASONOGRAPHY, 8123*
    - CHOLELITHIASIS
        - DIAGNOSIS, 1180*, 3046*, 3943*
        - RADIOLOGY, 3046*
        - ULTRASONOGRAPHY, 8123*
        - ULTRASOUND, 3046*
    - COMMON BILE DUCT
        - MOTILITY, 70
    - COMPLICATIONS, 3953, 3962
    - CONTRAST MEDIA, 3915, 3952, 3953, 3954, 6189, 8130, 8140
        - TECHNIQUES, 7197*
        - TOLERANCE, 3953, 3962, 3963
    - CYSTIC FIBROSIS
        - GALLBLADDER DISEASES, 7236
    - GALLBLADDER
        - CERULEIN, 4752*
    - GALLBLADDER DISEASES
        - DIAGNOSIS, 2567*, 5913*
    - JEJUNUM
        - ABSORPTION, 1785
        - PERMEABILITY, 1785
        - SOLUBILITY, 1785
    - PANCREATITIS
        - ALCOHOLISM, 4991*
    - TECHNIQUES, 3953, 3962
        - DIETARY FACTORS, 6191
    - ULTRASONOGRAPHY
        - CALCULI, 1180*
        - CHOLELITHIASIS, 1180*
        - DIAGNOSIS, 1180*

- CHOLECYSTOKININ
    - ANTRUM
        - RADIOIMMUNOASSAY, 3592
    - CELLS
        - FETUS, 4489*
    - CHOLELITHIASIS
        - REFLUX, 5632
        - SURGERY, 5632
    - COLON
        - MUSCLES, 6026*
    - DEFICIENCY
        - ANALYSIS, 6631
    - DUODENUM
        - ENZYMES, 3999
        - MOTILITY, 5314*
        - RADIOIMMUNOASSAY, 3592
    - DYES
        - BILE ACIDS AND SALTS, 1965*
    - ESOPHAGUS
        - MOTILITY, 4519*
        - SPHINCTER, 4519*
    - FATS
        - METABOLISM, 5445*
    - GALLBLADDER
        - DYES, 1965*
        - HORMONE EFFECTS ON, 3650
        - HORMONES, GASTROINTESTINAL, 3650
        - MOTILITY, 1083
        - NERVOUS CONTROL, 1970*
        - RADIOLOGY, 131, 1965*
    - GASTROINTESTINAL SYSTEM
        - PANCREOZYMIN, 4548
    - INTESTINE, SMALL
        - MOTILITY, 2129, 4528*, 5314*
        - RADIOIMMUNOASSAY, 2082
    - INTESTINES
        - MOTILITY, 2751
        - MUSCLES, 5312*
    - JEJUNUM
        - MOTILITY, 5314*
        - RADIOIMMUNOASSAY, 3592
    - NEOPLASMS
        - STEATORRHEA, 5445*
    - NERVOUS SYSTEM
        - PANCREOZYMIN, 4548
    - ODDI'S SPHINCTER
        - DRUG EFFECTS ON, 2747
        - MANOMETRY, 3637*
    - PANCREAS
        - ADENYL CYCLASE, 2853
        - AMYLASES, 3724*
        - BICARBONATE SECRETION, 4234
        - BIOASSAY, 5394
        - CALCIUM, 1941
        - ENZYMES, 115, 1941, 4234
        - MORPHOLOGY, 999
        - NUCLEOTIDES, 115
        - SECRETION, 981, 1937, 1944, 2852
    - PANCREATIC DISEASES
        - DIAGNOSIS, 4981
    - PANCREATITIS, CHRONIC
        - DRUG THERAPY, 5001
    - PANCREOZYMIN
        - DEFICIENCY, 6631
    - PYLORUS
        - MOTILITY, 67
    - REFLUX
        - PYLORUS, 5632
    - REVIEW, 207

CHOLECYSTOKININ (continued)
- STOMACH
  - ACID SECRETION, 2794*
  - ELECTROPHYSIOLOGY, 3632*
  - MANOMETRY, 3632*
  - MOTILITY, 67, 3648
  - RADIOIMMUNOASSAY, 2082, 3592
  - SECRETION, 2794*, 2852, 3738
- ULCER
  - THERAPY, 3876
- ULCER, PEPTIC
  - ACID SECRETION, 1339*
  - H2 RECEPTOR ANTAGONISTS, 1339*
  - REFLUX, 5632
  - SURGERY, 5632
- VAGOTOMY
  - SECRETION, 3738

CHOLEDOCHOLITHIASIS
- SEE COMMON BILE DUCT CALCULI

CHOLELITHIASIS
- SEE ALSO GALLSTONES
- ADOLESCENCE
  - COMMON BILE DUCT CALCULI, 2574*
  - DIAGNOSIS, 2574*
  - PREGNANCY, 2574*
  - RESPIRATORY SYSTEM, 7221
  - SEX FACTORS, 2574*
- AGE FACTORS
  - STATISTICAL STUDY, 2576*
- BILE, 5004*
  - BACTERIA, 5147*
  - BILE ACIDS AND SALTS, 7437*
  - CHEMICAL COMPOSITION, 7437*
  - CHENODEOXYCHOLIC ACID, 7212*
  - CHOLESTEROL, 2031, 7437*
  - CHROMATOGRAPHY, 1579*
  - PHOSPHORUS, 6543*
- BILE ACIDS AND SALTS, 761, 1052, 4662
  - CHEMICAL COMPOSITION, 3498*
  - CIRCULATION, 4363*
  - PREGNANCY, 5238
- BILE DUCTS
  - DIAGNOSIS, 3968
  - DILATATION, 7207*
  - FISTULA, 765
  - PROGNOSIS, 7207*
- BILIARY TRACT
  - BACTERIAL INFECTIONS, 3503*
  - INFLAMMATION, 7847
  - OBSTRUCTION, 7847
- BILIARY TRACT DISEASES
  - AGE FACTORS, 724
- BILIRUBIN
  - DEFICIENCY, 5148*
  - ENZYMES, 5148*
- CHENODEOXYCHOLIC ACID
  - DIAGNOSIS, 1579*
  - DIETARY FACTORS, 3496*
  - DRUG THERAPY, 3498*, 4364*
  - KINETICS, 1486
  - REVIEW, 4364*
  - SURGERY, 7212*
  - THERAPY, 751, 1579*, 2587, 3500*, 7213*

CHOLELITHIASIS (continued)
- CHILD
  - COMMON BILE DUCT CALCULI, 2574*
  - DIAGNOSIS, 2574*, 4366*
  - ETIOLOGY, 7208*
  - PROGNOSIS, 7208*
  - RADIOLOGY, 7208*
  - RESPIRATORY SYSTEM, 7221
  - SEX FACTORS, 2574*
  - STATISTICAL STUDY, 4366*
  - SURGERY, 7208*
- CHOLANGIOGRAPHY, 5163
  - COMMON BILE DUCT CALCULI, 743
  - COMPLICATIONS, 743
- CHOLECYSTECTOMY
  - ABSORPTION, 2572*
  - AGE FACTORS, 5141*
  - COMPLICATIONS, 5149*, 7211*
  - MORPHOLOGY, 2572*
  - PROGNOSIS, 5149*
  - STATISTICAL STUDY, 7211*
  - THERAPY, 6572*
- CHOLECYSTITIS
  - DIAGNOSIS, 1584
  - THERAPY, 1584
- CHOLECYSTOGRAPHY
  - DIAGNOSIS, 1180*
  - RADIOLOGY, 3046*
  - ULTRASOUND, 3046*
- CHOLECYSTOKININ, 5632
- CHOLESTEROL
  - BILE ACIDS AND SALTS, 6572*, 6788
  - PHOSPHOLIPIDS, 6572*
  - PRIMATES, 1582
  - REVIEW, 7829, 7837
  - SIMULATION, 2031
  - SOLUBILITY, 6572*
  - THERAPY, 6788
  - ULTRASTRUCTURE, 4620*
- COMPLICATIONS, 3503*
- CONTRACEPTIVES, ORAL
  - CHOLESTEROL, 1634
- CROHN'S DISEASE
  - DISEASES ASSOCIATED WITH, 2325
  - EPIDEMIOLOGY, 2325
  - MECKEL'S DIVERTICULUM, 2325
  - OXALATES, 4475*
- CYTOCHROMES
  - CHENODEOXYCHOLIC ACID, 2587
  - ENZYMES, 2587
- DIAGNOSIS
  - CHOLANGIOGRAPHY, 3943*
  - CHOLECYSTECTOMY, 4367*
  - CHOLECYSTOGRAPHY, 3046*, 3943*
  - COMPLICATIONS, 4367*
  - DRAINAGE, 6152*
  - FECES, 3344*
  - REVIEW, 1619
  - ULTRASONOGRAPHY, 3943*
- DIET, 761
- DISEASES ASSOCIATED WITH
  - GILBERT'S DISEASE, 5845
  - HYPERCALCEMIA, 6564*
  - NEOPLASMS, MALIGNANT, 4376
  - PANCREATITIS, 3344*
  - PARATHYROID GLANDS, 6564*
- DRUG-INDUCED, 2584
  - REVIEW, 7851

CHOLELITHIASIS (continued)
  DRUG THERAPY, 761
    CHENODEOXYCHOLIC ACID, 3514, 4670, 5922*, 7824*, 8429*
    CHOLIC ACID, 4670, 5145*
    SOLUBILITY, 762
    SOLVENTS, 5144*, 5145*
  ENTERITIS, REGIONAL
    DIAGNOSIS, 854
  ENZYMES, 5928
    LIVER, 1457*
    SERUM, 1457*
    URINE, 1457*
  EPIDEMIOLOGY, 1594, 7206, 7237, 7238
    STATISTICAL STUDY, 2576*
  ESTROGENS
    ETIOLOGY, 3778
  ETHNIC FACTORS
    STATISTICAL STUDY, 2576*
  ETIOLOGY, 4651
    ANTIBIOTICS, 1977*
    CHEMICAL COMPOSITION, 7388*
    DIETARY FACTORS, 8072
    ETHNIC FACTORS, 7388*
    REVIEW, 6573*
    STATISTICAL STUDY, 2576*
  GALLBLADDER
    CELLS, 3515
    DYSPLASIA, 1977*
    NEOPLASMS, 7203*
    ULTRASONOGRAPHY, 7845
  HEPATOCYTES
    MITOCHONDRIA, 3514, 7836
    ULTRASTRUCTURE, 3514, 5928
  HORMONE EFFECTS ON
    EPIDEMIOLOGY, 1580
  HORMONES, 761
  HYPERLIPOPROTEINEMIA, 8428*
  INTESTINAL OBSTRUCTION
    DIAGNOSIS, 3306, 5166, 5924*
    ENDOSCOPY, 5924*
    SURGERY, 5166
    THERAPY, 3306, 5166
  INTESTINE, SMALL
    MORPHOLOGY, 8194*
  INTESTINES
    DIAGNOSIS, 3228
    OBSTRUCTION, 3228
    THERAPY, 3228
  JAUNDICE, OBSTRUCTIVE
    URINARY SYSTEM, 2579*
  LIVER
    INFLAMMATION, 3503*
    MORPHOLOGY, 1595
    PATHOLOGY, 3503*
    REGENERATION, 4382
    ULTRASTRUCTURE, 4662
  LIVER CIRRHOSIS
    EPIDEMIOLOGY, 2573*
  PANCREAS
    NEOPLASMS, MALIGNANT, 564
  PANCREATITIS
    AMYLASES, 2430*
    COMPLICATIONS, 2444
    DIAGNOSIS, 2430*
    DISEASES ASSOCIATED WITH, 3338*
    ETIOLOGY, 4222*
    JAUNDICE, 2430*
    PROGNOSIS, 4986*

CHOLELITHIASIS (continued)
  PANCREATITIS (continued)
    SURGERY, 4986*, 7075*
    THERAPY, 4986*
  PATHOLOGY
    REVIEW, 6573*
  PIGMENTS
    SIMULATION, 3779
  PLASMA
    BILE ACIDS AND SALTS, 4670
    CHENODEOXYCHOLIC ACID, 4670
    CHOLIC ACID, 4670
  PREVENTION
    ANTIBIOTICS, 1976*
    VITAMIN C, 6780*
  RESPIRATORY SYSTEM
    SURGERY, 7221
  REVIEW, 1594, 8051
    DIETARY FACTORS, 1619
    THERAPY, 1619
  SERUM
    FATTY ACIDS, 3501*
    LIPIDS, 3501*
    TRIGLYCERIDES, 3501*
  SEX FACTORS
    STATISTICAL STUDY, 2576*
  SOLUBILITY
    CHENODEOXYCHOLIC ACID, 7212*
  STOMACH
    NERVOUS CONTROL, 3501*
  SURGERY
    CHOLECYSTOKININ, 5632
    PROGNOSIS, 5918
    RECURRENCE, 7205
    TECHNIQUES, 7223
  THERAPY
    BILE ACIDS AND SALTS, 5919*, 6567*, 6788, 7824*
    CHENODEOXYCHOLIC ACID, 3497*, 3499*, 7824*
    REVIEW, 6572*
    TECHNIQUES, 5923
  ULCER, PEPTIC
    SURGERY, 5632
  ULTRASONOGRAPHY, 7842
    CHOLECYSTOGRAPHY, 1180*, 8123*
    DIAGNOSIS, 1180*, 2174*

CHOLERA
  BACTERIAL INFECTIONS
    SIMULATION, 2658
    TOXICOLOGY, 2658
  DIAGNOSIS
    TECHNIQUES, 7545
  EPIDEMIOLOGY, 4418, 4419, 4420
    CARRIER STATE, 779
    GEOGRAPHICAL FACTORS, 1676
  GASTROENTERITIS
    ANURIA, 6592
    SERUM, 7243
  ILEUM
    IMMUNITY, 223
    ION TRANSPORT, 6012
    MOTILITY, 2657
    TOXINS, 2657
  IMMUNOLOGY, 6842
  INTESTINE, SMALL
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 3840

- CHOLERA (continued)
  - INTESTINE, SMALL
    - ENTEROTOXINS, 2084
    - GLYCOPROTEINS, 3850
    - SECRETION, 2084, 3840
  - INTESTINES
    - ENTEROTOXINS, 2083
    - IMMUNITY, 2133
    - IMMUNOGLOBULINS, 4697
    - INTESTINE, SMALL, 4697
    - SECRETION, 2083
    - SIMULATION, 2133
    - TOXINS, 3617
  - JEJUNUM
    - ENTEROTOXINS, 2059*, 2060*
    - ION TRANSPORT, 2059*, 6012
    - WATER, ELECTROLYTE BALANCE, 2059*
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7644
  - PANCREAS
    - ENZYMES, 5505
  - PANCREATIC DISEASES
    - ABSORPTION, 4391*
    - SECRETION, 4391*
  - PATHOLOGY
    - REVIEW, 778
  - SECRETION
    - ENTEROTOXINS, 186
  - SODIUM
    - SECRETION, 1086*
    - TRANSPORT, 1086*
  - THERAPY
    - REVIEW, 778, 780
  - TOXINS
    - PROSTAGLANDINS, 781
    - SODIUM, 1086*
  - TRANSMISSION, 4418, 4420
    - WATER, 4419
  - TRANSPORT
    - ILEUM, 1086*
  - VACCINES
    - ANTIBODIES, 777
  - WATER, ELECTROLYTE BALANCE
    - ENTEROTOXINS, 2085
    - INTESTINE, SMALL, 2085

- CHOLERESIS
  - BILE ACIDS AND SALTS, 2877*
    - HEPATOCYTES, 570
    - VAGOTOMY, 8108*
  - BILE CANALICULI
    - ULTRASTRUCTURE, 2877*
  - BILIRUBIN
    - BILE ACIDS AND SALTS, 2928
    - SIMULATION, 1054
  - CHOLAGOGUES AND CHOLERETICS
    - SIMULATION, 2045
  - CONTRAST MEDIA
    - SIMULATION, 2204
  - CYTOCHROMES
    - HORMONES, ADRENAL CORTEX, 1070
  - DIURETICS
    - SIMULATION, 160
  - DRUG EFFECTS ON, 4356*, 4661
  - DRUG-INDUCED
    - SIMULATION, 2917
  - LIVER
    - SULFOBROMOPHTHALEIN, 1051
  - PROSTAGLANDINS, 1050

- CHOLERESIS (continued)
  - SECRETIN
    - TECHNIQUES, 3725*
  - TRANQUILIZING AGENTS
    - BILE, 7414*
    - MICROSOMES, 7414*

- CHOLERETICS
  - SEE CHOLAGOGUES AND CHOLERETICS

- CHOLESTASIS
  - ACID SECRETION
    - GLUCOSE, 6057
  - ALCOHOLISM
    - MARKER STUDY, 4638
  - ALKALINE PHOSPHATASE
    - SYNTHESIS, 1103*
  - ANTIBODIES
    - AUTOIMMUNE DISEASES, 4252*
  - AUSTRALIA ANTIGEN
    - IMMUNITY, 7151*
  - BILE
    - EXCRETION, 567
    - GENETIC FACTORS, 567
    - TRANSPORT, 2049
  - BILE ACIDS AND SALTS, 2877*, 6111
    - BILE, 7105*
    - CIRCULATION, 6523*
    - DIAGNOSIS, 4751*
    - ETIOLOGY, 2450*
    - EXCRETION, 2046, 6523*
    - GLUCURONIDASE, 2046
    - INFANT, 7105*
    - INTEGUMENTARY SYSTEM, 1600
    - LYMPH, 2054
    - METABOLISM, 2577*, 6445*, 8432*
    - MICELLES, 5421*
    - PLASMA, 2054
    - PREVENTION, 5421*
    - SERUM, 3362*, 7105*
    - SIMULATION, 2048
    - SULFATES, 3362*
    - TECHNIQUES, 7393*
    - URINE, 2577*, 3362*
  - BILE CANALICULI
    - ULTRASTRUCTURE, 2877*
  - BILIARY TRACT, 4255*
    - OBSTRUCTION, 1601
    - SULFOBROMOPHTHALEIN, 1966*
    - SURGERY, 1599
  - BILIRUBIN
    - LYMPH, 2054
    - PLASMA, 2054
  - BIOCHEMISTRY, 3107
  - CELLS
    - ALKALINE PHOSPHATASE, 7403*
    - ENZYMES, 7403*
  - CHENODEOXYCHOLIC ACID
    - METABOLISM, 2577*
  - CHOLANGIOGRAPHY
    - COLITIS, ULCERATIVE, 5763*
    - RADIOGRAPHY, 3949*
  - CHOLESTEROL
    - PREGNANCY, 1581*
    - SERUM, 1581*
  - COPPER
    - METABOLISM, 224
    - SIMULATION, 224
    - SULFHYDRYL COMPOUNDS, 2540*

CHOLESTASIS (continued)
- DIAGNOSIS, 569
  - BILIRUBIN, 6566*
  - LIPOPROTEINS, 6438, 6566*
  - LIVER FUNCTION TESTS, 6566*
  - ULTRASONOGRAPHY, 7823*
- DRUG-INDUCED, 2483, 6445*
  - BIOCHEMISTRY, 8294*
  - ESTROGENS, 2049
  - HYPOGLYCEMIC AGENTS, 6444*
  - REVIEW, 8294*
- DRUG METABOLISM
  - CYTOCHROMES, 1082
  - DRUG EFFECTS ON, 6411*
  - ENZYMES, 1082
  - HYPNOTIC AGENTS, 5025*
  - SEDATIVES, 5025*
  - SIMULATION, 1082
- DRUG THERAPY
  - COMPLICATIONS, 7765
- ENZYMES, 3385
  - DIAGNOSIS, 7214
  - SYNTHESIS, 1103*
- ERYTHROCYTES
  - PHOSPHOLIPIDS, 630
- ESTROGENS
  - BILE ACIDS AND SALTS, 7399*
- ETIOLOGY
  - BILE ACIDS AND SALTS, 7443*
  - DIAGNOSIS, 546
  - IMMUNOLOGY, 6446*
- FAMILIAL FACTORS
  - CHILD, 2450*
  - DYSPLASIA, 2450*
  - INFANT, 2450*
- FATTY ACIDS, 3385
- HEPARIN, 3516
  - SIMULATION, 763
- HEPATITIS
  - DIAGNOSIS, 8369
  - ETIOLOGY, 8369
- HEPATITIS, CHRONIC
  - ANTIBODIES, 4317
  - DIAGNOSIS, 4317
- HEPATITIS, INFECTIOUS
  - DIAGNOSIS, 8369
  - ETIOLOGY, 8369
  - PREGNANCY, 3424*
- HEPATITIS, NONVIRAL
  - THERAPY, 639*
- HEPATOCYTES, 4255*
  - ALKALINE PHOSPHATASE, 7403*
  - BIOCHEMISTRY, 2880*
  - ENZYMES, 7403*
  - MORPHOMETRY, 2677*, 2880*
  - PATHOLOGY, 2880*
  - ULTRASTRUCTURE, 2880*
- HISTOCHEMISTRY, 5075*
- HYPERBILIRUBINEMIA
  - DRUG METABOLISM, 5023*
- HYPNOTIC AGENTS
  - DRUG METABOLISM, 2047
  - EXCRETION, 2047
- HYPOGLYCEMIC AGENTS
  - COMPLICATIONS, 6444*
- IATROGENESIS, 7106*
- IMMUNITY
  - PLASMA, 8433*

CHOLESTASIS (continued)
- INFANT
  - DIAGNOSIS, 3112
  - LIVER FUNCTION TESTS, 4274*
  - MORPHOLOGY, 4274*
- JAUNDICE
  - DIAGNOSIS, 6574*
  - ULTRASONOGRAPHY, 6574*
- KIDNEY DISEASES
  - LIPIDS, 624
- KIDNEYS
  - TRANSPLANTATION, 1654
- LIPASE, 3516
- LIPIDS, 3385
- LIPOPROTEINS, 3385
  - CLEARANCE STUDY, 3516
  - DIAGNOSIS, 274, 1598, 5158*, 7827*
  - HEPARIN, 566
  - PREGNANCY, 1581*
  - REVIEW, 5158*
- LIVER, 5055
  - ALKALINE PHOSPHATASE, 1047
  - CHILD, 5024*
  - CIRCULATION, 3922
  - DIAGNOSIS, 542*, 548*
  - ENZYMES, 542*, 683
  - MEMBRANES, 2049
  - MITOCHONDRIA, 2691
  - MORPHOLOGY, 2049
  - NEONATE, 5024*
  - PATHOLOGY, 8316
  - SARCOIDOSIS, 1462*
  - SIMULATION, 1047
  - ULTRASTRUCTURE, 8316
- LIVER CIRRHOSIS
  - BILE ACIDS AND SALTS, 6523*
  - DIAGNOSIS, 7194
  - HYPERCHOLESTEREMIA, 4336*
  - HYPERPROTEINEMIA, 4336*
- LIVER INJURY
  - DRUG-INDUCED, 1511
- MARKER STUDY, 4638
- MONOAMINE OXIDASE
  - BILE ACIDS AND SALTS, 6086*
  - CYTOCHROMES, 6086*
  - LIPIDS, 6086*
  - PEROXIDATION, 6086*
- MYCOSES
  - IMMUNOGLOBULINS, 1654
- PANCREATITIS, CHRONIC
  - COMPLICATIONS, 4989*
  - ETIOLOGY, 539
- PHENOBARBITAL
  - DRUG THERAPY, 3517
- PHOSPHOLIPIDS, 3385
- PREGNANCY
  - BILE ACIDS AND SALTS, 6565*
  - FATTY ACIDS, 2451*
  - JAUNDICE, 4256*
  - LIVER, 3518
  - LIVER FUNCTION TESTS, 6565*
  - PREMATURITY, 7215*
  - PRURITIS, 4256*
  - ULTRASTRUCTURE, 3518
- PROTEINS, 3516
- PROTHROMBIN
  - METABOLISM, 8073
  - PREGNANCY, 565

- CHOLESTASIS (continued)
  - PRURITIS
    - JAUNDICE, 4256*
  - RADIOGRAPHY
    - TECHNIQUES, 3949*
  - SEQUELAE, 569
  - SIMULATION, 3922
  - SOLUBILITY
    - BILE ACIDS AND SALTS, 1004*
  - STEROIDS
    - PREGNANCY, 568
  - SULFOBROMOPHTHALEIN
    - ABSORPTION, 1966*
    - LIVER FUNCTION TESTS, 4274*
    - MORPHOLOGY, 4274*
  - SURGERY, 569
    - DIAGNOSIS, 7106*
    - ETIOLOGY, 7106*
  - TRANSPLANTATION
    - KIDNEYS, 5176*
  - TRIGLYCERIDES, 3385

- CHOLESTEROL
  - ABSORPTION
    - DRUG EFFECTS ON, 3762*
  - BILE, 6085*
    - CHENODEOXYCHOLIC ACID, 2927
    - CHOLELITHIASIS, 2031
    - CONTRAST MEDIA, 8069
    - PHOSPHOLIPIDS, 7398*
    - PROSTAGLANDINS, 2890*
    - SECRETION, 2866*
  - BILE ACIDS AND SALTS
    - BREATH TEST, 3087, 3777
    - METABOLISM, 1992, 7400*
    - MICELLES, 3772
    - OXIDATION, 3777
    - PRIMATES, 3777
    - RADIOISOTOPES, 3087
    - SYNTHESIS, 3087, 7413*
  - BILIARY TRACT
    - CALCULI, 1583
    - LIPIDS, 3496*
    - OBESITY, 1583
    - SECRETION, 8004*
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 4375
  - CALCULI
    - BILIARY TRACT, 3495*
    - CHENODEOXYCHOLIC ACID, 1607
    - CHOLECYSTITIS, 764
    - REVIEW, 3495*
  - CATHARTICS
    - SERUM, 2403
  - CECUM
    - METABOLISM, 3221*
    - SURGERY, 3221*
  - CHEMICAL PROPERTIES, 7479
  - CHENODEOXYCHOLIC ACID
    - CALCULI, 1611
    - SYNTHESIS, 550*
  - CHOLELITHIASIS
    - BILE, 7437*
    - BILE ACIDS AND SALTS, 6572*, 6788
    - PHOSPHOLIPIDS, 6572*
    - PRIMATES, 1582
    - REVIEW, 7829, 7837
    - SIMULATION, 2031
    - SOLUBILITY, 6572*

- CHOLESTEROL (continued)
  - CHOLELITHIASIS (continued)
    - THERAPY, 6788
    - ULTRASTRUCTURE, 4620*
  - CHOLESTASIS
    - PREGNANCY, 1581*
    - SERUM, 1581*
  - COLITIS, ULCERATIVE
    - FECES, 7717*
    - METABOLISM, 7717*
  - COLON
    - METABOLISM, 3221*
    - NEOPLASMS, 7659*
    - SURGERY, 3221*
  - COMMON BILE DUCT CALCULI
    - SOLUBILITY, 6568*
  - CONTRACEPTIVES, ORAL
    - CHOLELITHIASIS, 1634
  - DIET
    - WOLMAN'S DISEASE, 4653
  - ENZYMES
    - DIET, 5461
    - INTESTINES, 5461
  - ESTROGENS
    - BILE, 3778
  - FECES
    - BACTERIA, 185
  - GALLBLADDER
    - CALCULI, 5152*
  - GALLSTONES, 4363*, 4651
    - BILIRUBIN, 5143*
    - DRUG THERAPY, 1609
    - PIGMENTS, 2575*
    - SOLUBILITY, 8001*
  - HEPATOCYTES
    - LIPOPROTEINS, 8013*
  - INTESTINAL ABSORPTION, 1005*
  - INTESTINE, SMALL
    - METABOLISM, 3221*
    - SURGERY, 3221*
    - SYNTHESIS, 4618*
  - INTESTINES
    - EXCRETION, 1005*
    - SECRETION, 1005*
    - SYNTHESIS, 2086, 2975
  - JAUNDICE, OBSTRUCTIVE
    - ACYLTRANSFERASES, 2586
  - JEJUNUM
    - SECRETION, 2087
    - SYNTHESIS, 4618*
  - LIVER
    - ACIDS, 6808
    - BILE ACIDS AND SALTS, 7400*
    - COENZYMES, 2953
    - DIETARY FACTORS, 8015*
    - DRUG EFFECTS ON, 6127
    - ENZYMES, 6791
    - FATTY ACIDS, 8003*
    - LIPOPROTEINS, 7397*
    - METABOLISM, 5415*, 6119, 6791, 7413*
    - NEOPLASMS, 7097*
    - PHOSPHOLIPIDS, 7398*
    - SYNTHESIS, 4618*, 4652, 5413*, 5415*, 5484, 6773*, 6791, 6808, 7397*
  - LIVER CIRRHOSIS
    - SERUM, 7097*

CHOLESTEROL (continued,
  METABOLISM
    BILE ACIDS AND SALTS, 3756*, 7413*
    DIETARY FACTORS, 4619*
    DRUG EFFECTS ON, 3762*
    FATS, 4619*
    HEPATITIS, 6478*
    TRACER STUDY, 3221*
  MICELLES
    KINETICS, 3772
  OBESITY
    SURGERY, 6942*
  PHOSPHOLIPIDS
    FATTY ACIDS, 7398*
  PLASMA
    STEROLS, 6478*
  POLYPS
    BILE ACIDS AND SALTS, 7659*
  PORTACAVAL SHUNT
    HYPERCHOLESTEREMIA, 1653
  SECRETION
    ESTROGENS, 8004*
    HORMONE EFFECTS ON, 8004*
  SERUM
    PHOSPHOLIPIDS, 7398*
    PROSTAGLANDINS, 2890*
  SHUNT, INTESTINAL
    LIVER, 5484
    SYNTHESIS, 5484
  SYNTHESIS
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4652
    BILE ACIDS AND SALTS, 4618*
    DRUG EFFECTS ON, 3762*, 4652
    PROSTAGLANDINS, 4652

CHOLIC ACID
  BACTERIA
    INTESTINES, 7440*
    METABOLISM, 2156, 4446
  BILE ACIDS AND SALTS
    CHEMICAL COMPOSITION, 2875*
    KINETICS, 2875*
    METABOLISM, 1007*
    TRANSPORT, 1007*
  BILIARY TRACT
    SECRETION, 2926
  CHOLELITHIASIS
    DRUG THERAPY, 4670, 5145*
    PLASMA, 4670
  COMMON BILE DUCT CALCULI
    DRUG THERAPY, 5145*
  GALLSTONES
    DRUG THERAPY, 5145*
  HYPERTENSION, PORTAL
    RADIOIMMUNOASSAY, 4341
    TOLERANCE TEST, 4341
  ILEAL DISEASES
    EXCRETION, 2311*
    TRACER STUDY, 2311*
  IMMUNITY
    METABOLISM, 1112
  JAUNDICE, OBSTRUCTIVE
    CLEARANCE STUDY, 3519
  LIVER
    BILE, 1576*
    BINDING, 1057
    MICROSOMES, 3770

CHOLIC ACID (continued)
  LIVER CIRRHOSIS
    LIVER FUNCTION TESTS, 2549
    RADIOIMMUNOASSAY, 2549, 4341
    SERUM, 2549
    TOLERANCE TEST, 4341
  LIVER COMA
    CLEARANCE STUDY, 3364*
    KINETICS, 3364*
  LIVER FUNCTION TESTS
    METABOLISM, 3364*
  PLASMA
    LIVER DISEASES, 4670
  SYNTHESIS, 3359*, 6766

CHOLINE
  INTESTINE, SMALL
    ADRENERGIC RECEPTOR BLOCKADERS, 2073
  JEJUNUM
    ABSORPTION, 2709*
  LIVER CIRRHOSIS
    THERAPY, 3098

CHOLINERGIC AGENTS
  SEE PARASYMPATHOMIMETICS

CHOLINESTERASES
  HEPATITIS, CHRONIC
    DIAGNOSIS, 278
  HEPATITIS, INFECTIOUS
    ANTI-INFLAMMATORY AGENTS, 8371
    DRUG EFFECTS ON, 8371
    SERUM, 8371
  HIRSCHSPRUNG'S DISEASE
    DIAGNOSIS, 240
  LIVER DISEASES
    DIAGNOSIS, 270
    LIVER FUNCTION TESTS, 3382

CHROMATIN
  INTESTINES
    HORMONES, 2088
    VITAMIN D, 2088

CHROMATOGRAPHY
  AUSTRALIA ANTIGEN
    CARBOHYDRATES, 8121
  BILE
    BILIRUBIN, 1009*
    CHENODEOXYCHOLIC ACID, 1579*
    CHOLELITHIASIS, 1579*
    THERAPY, 1579*
  BILE ACIDS AND SALTS
    METABOLISM, 5512*
    TECHNIQUES, 7391*
  CELIAC DISEASE
    GLUTEN, 4917
  DUODENUM
    AMINO PEPTIDASES, 7506
    DISACCHARIDASES, 7506
    ENTEROKINASE, 7506
    ENZYMES, 7506
  GALLSTONES
    PIGMENTS, 7826*
  GASES
    INTESTINES, 1179*
  GLUCAGON
    TECHNIQUES, 6032

CHROMATOGRAPHY (continued)
  HORMONES, GASTROINTESTINAL
    TECHNIQUES, 6032
  INTRINSIC FACTOR
    VITAMIN B12, 3014
  LIVER
    CONTRAST MEDIA, 7386*
    RADIONUCLIDES, 7386*
  LIVER COMA
    FATTY ACIDS, 7751*
    THERAPY, 5028*
  LIVER DISEASES
    BILE ACIDS AND SALTS, 7391*
  LIVER INJURY
    THERAPY, 5028*
  PLASMA
    CHOLAGOGUES AND CHOLERETICS, 6098
  STOMACH
    GLYCEROGLUCOLIPIDS, 3661*
    GLYCOLIPIDS, 1887, 3661*
  URINE
    CHOLAGOGUES AND CHOLERETICS, 6098

CHROMOSOMES
  BEHCET'S SYNDROME
    ANTIGENS, 5167*
  DUODENUM
    DIVERTICULUM, 1366
  LIVER CIRRHOSIS
    ULTRASTRUCTURE, 4330*
  WILSON'S DISEASE
    ULTRASTRUCTURE, 3404

CHYLOMICRONS
  INTESTINAL ABSORPTION
    SYNTHESIS, 7924
  INTESTINE, SMALL
    SECRETION, 3827*, 5439*
    TRANSPORT, 5439*
    ULTRASTRUCTURE, 3827*
  INTESTINES
    ABSORPTION, 7302*
    PHOSPHOLIPIDS, 1795, 2130
    TRANSPORT, 7302*
  JEJUNUM
    SECRETION, 5439*
    TRANSPORT, 5439*
  LIVER
    HYDROLYSIS, 3758
    NEONATE, 7461
  PHOSPHOLIPIDS
    CIRCULATION, 1795

CHYME
  INTESTINE, SMALL
    HYPEREMIA, 2972
  PHOSPHOLIPIDS
    CYTOLOGY, 1098

CHYMOTRYPSIN
  CECUM
    METABOLISM, 1929*
  COLITIS, ULCERATIVE
    DIAGNOSIS, 4199*
  CROHN'S DISEASE
    DIAGNOSIS, 4199*
  INFLAMMATORY BOWEL DISEASES
    COLON, 4199*
    DIAGNOSIS, 4199*

CHYMOTRYPSIN (continued)
  INTESTINE, SMALL
    METABOLISM, 1929*
  INTESTINES
    METABOLISM, 1929*
  PANCREAS, 3122
    HORMONES, GASTROINTESTINAL, 1936
    SECRETIN, 2840
    SECRETION, 1936, 5442*, 7982*
  PANCREAS FUNCTION TESTS
    FECES, 3122

CHYMOTRYPSINOGEN
  PANCREAS
    ENZYMES, 1930*
    SECRETION, 1930*
    TRYPSIN, 1930*

CIRCADIAN RHYTHM
  COLON
    GLYCOGEN, 2960*
  GASTRIN, 3692
  GLYCOGEN PHOSPHORYLASE
    FEEDING, 2039
    LIVER, 2039
  INTESTINE, SMALL
    ENZYMES, 3843
    GUANYL CYCLASE, 2090
  LIVER
    ENZYMES, 3797, 6791
    NUCLEIC ACIDS, 3797
    PROTEINS, 3797
  LIVER CIRRHOSIS
    GASTRIN, 7178*
    PROLACTIN, 6526*
  LIVER INJURY
    HEPATOCYTES, 4610*
    MITOSIS, 4610*
  PANCREAS
    ENZYMES, 3843, 7377
    LIPASE, 7377
    SECRETION, 6750
  SERUM
    GASTRIN, 7178*, 7575
  STEROIDS
    MICROSOMES, 1980
  ULCER
    STRESS, 3894
  ULCER, PEPTIC
    GASTRIN, 7575

CIRCULATION
  SEE ALSO CARDIOVASCULAR SYSTEM
  ABSORPTION
    AMINO ACIDS, 3011
    ELECTROLYTES, 4503*
    SODIUM, 4503*
  ANGIOGRAPHY
    NEOPLASMS, 7267
  ANTRUM
    HEMORRHAGE, 4703*
    STRESS, 4703*
  AUSTRALIA ANTIGEN
    ANTIBODIES, 5866*
    IMMUNITY, 5866*
    TECHNIQUES, 5866*
  BARIUM
    LIVER, 2200

CIRCULATION (continued)

- BILE
  - ESTROGENS, 4650
- BILE ACIDS AND SALTS, 2983*
  - AMINO ACIDS, 1968*
  - DRUG EFFECTS ON, 4643
  - INTESTINAL ABSORPTION, 6523*
  - KINETICS, 1968*
  - STEROIDS, 1968*
- CHENODEOXYCHOLIC ACID, 2983*
- CHOLECYSTITIS, 7857
- CHOLELITHIASIS
  - BILE ACIDS AND SALTS, 4363*
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6523*
  - LIVER, 3922
- CHYLOMICRONS
  - PHOSPHOLIPIDS, 1795
- COLITIS, ULCERATIVE
  - CROHN'S DISEASE, 6350*
  - IMMUNITY, 5768
  - IMMUNOGLOBULINS, 6350*
- COLON
  - ANGIOGRAPHY, 6681*
  - COLITIS, 1412
  - INFLAMMATION, 8262
  - MORPHOLOGY, 498, 6681*
  - PRESSURE STUDY, 5490
  - SURGERY, 5756
  - ULTRASONOGRAPHY, 5756
- COLONIC DISEASES
  - DIET, 456
- COMA
  - LIVER, 573
  - NERVOUS SYSTEM, 573, 3792
- DUODENUM
  - ACIDITY, 5470*
  - HEMORRHAGE, 4704*
  - HORMONE EFFECTS ON, 4700*
  - HORMONES, GASTROINTESTINAL, 4700*
  - HYPOXIA, 1141
  - STRESS, 1141
  - VARICES, 6291*
- ENTERITIS, 7857
- ESOPHAGUS
  - HEMORRHAGE, 4704*
  - MORPHOMETRY, 7901*
  - STOMACH, 7901*
- ESOPHAGUS, ARTIFICIAL
  - STOMACH, 3873
- ESTROGENS
  - ANTIBIOTICS, 4650
  - DRUG EFFECTS ON, 4650
- FATS
  - ABSORPTION, 3017
  - DIGESTION, 3017
  - INTESTINE, SMALL, 2971
- FOLIC ACID
  - GLYCOPROTEINS, 1810
- GASTRIN, 3668*
  - REVIEW, 204
- GASTRITIS
  - ACIDS, 1920
- GASTROINTESTINAL DISEASES
  - DIAGNOSIS, 8489, 8490
  - ETIOLOGY, 8489
  - PROGNOSIS, 8491
  - SURGERY, 8491
  - THERAPY, 8489

CIRCULATION (continued)

- GASTROINTESTINAL SYSTEM
  - ANESTHESIA, 3862*
  - DRUG EFFECTS ON, 3862*
  - HEMORRHAGE, 4704*
  - REVIEW, 2994
- HEMORRHOIDS
  - MORPHOLOGY, 3587*
- HEPATECTOMY
  - CLEARANCE STUDY, 7475
  - REGENERATION, 7462
- HEPATITIS
  - CHILD, 6488
- HEPATITIS, CHRONIC
  - IMMUNOLOGY, 5108
- HEPATITIS, INFECTIOUS
  - CHILD, 6488
  - DISEASES ASSOCIATED WITH, 5870*
- HEPATOCYTES
  - ULTRASTRUCTURE, 3032
- ILEUM
  - OXYGEN, 2126
  - RADIOLOGY, 3586*
- INDOCYANINE GREEN
  - CLEARANCE STUDY, 7432*
- INTESTINAL OBSTRUCTION
  - OXYGEN, 4707*
  - SIMULATION, 4726, 4728
- INTESTINE, LARGE
  - COLITIS, ULCERATIVE, 3318*
  - CROHN'S DISEASE, 3318*
  - NERVOUS CONTROL, 4705*
  - SURGERY, 3318*
- INTESTINE, SMALL
  - ABSORPTION, 7297*
  - DISTENTION, 4707*
  - HEMODYNAMICS, 1121
  - MOTILITY, 3863*
  - NERVOUS CONTROL, 4705*
  - OXYGEN, 4707*
  - RADIOLOGY, 3586*
  - SECRETIN, 208
  - TRANSPLANTATION, 3889
  - ULTRASTRUCTURE, 6142*
  - VILLI, 1120, 2124
- INTESTINES
  - ACETYLCHOLINE, 3878
  - COMPLICATIONS, 6301
  - DISTENTION, 3878
  - ESTROGENS, 4650
  - HORMONES, 2128
  - ISCHEMIA, 6607
  - NERVOUS CONTROL, 4705*
  - TRACER STUDY, 5503
- JEJUNUM
  - HORMONE EFFECTS ON, 4700*
  - HORMONES, GASTROINTESTINAL, 4700*
  - RADIOLOGY, 3586*
- KIDNEYS
  - HORMONE EFFECTS ON, 4700*
- LIPOPROTEINS
  - PHOSPHOLIPIDS, 1795
- LIVER, 4972
  - ADOLESCENCE, 1204
  - ANGIOGRAPHY, 161
  - ANOMALY, 1484
  - ARTERIES, 3864*
  - BACTERIAL INFECTIONS, 1426
  - BILE ACIDS AND SALTS, 1483

CIRCULATION (continued)
  LIVER (continued)
    BILIARY TRACT DISEASES, 746
    CHILD, 1204
    CHOLECYSTECTOMY, 756
    CLEARANCE STUDY, 6755*, 7462
    COMA, 3792
    CYSTS, 1484
    DRUG EFFECTS ON, 3919
    ENZYMES, 6104
    ESTROGENS, 4650
    FETUS, 7184*
    INDOCYANINE GREEN, 598, 4339*
    LIVER CIRRHOSIS, 3470*
    LIVER DISEASES, 598
    LYMPHATIC SYSTEM, 4723
    METABOLISM, 6104, 8082
    MORPHOLOGY, 7184*
    MUSCLES, 3921
    NEOPLASM METASTASIS, 8045*
    NERVOUS CONTROL, 3864*, 6757*
    OBSTRUCTION, 154
    REGENERATION, 4609*, 7462
    SURGERY, 4735
    SYMPATHOMIMETICS, 1171
    TECHNIQUES, 1158, 3920, 8107*
    TONICITY, 1204
    TRANSPLANTATION, 6108, 6432
    ULTRASTRUCTURE, 2891, 3921
    VASOPRESSIN, 6756*, 8006*
    WATER, ELECTROLYTE BALANCE, 4706*
  LIVER CIRRHOSIS
    BILE ACIDS AND SALTS, 6523*
    CHILD, 708
    FETUS, 7184*
    HEMATOLOGY, 708
    HYPERBILIRUBINEMIA, 3470*
    HYPERTENSION, PORTAL, 5118*, 8402*
    INDOCYANINE GREEN, 4339*
    MORPHOLOGY, 7184*, 7187*
    SCANNING, SCINTILLATION, 5118*
    SHUNT, 2543*, 5909
  LIVER DISEASES, ALCOHOLIC
    SHUNT, 2543*
  LIVER INJURY
    THERAPY, 6113
  LYMPH, 5492
  LYMPHATIC SYSTEM
    DISEASE, 5493
    IMMUNOLOGY, 5493
  MUSCLES
    HORMONE EFFECTS ON, 4700*
    HORMONES, GASTROINTESTINAL, 4700*
  NECROSIS, 7857
  NERVOUS SYSTEM
    PERMEABILITY, 3792
  PANCREAS
    ELECTROPHYSIOLOGY, 1224
  PANCREATITIS, CHRONIC
    COMPLICATIONS, 540
  PANCREATOGRAPHY
    LIPASE, 3329
  PRIMATES
    VASOPRESSIN, 2118
  PROTEINS
    TRANSMISSION, 7304*
  RECTUM
    HEMORRHOIDS, 3587*

CIRCULATION (continued)
  SALIVARY GLANDS
    NERVOUS CONTROL, 1109
  SHOCK
    BLEEDING, 2119
    GASTROINTESTINAL SYSTEM, 2119
  SHUNT
    MARKER STUDY, 6143*
    TECHNIQUES, 6143*
  SHUNT, INTESTINAL
    VITAMIN D, 3223*
  SPLEEN
    HORMONE EFFECTS ON, 4700*
    HORMONES, GASTROINTESTINAL, 4700*
  STOMACH
    ACID SECRETION, 4572*
    ANTI-INFLAMMATORY AGENTS, 1880*
    BILE ACIDS AND SALTS, 2807
    CATECHOLAMINES, 976
    CLEARANCE STUDY, 2139, 3892
    ENDOTOXINS, 6006*
    HEMORRHAGE, 4703*, 4704*, 5368*
    HORMONE CONTROL, 7342*
    HORMONE EFFECTS ON, 7347*, 7375*
    HYPOXIA, 1141
    MORPHOMETRY, 7901*
    MOTILIN, 1898, 7347*
    NERVOUS CONTROL, 976, 7342*
    NOREPINEPHRINE, 7342*
    PENTAGASTRIN, 965, 2140, 2991*
    PERMEABILITY, 35
    PRIMATES, 83
    PROSTAGLANDINS, 2807
    SECRETION, 83
    SHOCK, 5368*
    SOMATOSTATIN, 7375*
    STRESS, 1141, 4703*
    SURGERY, 1326
    TECHNIQUES, 3003
    VASOCONSTRICTOR AGENTS, 1142
  TRIGLYCERIDES
    ABSORPTION, 3017
    DIGESTION, 3017
  ULCER
    PENTAGASTRIN, 2991*
    STRESS, 3865*, 7857
  VARICES
    OBSTRUCTION, 6291*
  VASOPRESSIN
    MESENTERY, 2118
  VILLI
    TECHNIQUES, 2124
  VITAMIN D
    DIABETES, 5294

CIRRHOSIS
  SEE LIVER CIRRHOSIS

CIRRHOSIS, BILIARY
  SEE LIVER CIRRHOSIS, OBSTRUCTIVE

CITRATES
  LIVER
    METABOLISM, 7450
    STRESS, 7450
    SURGERY, 7450
  METABOLISM
    STRESS, 7450
  STRESS
    SURGERY, 7450

LOSTRIDIUM
  DIARRHEA
    ENTERITIS, 7268
  FOOD POISONING
    BACTERIAL INFECTIONS, 3524
    DIAGNOSIS, 3524
  GANGRENE
    THERAPY, 4115
  INTESTINES
    STRANGULATION, 2987*
    THERAPY, 4115

OBALT
  DUODENUM
    KINETICS, 17*
  INTESTINE, SMALL
    PERMEABILITY, 1804
    WATER, ELECTROLYTE BALANCE, 1804
  INTESTINES
    CYTOCHROMES, 1012*
  LIVER
    CYTOCHROMES, 1012*
  SPLEEN
    CYTOCHROMES, 1012*

OENZYMES
  ABSORPTION
    REVIEW, 6987
  HEPATITIS, INFECTIOUS
    DRUG THERAPY, 664
  HEPATOCYTES, 2867*
  LIVER, 6776*
    ALCOHOL OXIDOREDUCTASES, 7405*
    CHOLESTEROL, 2953
    GLYCEROPHOSPHATES, 146
    LIPOGENESIS, 7417*
    TECHNIQUES, 1993
  LIVER INJURY, 6798
    VITAMINS, 8295*
  MALABSORPTION SYNDROMES
    REVIEW, 6987

COLECTOMY
  ABSORPTION, 2966*
  INTESTINE, SMALL
    TRANSPLANTATION, 3020
  MOTILITY, 2966*
  SERUM
    GASTRIN, 3690
  TRANSPLANTATION
    ILEUM, 2755
  VILLI, 2966*

COLITIS
  AMEBIASIS
    DIAGNOSIS, 4943
    GANGRENE, 5248
    INTESTINES, 6667
  ANTIBIOTICS, 3522*
    AGE FACTORS, 3523*
    BACTERIA, 5718*
    CHILD, 7000*
    DIAGNOSIS, 2390
    EPIDEMIOLOGY, 6329*
    GEOGRAPHICAL FACTORS, 3523*, 6329*
  BACTERIA
    DRUG EFFECTS ON, 7720
  BIOPSY
    DIAGNOSIS, 3276*

COLITIS (continued)
  COLITIS, ULCERATIVE
    DIAGNOSIS, 4958*
    PANTOTHENIC ACID, 1437
    RADIOLOGY, 4958*
  COLON
    CIRCULATION, 1412
    COLLAGEN, 2409
    ISCHEMIA, 498
    URTICARIA PIGMENTOSA, 8242
  CONTRACEPTIVES, ORAL, 4945, 5757*
  CROHN'S DISEASE
    BIOPSY, 5254*
    PROGNOSIS, 5254*
    REVIEW, 1739
  DIAGNOSIS
    ALLERGENS, 8261
    BIOPSY, 4009
    ENDOSCOPY, 3320*, 4009
  DISEASES ASSOCIATED WITH, 4009
    ANEMIA, HEMOLYTIC, 4154*
    NEOPLASMS, MALIGNANT, 3295
    UREMIA, 4154*
  DRUG-INDUCED
    ANTIBIOTICS, 482, 485, 2390, 4179, 4180, 4730, 4931*, 4932*, 5718*, 6329*, 7000*
    DIAGNOSIS, 8261
    DRUG THERAPY, 4730
    EPIDEMIOLOGY, 6329*
    ETIOLOGY, 4180, 4931*
    GEOGRAPHICAL FACTORS, 6329*
    PATHOLOGY, 4179
    REVIEW, 4179
    THERAPY, 4179
  DRUG THERAPY, 3322
    ANTIBACTERIALS, 2369*
  ENDOSCOPY, 3296
  ETIOLOGY, 5757*
    AMEBIASIS, 3543, 3557*
    ANTIBIOTICS, 3296
    BILE ACIDS AND SALTS, 4180
    ISCHEMIA, 7706
    NEOPLASMS, MALIGNANT, 3543
    PERFUSION, 5476*
    TOXINS, 4931*
  GIARDIASIS
    COMPLICATIONS, 8506
  GLUCOSAMINE
    ENZYMES, 5717*
    SYNTHESIS, 5717*
  HYPERSENSITIVITY
    ANTIHYPERTENSIVE AGENTS, 2481*
  IATROGENESIS
    DRUG-INDUCED, 4182
  INTESTINE, LARGE
    CYSTS, 481
  IRRADIATION
    COLON, 486
    REVIEW, 486
  ISCHEMIA, 4944
    DIAGNOSIS, 4155*, 4943, 7706
    DISEASES ASSOCIATED WITH, 6328*
    ETIOLOGY, 5476*
    RADIOLOGY, 4155*
    REVIEW, 1413
    SIMULATION, 5475*, 5476*
  MALABSORPTION SYNDROMES
    PROTEINS, 5716*

COLITIS (continued)
  NEOPLASMS
    POLYPS, 5253*
  NEOPLASMS, MALIGNANT
    DISEASES ASSOCIATED WITH, 6328*
  PANCREATITIS
    CAROLI'S DISEASE, 4221*
  PANTOTHENIC ACID
    DEFICIENCY, 1437
  PATHOLOGY, 3296, 3543
  PERFUSION
    PRESSURE STUDY, 5476*
  PROCTITIS
    ANTIBIOTICS, 3275*
    DIAGNOSIS, 3276*
    DRUG-INDUCED, 3275*
    PROGNOSIS, 2387
  PROTEINS
    INTOLERANCE, 5716*
  RADIATION
    DIAGNOSIS, 4943
  RADIOLOGY, 3296
  RECTUM
    FISTULA, 490
  SHIGELLOSIS
    MEGACOLON, 6605
  STEROIDS
    ENEMA, 509*
  THERAPY, 3322, 7721
  TUBERCULOSIS
    DIAGNOSIS, 3277*
    RADIOLOGY, 3277*
    STRICTURE, 3277*
  UROGENITAL SYSTEM
    FISTULA, 490

COLITIS, ULCERATIVE
  ALKALINE PHOSPHATASE
    ISOENZYMES, 4209
  ANTIBIOTICS
    HEMOPHILIA, 5769
  ANTIBODIES
    FAMILIAL FACTORS, 4962*
  ANTIGENS
    EPIDEMIOLOGY, 8264*
    GENETIC FACTORS, 1744
  AUTOIMMUNE DISEASES
    IMMUNOLOGY, 1104*
  BACTERIA
    ENTERECTOMY, 4970
  BILE ACIDS AND SALTS
    METABOLISM, 4963*, 7717*
    VITAMIN B12, 4963*
  BLOOD
    CHEMOTAXIS, 4202*
  CARCINOEMBRYONIC ANTIGEN
    NEOPLASMS, MALIGNANT, 460
  CHILD
    EPIDEMIOLOGY, 844
    SURGERY, 5766, 8265
    THERAPY, 4205
  CHOLANGIOGRAPHY
    CHOLESTASIS, 5763*
  CHOLESTEROL
    METABOLISM, 7717*
  CHYMOTRYPSIN
    DIAGNOSIS, 4199*
  CIRCULATION
    IMMUNITY, 5768

COLITIS, ULCERATIVE (continued)
  CLASSIFICATION, 5757*
  CLEARANCE STUDY
    ALBUMINS, 4972
  CLOTTING
    HISTOCHEMISTRY, 513
  COLITIS
    DIAGNOSIS, 4958*
    PANTOTHENIC ACID, 1437
    RADIOLOGY, 4958*
  COLON
    ANTIBODIES, 4961*
    ANTIGENS, 1104*
    MORPHOLOGY, 2407*
    MOTILITY, 514
    NEOPLASMS, 7008
    POLYSACCHARIDES, 2407*
    RADIOLOGY, 6355
  COMPLICATIONS, 3319*, 3323, 4469*
    MEGACOLON, 4966*
    NEOPLASMS, MALIGNANT, 4974
    URINARY SYSTEM, 3578*
  CONTRACEPTIVES, ORAL, 5757*
  CROHN'S DISEASE
    CIRCULATION, 6350*
    DIAGNOSIS, 4969, 6353
    DRUG THERAPY, 6353
    ENDOSCOPY, 512
    IMMUNOGLOBULINS, 6350*
    LYMPHOCYTES, 3580*, 4468*
    PREGNANCY, 4200*
  CYTOLOGY
    EVOLUTION, 4968
  CYTOMEGALOVIRUSES, 4201*
  DIAGNOSIS, 3078
    DRUG THERAPY, 6353
    ENDOSCOPY, 3320*
    GRANULOCYTES, 7718*
    LYSOZYMES, 7718*
    RADIOLOGY, 4969
    REVIEW, 5767
  DIARRHEA, 511
  DIET
    THERAPY, 3527
  DISEASES ASSOCIATED WITH, 510*
    DIAGNOSIS, 518
    HEMORRHOIDS, 4204
  DRUG THERAPY
    ANEMIA, 5770
    ANTI-INFLAMMATORY AGENTS, 7719
    COMPLICATIONS, 5770, 6357
    DRUG METABOLISM, 856
    HYPERSENSITIVITY, 515
    IMMUNOTHERAPY, 7719
    METABOLISM, 6357
    SURGERY, 8266
  ENDOSCOPY
    BIOPSY, 7065
    CYTOLOGY, 4968
  EOSINOPHILS
    INFLAMMATION, 4208
  EPIDEMIOLOGY
    REVIEW, 5767
  ETIOLOGY, 5757*, 5984
    IMMUNOLOGY, 4718, 6349*
    PROSTAGLANDINS, 4973
  FECES
    BILE ACIDS AND SALTS, 7717*
    CHOLESTEROL, 7717*

- COLITIS, ULCERATIVE (continued)
  - FIBROSIS
    - URINARY SYSTEM, 4967*
  - GLYCOPROTEINS
    - MORPHOLOGY, 5758*
  - HEMOPHILIA
    - SURVIVAL, 5769
  - HEMORRHAGE
    - IMMUNOLOGY, 3324
    - SURVIVAL, 5769
  - HISTOCHEMISTRY, 6349*
  - HORMONES, ADRENAL CORTEX, 7066
  - HYPERSENSITIVITY
    - THERAPY, 6356
  - IMMUNITY, 4975
    - LYMPHOCYTES, 1732*, 3321*
  - IMMUNOGLOBULINS, 6351*
    - CIRCULATION, 6350*
    - SERUM, 5513*
  - IMMUNOLOGY, 1735, 5984
  - INFLAMMATION
    - CELLS, 4960*
    - HISTOCHEMISTRY, 7067
    - ULTRASTRUCTURE, 7067
  - INTEGUMENTARY SYSTEM
    - AMEBIASIS, 1714
  - INTESTINE, LARGE
    - CIRCULATION, 3318*
    - MICROCIRCULATION, 3318*
  - INTESTINES
    - IMMUNOGLOBULINS, 852
  - LIVER
    - HISTOCHEMISTRY, 5075*
  - LYMPHOCYTES, 5984
    - ANTIBODIES, 4210
    - INFLAMMATION, 4468*
  - LYSOZYMES, 7062*
    - DIAGNOSIS, 4203*
  - MEGACOLON
    - INFANT, 517
    - SURGERY, 4959*
  - MICROORGANISMS
    - PATHOLOGY, 1436
    - PREVENTION, 1436
  - NEOPLASMS
    - DIAGNOSIS, 5761*
    - FAMILIAL FACTORS, 516
    - REVIEW, 1739
  - PARENTERAL ALIMENTATION
    - THERAPY, 3527
  - PATHOLOGY, 3323, 4718
  - PLASMA
    - ZINC, 3317*
  - POLYPS
    - DIAGNOSIS, 518
    - INTESTINAL OBSTRUCTION, 3282*
  - PROSTAGLANDINS
    - SYNTHESIS, 6354
  - PSEUDOTUMORS
    - COLON, 5762*
  - RADIOLOGY, 7065
    - CLASSIFICATION, 3078
    - ENDOSCOPY, 6355
    - REVIEW, 6355
  - RECTUM
    - AMINES, 5759*
    - BIOPSY, 5759*
    - DRUG EFFECTS ON, 7064*

- COLITIS, ULCERATIVE (continued)
  - RECTUM (continued)
    - GLYCOPROTEINS, 4971
    - MORPHOLOGY, 7031
    - NEOPLASMS, 7008
    - NERVOUS CONTROL, 5759*
  - REMISSION
    - DRUG EFFECTS ON, 7064*
  - REVIEW
    - INFLAMMATORY BOWEL DISEASES, 2408
  - SERUM
    - LYSOZYMES, 1745, 3076, 3077
  - SIMULATION
    - IMMUNOLOGY, 2102
    - TECHNIQUES, 3021
  - STENOSIS
    - URINARY SYSTEM, 4967*
  - SURGERY, 7063*
    - PRECANCEROUS CONDITIONS, 6352*
    - REVIEW, 6352*
    - SEQUELAE, 6352*
    - TECHNIQUES, 4959*
  - THERAPY, 4207, 7063*
    - REVIEW, 5767
    - ZINC, 3317*
  - TRANSMISSION, 4477*
  - ULTRASTRUCTURE, 5483, 6349*
  - UREMIA
    - CHILD, 519
  - VIRUS DISEASES, 7279
  - VIRUSES
    - BIOCHEMISTRY, 2406*
  - VITAMIN B12
    - ABSORPTION, 4963*

- COLLAGEN
  - CELIAC DISEASE
    - CHILD, 6994
  - COLON
    - COLITIS, 2409
    - ENZYMES, 461
    - SURGERY, 461
  - DISEASE
    - ANEMIA, PERNICIOUS, 8480
  - DRUG EFFECTS ON
    - ALCOHOLS, 2871*, 2872*
  - FATTY LIVER
    - ENZYMES, 8296*
  - GASTROENTERITIS
    - METABOLISM, 7870
  - HEPATITIS, CHRONIC
    - ENZYMES, 8296*
    - SYNTHESIS, 7742*
  - HEPATITIS, INFECTIOUS
    - ENZYMES, 8296*
  - HEPATITIS, TOXIC
    - SYNTHESIS, 7742*
  - INTESTINE, SMALL
    - HYPERTROPHY, 7488*
    - MUSCLES, 7488*
    - SYNTHESIS, 7488*
  - LIVER
    - BLEEDING, 7109*
    - FIBROSIS, 1013*
    - METABOLISM, 2872*
    - SCHISTOSOMIASIS, 3823
  - LIVER CIRRHOSIS, 704
    - ENZYMES, 8296*
    - SYNTHESIS, 2871*

COLLAGEN (continued)
- LIVER DISEASES
  - ANALYSIS, 2468
  - ENZYMES, 8296*
- LIVER DISEASES, ALCOHOLIC
  - SYNTHESIS, 7742*
- LIVER INJURY
  - CARBON TETRACHLORIDE, 8023*
  - DRUG-INDUCED, 8023*
  - ENZYMES, 8296*
  - METABOLISM, 8023*
- METABOLISM
  - AMINO ACIDS, 8023*

COLON
- SEE ALSO CECUM, INTESTINE, LARGE
- ABSORPTION
  - ALBUMINS, 2707*
  - ANTIGENS, 2707*
  - CATHARTICS, 3825*
  - DIARRHEA, 5302
  - DRUG EFFECTS ON, 3825*
  - ELECTROLYTES, 4506*
  - KIDNEYS, 1790
  - OXALATES, 6019, 6020
  - SODIUM, 4506*, 6816*
  - VITAMIN K, 7314
  - WATER, 4506*
- ACIDS
  - MARKER STUDY, 1750*
  - NUCLEIC ACIDS, 7483*
  - PERMEABILITY, 7483*
  - SECRETION, 7483*
  - ULTRASTRUCTURE, 1750*
- ADENOSINE TRIPHOSPHATASE
  - BILE ACIDS AND SALTS, 6816*
- ADENYL CYCLASE
  - ALCOHOLS, 2074
  - BILE ACIDS AND SALTS, 2074
  - FATTY ACIDS, 2074
  - HORMONES, 178
- ADHESIONS
  - OBSTRUCTION, 4167
- ALCOHOLS, 3531
- AMEBIASIS
  - DIAGNOSIS, 7893
  - ENZYMES, 7893
  - RADIOLOGY, 6642*
- AMINO ACIDS
  - GROWTH FACTORS, 1766*
- ANISAKIASIS
  - PATHOLOGY, 1722
- ANOMALY, 7660*
  - CONSTIPATION, 2384
  - NEONATE, 466
  - NEOPLASMS, 2384
  - NERVOUS SYSTEM, 466
  - RADIOLOGY, 2384
  - RECTUM, 6322*
- ANOMALY, CONGENITAL
  - DIAGNOSIS, 7690, 7691
  - MALROTATION, 7690
  - RADIOLOGY, 7690, 7691
- ANORECTUM
  - ANOMALY, 7057
- ANTIGENS
  - BLOOD GROUPS, 4715*
  - SECRETION, 2063

COLON (continued)
- ANUS
  - NEOPLASMS, 7019
- APPENDICITIS
  - PNEUMATOSIS, 4168
- ATRESIA, 7037
- BACTERIA, 455
  - ANTIGENS, 1644*, 4715*
  - GENETIC FACTORS, 1644*
- BACTERIAL INFECTIONS
  - SURGERY, 5710*
- BARIUM
  - COMPLICATIONS, 2190
  - ENEMA, 2190, 2396
- BILE ACIDS AND SALTS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2060*
  - DIARRHEA, 5302
- BIOPSY
  - INFLAMMATORY BOWEL DISEASES, 7551
  - PROCTITIS, 5723*
- BLOOD GROUPS
  - ANTIGENS, 1644*
- CALCIUM
  - DIETARY FACTORS, 1770*
  - HOMEOSTASIS, 1770*
  - TRANSPORT, 220
- CARCINOEMBRYONIC ANTIGEN
  - TECHNIQUES, 5715*
- CARCINOGENS
  - DIETARY FACTORS, 2379
  - LIPIDS, 2379
  - SIMULATION, 2379
- CELLS
  - KINETICS, 2099*
  - MORPHOLOGY, 7693
  - SECRETION, 3591
  - ULTRASTRUCTURE, 3591, 7693
- CHOLESTEROL
  - METABOLISM, 3221*
- CIRCULATION
  - ANGIOGRAPHY, 6681*
  - COLITIS, 1412
  - INFLAMMATION, 8262
  - MORPHOLOGY, 498, 6681*
  - PRESSURE STUDY, 5490
  - SURGERY, 5756
  - ULTRASONOGRAPHY, 5756
- COLITIS
  - COLLAGEN, 2409
  - IRRADIATION, 486
  - ISCHEMIA, 498
  - URTICARIA PIGMENTOSA, 8242
- COLITIS, ULCERATIVE
  - ANTIBODIES, 4961*
  - ANTIGENS, 1104*
  - MORPHOLOGY, 2407*
  - MOTILITY, 514
  - POLYSACCHARIDES, 2407*
  - PSEUDOTUMORS, 5762*
  - RADIOLOGY, 6355
- COLLAGEN
  - ENZYMES, 461
  - SURGERY, 461
- COLOSTOMY
  - WOUNDS AND INJURIES, 2404
- CONSTIPATION
  - DIAGNOSIS, 4957

COLON (continued)
- CONTRACEPTIVES, ORAL
  - ISCHEMIA, 5755
- CROHN'S DISEASE
  - ANASTOMOSIS, 5257*
  - BIOPSY, 5254*
  - COMPLICATIONS, 2672*
  - CONTRACEPTIVES, ORAL, 5757*
  - DIAGNOSIS, 5260, 8513
  - DIVERTICULUM, 3579*
  - DRUG THERAPY, 8517
  - ENDOSCOPY, 512, 848
  - ENTERECTOMY, 5257*
  - ESOPHAGUS, 5985
  - ETIOLOGY, 5255*, 5757*
  - HORMONES, ADRENAL CORTEX, 8517
  - IMMUNOTHERAPY, 8516
  - PATHOLOGY, 846, 1743
  - PERFORATION, 2672*
  - PROGNOSIS, 1742, 5254*
  - PSEUDOTUMORS, 5762*
  - RADIOLOGY, 5260
  - REVIEW, 845
  - STEROIDS, 8517
  - SURGERY, 5257*
  - THERAPY, 8516
  - VIRUSES, 5255*
- CYSTS, 7014
- DIAGNOSIS
  - COMPLICATIONS, 5550
- DILATATION, 4965
- DISTENTION
  - DRUG EFFECTS ON, 2742*
  - NERVOUS CONTROL, 2742*
  - PHYSICAL FACTORS, 54
- DIVERTICULITIS
  - DIET, 4404
  - FIBERS, 4404
  - FISTULA, 7059
  - SURGERY, 4946
- DIVERTICULUM
  - AGE FACTORS, 4947
  - BLEEDING, 1391*, 4934*
  - COLECTOMY, 5737
  - COMPLICATIONS, 3299, 3301, 3303
  - DIAGNOSIS, 3301, 4933*
  - DIETARY FACTORS, 3299
  - DISEASES ASSOCIATED WITH, 3301
  - EPIDEMIOLOGY, 7060
  - ETIOLOGY, 1391*, 3298
  - FECALITH, 2386
  - GEOGRAPHICAL FACTORS, 3301
  - HEREDITARY FACTORS, 3301
  - MOTILITY, 5720*
  - MUSCLES, 3298
  - NEOPLASMS, MALIGNANT, 2386, 3301
  - PATHOLOGY, 1391*, 3303
  - PERFORATION, 5754
  - POLYPS, 3301
  - PRESSURE STUDY, 5720*
  - PROGNOSIS, 4947
  - RADIOLOGY, 3301, 7692
  - REVIEW, 3299, 3301, 7674
  - SURGERY, 4947
  - THERAPY, 3299
- DRUG EFFECTS ON
  - CATHARTICS, 4160

COLON (continued)
- DUODENUM
  - FISTULA, 5668
  - NEOPLASMS, MALIGNANT, 5668
- DYSPLASIA
  - DIAGNOSIS, 2370*
  - ENDOSCOPY, 2370*
  - SURGERY, 2370*
- ELECTROLYTES
  - ACIDOSIS, 4501*
  - ALKALOSIS, 4501*
- ELECTROPHYSIOLOGY, 1856, 1857, 4505*
  - AMINO ACIDS, 1766*
  - GROWTH FACTORS, 1766*
  - INFANT, 1766*
  - NEONATE, 1766*
  - SURGERY, 5190
- ENDOSCOPY, 6166, 7675
  - COMPLICATIONS, 2196, 3285, 5708*
  - ELECTROCARDIOGRAPHY, 1400
  - PERFORATION, 1199, 3285, 5708*
  - POLYPS, 1254, 3069
  - REVIEW, 7677
  - SURGERY, 459
  - TECHNIQUES, 2181, 3064, 4005, 5744
  - THERAPY, 459
- ENTEROCOLITIS, NECROTIZING
  - ATRESIA, 2374
  - STENOSIS, 2374
- EPITHELIUM
  - ACIDS, 1750*
  - HISTOCHEMISTRY, 954
  - POLYSACCHARIDES, 2407*
- ESOPHAGUS, ARTIFICIAL, 8153
  - BURNS, 6209
  - MOTILITY, 4028
- FECES
  - FIBERS, 1389*
- FEEDING
  - MITOSIS, 2986*
- FETUS
  - ENZYMES, 1423
  - GLYCOPROTEINS, 3853
- FIBERS
  - MOTILITY, 1389*
  - NEOPLASMS, 4401
- FISTULA, 7584
  - IATROGENESIS, 7713
  - NEOPLASMS, MALIGNANT, 5668
  - SURGERY, 7627
  - UROGENITAL SYSTEM, 7705
- GARDNER'S SYNDROME
  - AMINES, 6999*
- GASES
  - CYSTS, 2338
  - PATHOLOGY, 2338
  - RADIOLOGY, 2338
- GLYCOGEN
  - CIRCADIAN RHYTHM, 2960*
- GLYCOPROTEINS
  - SYNTHESIS, 2061*, 3853
- HELMINTHIASIS
  - PATHOLOGY, 1722
- HEMANGIOMA
  - BLEEDING, 3073
  - ENDOSCOPY, 3073
- HEMORRHAGE, 7045
  - DIAGNOSIS, 1182*
  - RADIONUCLIDES, 1182*

COLON (continued)
- HEMORRHAGE (continued)
  - THERAPY, 6874*
- HIRSCHSPRUNG'S DISEASE
  - DYSPLASIA, 5721*
  - MORPHOLOGY, 4711*
  - SIMULATION, 4711*
  - SURGERY, 5742
- INFANT
  - PERMEABILITY, 1766*
- INFLAMMATION
  - CYTOLOGY, 8238
  - DIAGNOSIS, 8238
  - THROMBOSIS, 8262
- INFLAMMATORY BOWEL DISEASES
  - CHYMOTRYPSIN, 4199*
- INTESTINAL OBSTRUCTION
  - ADOLESCENCE, 5735
  - AGE FACTORS, 5740
  - CHILD, 5735
  - CLASSIFICATION, 6336*
  - COMPLICATIONS, 7709
  - CONSTIPATION, 5724*
  - DIAGNOSIS, 2398, 5735
  - EPIDEMIOLOGY, 2398
  - ETIOLOGY, 2397
  - MUSCLES, 3656
  - PATHOLOGY, 5740
  - RADIOLOGY, 5740
  - REVIEW, 2398
  - SIMULATION, 3656
  - SURGERY, 5724*, 6336*
  - THERAPY, 5724*
- INTESTINE, SMALL
  - EPITHELIUM, 1123
  - NUCLEIC ACIDS, 6813
  - SURGERY, 1748*
- INTUSSUSCEPTION
  - NEOPLASMS, 7035
- ION TRANSPORT, 4505*
  - ACIDOSIS, 4501*
  - ALKALOSIS, 4501*
  - BILE ACIDS AND SALTS, 4506*, 6816*
  - CALCIUM, 5441*, 5495
  - CATECHOLAMINES, 6015
  - CATHARTICS, 4506*
  - CHLORIDES, 6013
  - DRUG EFFECTS ON, 4506*, 7922
  - ELECTROPHYSIOLOGY, 2696*
  - EPINEPHRINE, 6015
  - HORMONE EFFECTS ON, 7922
  - HORMONES, ADRENAL CORTEX, 7922
  - MAGNESIUM, 5495
  - POTASSIUM, 6013, 7918*
  - SODIUM, 6013
  - STEROIDS, 7922
- ISCHEMIA
  - DISEASES ASSOCIATED WITH, 6380*
- JEJUNUM
  - ENZYMES, 5990*
  - REGENERATION, 5990*
  - VILLI, 5990*
- KINETICS
  - INTESTINE, SMALL, 2099*
  - SURGERY, 2099*
- LYMPHATIC SYSTEM
  - IMMUNOLOGY, 1122
- MALABSORPTION SYNDROMES
  - RADIOLOGY, 4001

COLON (continued)
- MALROTATION
  - DIAGNOSIS, 7690
  - RADIOLOGY, 7690
- MESENTERY
  - NEOPLASMS, 2628
- MORPHOLOGY
  - PROCTITIS, 5723*
- MOTILITY
  - ANALGESICS AND ANTIPYRETICS, 923
  - CATECHOLAMINES, 7950
  - DISTENTION, 4543
  - DRUG EFFECTS ON, 923, 1858, 2742*, 4543, 7950
  - DRUGS, 938
  - ELECTROPHYSIOLOGY, 923, 935, 5190
  - EPINEPHRINE, 7950
  - HORMONES, GASTROINTESTINAL, 938
  - HYPERACTIVITY, 4927*
  - HYPERTENSION, 7327
  - NEOPLASMS, 2385
  - NEOPLASMS, MALIGNANT, 6324*
  - NERVOUS CONTROL, 935, 2742*
  - PEPTIDES, 4534
  - PRESSURE STUDY, 4543, 4927*
- MUSCLES
  - ACETYLCHOLINE, 6026*
  - CHOLECYSTOKININ, 6026*
  - ELECTROLYTES, 1859
  - ELECTROPHYSIOLOGY, 923
  - GLUCAGON, 6026*
  - GLYCOGEN, 2960*
  - HORMONE EFFECTS ON, 6026*
  - HYPERTENSION, 7327
  - MOTILITY, 923
- MYCOSES
  - RADIOLOGY, 4393*
- NECROSIS
  - AMEBIASIS, 3557*
  - DISEASES ASSOCIATED WITH, 6380*
- NEONATE
  - OBSTRUCTION, 2168*, 2394
  - PERMEABILITY, 1766*
- NEOPLASM METASTASIS, 4171
  - ADOLESCENCE, 5734
  - BONES, 7006
  - CHOLANGIOGRAPHY, 6997*
  - DIAGNOSIS, 6997*
  - OBSTRUCTION, 2242
  - RADIONUCLIDES, 6998*, 7006
  - SCANNING, SCINTILLATION, 6998*
- NEOPLASMS, 4171
  - ADOLESCENCE, 4955, 5734
  - AMINES, 6999*
  - BACTERIA, 8234*
  - BARIUM, 8256
  - BILE ACIDS AND SALTS, 7659*
  - BIOPSY, 3293
  - CARCINOEMBRYONIC ANTIGEN, 7049, 8252
  - CELLS, 5473*
  - CHOLESTEROL, 7659*
  - COLITIS, ULCERATIVE, 7008
  - DIAGNOSIS, 3289, 3290, 4170, 4928*, 5743, 6326*
  - DIARRHEA, 7040
  - DIET, 8234*
  - DIETARY FACTORS, 2626, 5600
  - DRUG THERAPY, 1135, 8233*

- COLON (continued)
  - NEOPLASMS (continued)
    - ENDOSCOPY, 3290, 7704
    - ENZYMES, 4930*
    - EPIDEMIOLOGY, 3292, 5600, 8234*
    - ETIOLOGY, 3312, 7008, 7659*
    - FAMILIAL FACTORS, 516
    - FECES, 8234*
    - FIBERS, 8234*
    - HEMORRHAGE, 7040
    - IMMUNOLOGY, 7003, 7051
    - LIPIDS, 2626
    - MACROMOLECULES, 3273*
    - MORHOLOGY, 7052
    - NUTRITION, 5600
    - POLLUTION, 5600
    - POLYPS, 3312, 7008
    - PREVENTION, 1770*, 7008
    - PROGNOSIS, 3293, 5739, 7051
    - PROTEINS, 8243
    - RADIOLOGY, 255, 7704, 8256
    - RADIONUCLIDES, 5749
    - REVIEW, 5743
    - RISK FACTORS, 8234*
    - SCANNING, SCINTILLATION, 5749, 5752
    - SIMULATION, 1135
    - STEROIDS, 8234*
    - SURGERY, 7009
    - TECHNIQUES, 255
    - ULTRASTRUCTURE, 3293, 7032
    - URINARY SYSTEM, 4153*
  - NEOPLASMS, BENIGN
    - DIAGNOSIS, 4177
    - PATHOLOGY, 4177
    - POLYPS, 5731
    - THERAPY, 4177
  - NEOPLASMS, MALIGNANT, 475, 3891, 4172
    - AGE FACTORS, 1424, 2383
    - ANEMIA, 7665
    - AUTORADIOGRAPHY, 4929*
    - BILE ACIDS AND SALTS, 8103*
    - BREATH TEST, 6323*
    - CARCINOEMBRYONIC ANTIGEN, 5713*, 5715*
    - CARCINOGENS, 222, 5474*
    - CHOLANGIOGRAPHY, 6997*
    - CHOLECYSTECTOMY, 3765*
    - COLOSTOMY, 7523
    - COMPLICATIONS, 7705, 7709
    - CROHN'S DISEASE, 2381
    - DIAGNOSIS, 476, 1193, 2383, 3297, 4173, 4940, 5715*
    - DIETARY FACTORS, 2377, 4696
    - DISEASES ASSOCIATED WITH, 3297, 5715*, 6328*, 7667
    - DRUG-INDUCED, 3765*, 4696
    - DRUG THERAPY, 5711*
    - ENDOSCOPY, 4940, 7681
    - ENZYMES, 5713*
    - EPIDEMIOLOGY, 2400, 5711*
    - ETIOLOGY, 2378, 5711*
    - FAMILIAL FACTORS, 473
    - FECES, 6324*
    - FIBERS, 2377
    - GEOGRAPHICAL FACTORS, 1424, 6324*
    - GLYCOPROTEINS, 3852
    - GROWTH FACTORS, 7681

- COLON (continued)
  - NEOPLASMS, MALIGNANT (continued)
    - IMMUNITY, 5714*
    - IMMUNOTHERAPY, 6144*
    - MARKER STUDY, 5713*
    - MOTILITY, 2378
    - NEOPLASM METASTASIS, 6997*
    - POLYPS, 4198
    - PROGNOSIS, 2382, 4173, 4941
    - PROTEINS, 5713*
    - RADIOLOGY, 3291, 3297, 4007, 4940, 8258
    - RADIONUCLIDES, 7658*
    - RADIOTHERAPY, 5711*, 5712*
    - REVIEW, 7681
    - SCANNING, SCINTILLATION, 7658*
    - SURGERY, 4942, 5711*, 5712*
    - THERAPY, 4173
  - NERVOUS CONTROL
    - MOTILITY, 5318*
  - NEUROMUSCULAR DISEASES, 4950
  - OBSTRUCTION
    - CHILD, 508
    - COMPLICATIONS, 7709
    - DIAGNOSIS, 2394
    - ENDOSCOPY, 1421
    - THERAPY, 1421
  - OXALATES
    - ABSORPTION, 2593*
  - PANCREATITIS
    - COMPLICATIONS, 3352, 4993
    - DISEASES ASSOCIATED WITH, 7735*
    - FISTULA, 5791*
    - INFLAMMATION, 7735*
    - NECROSIS, 7735*
    - STENOSIS, 4223*
    - STRICTURE, 2431*
  - PANCREATITIS, CHRONIC
    - STENOSIS, 4223*
  - PERFORATION, 7584
    - AMEBIASIS, 4178
    - DISEASES ASSOCIATED WITH, 1419
    - ENDOMETRIOSIS, 7001*
    - FECES, 501
    - HEMODIALYSIS, 5727
    - PREGNANCY, 7001*
    - RADIOLOGY, 2396
    - SURGERY, 1419
    - SURVIVAL, 1420
    - UROGENITAL SYSTEM, 7705
  - PERFUSION
    - ACIDS, 7483*
  - PERISTALSIS, 1857
    - ANALGESICS AND ANTIPYRETICS, 923
    - CATECHOLAMINES, 7321*
    - DRUG EFFECTS ON, 923
    - EPINEPHRINE, 919
    - PROSTAGLANDINS, 5317*
    - SYMPATHOMIMETICS, 919
  - PERMEABILITY, 5275*
    - BILE ACIDS AND SALTS, 26
    - CATHARTICS, 26
  - PHYSIOLOGY
    - REVIEW, 6136
  - PIGMENTATION
    - ENDOSCOPY, 1410
  - PNEUMATOSIS, 6333*
    - NECROSIS, 492
    - SHUNT, INTESTINAL, 3219*

COLON (continued)
- POLYPS, 3315, 7668
  - ADOLESCENCE, 4955
  - BARIUM, 7002*
  - BILE ACIDS AND SALTS, 1395*
  - BLOOD, 1193
  - CHILD, 4194
  - CLASSIFICATION, 3313
  - COLONOSCOPY, 7002*
  - DIAGNOSIS, 250, 254, 7544
  - DISEASES ASSOCIATED WITH, 4197
  - ENDOSCOPY, 254, 504, 506, 3285, 7544, 7679, 7681, 7682
  - EPIDEMIOLOGY, 2400, 6334*
  - FAMILIAL FACTORS, 1395*, 3314, 4157*
  - GENETIC FACTORS, 4157*
  - INFANT, 4194, 7710
  - INTESTINAL OBSTRUCTION, 3282*
  - NEOPLASMS, 6334*
  - NEOPLASMS, MALIGNANT, 3314, 4197
  - RADIOLOGY, 4194, 7544
  - REVIEW, 7681, 7682
  - SCHISTOSOMIASIS, 3560*
  - SURGERY, 506, 507, 1395*, 2399
  - THERAPY, 254, 3313, 5726
- POTASSIUM
  - SECRETION, 3833*
  - WATER, ELECTROLYTE BALANCE, 3833*
- PRECANCEROUS CONDITIONS
  - ENDOSCOPY, 7681
  - MACROMOLECULES, 3273*
  - NEOPLASMS, 2134
  - REVIEW, 7681
- PRESSURE STUDY
  - TECHNIQUES, 1824
  - VAGOTOMY, 3628*
- PRIMATES
  - EROSIONS, 3022
- PROCTITIS
  - IMMUNOCHEMISTRY, 8237*
  - PATHOLOGY, 8237*
- PROLAPSE
  - SALMONELLOSIS, 2402
- PSEUDO-OBSTRUCTION
  - DIAGNOSIS, 6330*
  - ETIOLOGY, 8236*
  - GANGRENE, 8236*
  - PERFORATION, 8236*
  - RADIOLOGY, 6330*
- RADIATION, 3005
- RADIATION EFFECTS ON, 3005
- RADIOLOGY
  - AGE FACTORS, 4158
  - CATHARTICS, 6165
  - COMPLICATIONS, 2396, 4158
  - ENEMA, 6165
  - GLUCAGON, 3063
  - NEONATE, 2168*
  - POLYPS, 5538
  - SEX FACTORS, 4158
  - TECHNIQUES, 4007, 4159, 4766, 4767, 4768, 7864
- RECTUM
  - DISEASE, 5732
  - GARDNER'S SYNDROME, 6999*
  - NEOPLASMS, 6326*, 6999*, 7008, 7009, 7040, 7051, 8233*, 8252
  - SEX FACTORS, 5732

COLON (continued)
- SCANNING, SCINTILLATION
  - CATHARTICS, 7687
  - TECHNIQUES, 7687
- SECRETION
  - CATHARTICS, 3825*
  - CELLS, 7693
  - CHLORIDES, 5441*
  - DRUG EFFECTS ON, 3825*
  - ELECTROLYTES, 4506*
  - GLUCOSE, 6132
- SEPSIS
  - ANTIBIOTICS, 5719*, 7017
- SIGMOID
  - ANOMALY, 8260
  - DUPLICATION, 8260
- SPASM
  - DRUG THERAPY, 4721
- SPHINCTER, 2746
- STARVATION
  - MITOSIS, 2986*
- STENOSIS, 3352
  - COMPLICATIONS, 7709
  - DISEASES ASSOCIATED WITH, 4993
  - PANCREATITIS, 4993
- STRICTURE
  - AMEBIASIS, 823
- SURGERY, 7716
  - ABSORPTION, 2966*
  - AGE FACTORS, 1742
  - ANTIBIOTICS, 5719*, 7662*
  - CHOLESTEROL, 3221*
  - COMPLICATIONS, 4942, 7231
  - DIET, 3284
  - INFECTION, 7046
  - MITOSIS, 1748*
  - MOTILITY, 2966*
  - NUCLEIC ACIDS, 1748*
  - SEPSIS, 5719*, 7017
  - TECHNIQUES, 464, 4163, 7016, 7663, 7664*, 7688, 8122, 8255
  - VILLI, 2966*
- TRANSPORT
  - CALCIUM, 1788, 6016
  - ELECTROLYTES, 4506*
  - HORMONES, 178
  - OXALATES, 6020
  - POTASSIUM, 7918*
  - PRESSURE STUDY, 3608*
  - SODIUM, 3608*, 4505*, 4506*
  - STARVATION, 1788
  - VITAMIN K, 7314
  - WATER, 3608*, 4506*
- VAGOTOMY, 3628*
- VILLI
  - NEOPLASMS, 7676
- WOUNDS AND INJURIES
  - AMINO ACIDS, 1398
  - COMPLICATIONS, 7005
  - HEALING, 1398, 8122
  - IATROGENESIS, 7713
  - REVIEW, 7029
  - SURGERY, 7027
  - SURVIVAL, 7005
  - THERAPY, 7028

COLONIC DISEASES
- AGE FACTORS, 4935

COLONIC DISEASES (continued)
- BACTERIA
  - COLONOSCOPY, 4147*
  - INTESTINE, LARGE, 4147*
- BLEEDING
  - RADIOLOGY, 1201
  - TECHNIQUES, 1201
- CIRCULATION
  - DIET, 456
- COLONOSCOPY
  - DIAGNOSIS, 3071, 3072
  - REVIEW, 3070
- COMPLICATIONS, 7697
- DIAGNOSIS
  - ENDOSCOPY, 7694
  - RADIOLOGY, 4158, 7695
- DIET
  - FIBERS, 1415
- DIVERTICULUM
  - FIBERS, 1415
- ENDOSCOPY
  - DIAGNOSIS, 458
  - REVIEW, 3067
- ETIOLOGY, 7696
- FECES
  - BACTERIA, 455
- FIBERS
  - DIET, 456
- INFANT
  - DIAGNOSIS, 4008
  - RADIOGRAPHY, 4008
- INTESTINAL OBSTRUCTION, 5676
- INTESTINE, LARGE
  - DIAGNOSIS, 4004
- MEGACOLON, 3274*
- POLYPS, 3243
- RADIOGRAPHY
  - CONTRAST MEDIA, 4008
- THERAPY
  - DIET, 3283
- UROGENITAL SYSTEM
  - SURGERY, 1417

COLONOSCOPY
- BACTERIAL INFECTIONS, 7553
- CECUM
  - DYSPLASIA, 2371*
  - TECHNIQUES, 5527
- CHILD
  - COMPLICATIONS, 3068
  - PROGNOSIS, 3068
- COLON
  - POLYPS, 7002*
- COLONIC DISEASES
  - BACTERIA, 4147*
  - DIAGNOSIS, 3071, 3072
  - REVIEW, 3070
- COMPLICATIONS
  - RISK FACTORS, 7010
  - HEMORRHAGE, 7010
  - OBSTRUCTION, 7010
  - PERFORATION, 7010
- DIAGNOSIS
  - ANALYSIS, 5526
  - POLYPS, 5538
  - TECHNIQUES, 3072
- DYSPLASIA
  - HEMORRHAGE, 2371*

COLONOSCOPY (continued)
- ILEUM
  - CECUM, 5527
- INFLAMMATORY BOWEL DISEASES, 7527*
- REVIEW, 6197

COLOSTOMY
- BLEEDING
  - LIVER CIRRHOSIS, 1565
  - VARICES, 1565
- COLON
  - NEOPLASMS, MALIGNANT, 7523
  - WOUNDS AND INJURIES, 2404
- COMPLICATIONS, 2322, 7689
  - NEOPLASMS, MALIGNANT, 3891
  - SURVIVAL, 2404
- INTESTINAL OBSTRUCTION
  - COMPLICATIONS, 2397
- MALABSORPTION SYNDROMES
  - PATHOLOGY, 3262
  - THERAPY, 3262
- PROGNOSIS, 7689
- RECTUM
  - NEOPLASMS, MALIGNANT, 7523
- SURVIVAL, 7689
- TECHNIQUES, 463
  - COMPLICATIONS, 7023

COLOSTRUM
- VIRUSES
  - IMMUNOGLOBULINS, 1111

COMA
- HEPATITIS, INFECTIOUS
  - DRUG THERAPY, 670
- LIVER
  - CIRCULATION, 573, 3792
  - HEPATECTOMY, 3792
  - PATHOLOGY, 573
  - TRANSPLANTATION, 1482
  - ULTRASTRUCTURE, 3792
- NERVOUS SYSTEM
  - CIRCULATION, 573, 3792

COMMON BILE DUCT
- ANOMALY, 5165
- BILE
  - ACIDITY, 3493*
- CHOLANGIOGRAPHY, 5163, 7832
  - ANOMALY, 3589*
  - PSEUDO-OBSTRUCTION, 7234
- CYSTS
  - CHILD, 5146*
  - DIAGNOSIS, 5146*
  - DILATATION, 5165
  - INFANT, 5146*
  - RADIOLOGY, 5146*
  - SCANNING, SCINTILLATION, 5146*
  - ULTRASONOGRAPHY, 5146*
- DILATATION
  - CALCULI, 7225
  - ULTRASONOGRAPHY, 7222
- DRUG EFFECTS ON
  - ADRENERGIC RECEPTOR AGONISTS, 3791
  - ADRENERGIC RECEPTOR BLOCKADERS, 3791
- ECHINOCOCCOSIS
  - CYSTS, 5956*

COMMON BILE DUCT (continued)

- ENDOSCOPY
  - SURGERY, 2205
  - TECHNIQUES, 280, 8424*
- LIVER
  - OBSTRUCTION, 2899
  - PATHOLOGY, 2899
- MORPHOLOGY
  - DISEASES ASSOCIATED WITH, 3508
- MOTILITY
  - CHOLECYSTOGRAPHY, 70
- NEOPLASMS
  - REVIEW, 4360*
- NERVOUS CONTROL, 3791
- OBSTRUCTION
  - BIOCHEMISTRY, 2884*
  - PATHOLOGY, 2884*
  - SURGERY, 734
- PANCREATIC DUCT
  - SURGERY, 1614
- PERFORATION
  - CYSTS, 5956*
- SPHINCTER
  - CONTRACTION, 7234
  - PSEUDO-OBSTRUCTION, 7234
- STENOSIS
  - BILIARY TRACT, 5153*
  - COMPLICATIONS, 4017
  - IATROGENESIS, 8434*
  - THERAPY, 8434*
- SURGERY, 4387
  - CHOLANGIOGRAPHY, 2177*
  - ENDOSCOPY, 2177*
  - PANCREATOGRAPHY, 2177*
- ULTRASONOGRAPHY
  - MORPHOMETRY, 1574*
- WOUNDS AND INJURIES
  - IATROGENESIS, 7589

COMMON BILE DUCT CALCULI

- SEE ALSO CALCULI
- BILE DUCTS
  - REVIEW, 4374
- BILIARY TRACT
  - BACTERIAL INFECTIONS, 3503*
- CHOLANGIOGRAPHY, 5163
- CHOLECYSTECTOMY
  - BILE, 2571*
  - ETIOLOGY, 2571*
  - RECURRENCE, 7210*
  - SEQUELAE, 2571*
- CHOLELITHIASIS
  - ADOLESCENCE, 2574*
  - CHILD, 2574*
  - CHOLANGIOGRAPHY, 743
- CHOLESTEROL
  - SOLUBILITY, 6568*
- COMPLICATIONS, 3503*
  - PERFORATION, 7220*
- DIAGNOSIS, 7209*
  - CHOLANGIOGRAPHY, 3502*
  - ENDOSCOPY, 8424*
- DISEASES ASSOCIATED WITH
  - NEOPLASMS, MALIGNANT, 3513
- DRUG THERAPY, 1630
  - BILE ACIDS AND SALTS, 8425*
  - CHOLIC ACID, 5145*
  - HEPARIN, 8425*
  - SOLVENTS, 5144*, 5145*

COMMON BILE DUCT CALCULI (continued)

- DUODENUM
  - DIVERTICULUM, 4883
- ENDOSCOPY
  - COMPLICATIONS, 4883
  - TECHNIQUES, 7201*
  - THERAPY, 7201*
- JAUNDICE, OBSTRUCTIVE
  - SURGERY, 4381
  - ULTRASONOGRAPHY, 7229
- LIVER
  - INFLAMMATION, 3503*
  - PATHOLOGY, 3503*
- MANOMETRY
  - SURGERY, 7198*
- SOLUBILITY
  - REVIEW, 6568*
  - TECHNIQUES, 6568*
- SURGERY, 7466
  - COMPLICATIONS, 4883, 7840
  - PROGNOSIS, 7209*
  - TECHNIQUES, 7840
- THERAPY, 741
  - BILE ACIDS AND SALTS, 8425*
  - ENDOSCOPY, 6551*
  - HEPARIN, 8425*
  - REVIEW, 6568*, 6569*
  - SURGERY, 3502*
  - TECHNIQUES, 1592, 6569*
- ULTRASOUND, 7224

COMPLEMENT

- GASTROINTESTINAL SYSTEM
  - NEOPLASMS, MALIGNANT, 8462
- HEPATITIS
  - IMMUNOLOGY, 5867*
- HEPATITIS, CHRONIC
  - BLOOD, 8332*
- HEPATITIS, INFECTIOUS
  - PROGNOSIS, 2517
- IMMUNOGLOBULINS
  - ANTIBODIES, 215
- LIVER CIRRHOSIS
  - IMMUNOLOGY, 3484
- LIVER DISEASES
  - SERUM, 1207
- LIVER DISEASES, ALCOHOLIC
  - LIVER CIRRHOSIS, 5867*
- LIVER INJURY
  - SERUM, 1207
- PANCREATITIS
  - ETIOLOGY, 530
  - IMMUNOLOGY, 530

COMPUTERS

- DYSPEPSIA
  - DIAGNOSIS, 1188, 2998
  - EPIDEMIOLOGY, 2998
- ESOPHAGEAL REFLUX
  - ANALYSIS, 6210
- INTESTINE, SMALL
  - CHILD, 3062
  - MOTILITY, 55, 932
- LIVER
  - TOMOGRAPHY, 6192, 8124*
- LIVER DISEASES
  - DIAGNOSIS, 596, 6192
  - LIVER FUNCTION TESTS, 4245*

COMPUTERS (continued)
    LIVER FUNCTION TESTS
        SCANNING, SCINTILLATION, 3964
    PANCREAS
        TOMOGRAPHY, 3119, 6192
    PANCREATIC DISEASES
        DIAGNOSIS, 4985
        TOMOGRAPHY, 4985
    PANCREATITIS
        DIAGNOSIS, 4985
        TOMOGRAPHY, 4985, 6382
    PANCREATOGRAPHY
        ENDOSCOPY, 3979
    STOMACH
        MORPHOLOGY, 242
    TOMOGRAPHY
        LIVER DISEASES, 5515*
        NEOPLASMS, 6363*
        PANCREATIC DISEASES, 6363*

CONNECTIVE TISSUE
    CROHN'S DISEASE
        REVIEW, 4476*
    DISEASE, 5214
    ESOPHAGUS
        DISEASE, 2230
    GALLBLADDER
        NERVOUS CONTROL, 5991*
    LIVER CIRRHOSIS
        MORPHOLOGY, 2538*
    LIVER INJURY
        CARBON TETRACHLORIDE, 5402*
    ULCER
        DRUG EFFECTS ON, 2814

CONSTIPATION
    CALCIUM
        REVIEW, 5193
    CATHARTICS
        REVIEW, 2634
    CHILD, 7698
        ETIOLOGY, 3536
        HIRSCHSPRUNG'S DISEASE, 3536
        INTESTINAL OBSTRUCTION, 3536
        MEGACOLON, 3536
        THERAPY, 3536
    COLON
        ANOMALY, 2384
        DIAGNOSIS, 4957
        INTESTINAL OBSTRUCTION, 5724*
    DIAGNOSIS
        REVIEW, 6603, 8471
    DISEASES ASSOCIATED WITH
        CARDIOVASCULAR SYSTEM, 4452
    DRUG THERAPY
        REVIEW, 2634
    ETIOLOGY
        REVIEW, 1687, 8471
    HEMORRHOIDS
        ETIOLOGY, 4188
    MOTILITY
        PRESSURE STUDY, 5720*
    PREGNANCY
        CATHARTICS, 5195
        DRUG THERAPY, 5195
    RECTUM
        SIGMOID, 4927*
    REVIEW, 2634

CONSTIPATION (continued)
    SIGMOID
        INTESTINAL OBSTRUCTION, 5724*
    THERAPY
        CATHARTICS, 5194
        REVIEW, 6603, 8471

CONTRACEPTIVES
    LIVER FUNCTION TESTS
        SULFOBROMOPHTHALEIN, 597

CONTRACEPTIVES, ORAL
    ANUS
        DISEASE, 4165
    BUDD-CHIARI SYNDROME, 5807*
        CALCIFICATION, 5039*
    CHOLELITHIASIS
        CHOLESTEROL, 1634
    COLITIS, 4945, 5757*
    COLITIS, ULCERATIVE, 5757*
    COLON
        CROHN'S DISEASE, 5757*
        ISCHEMIA, 5755
    ESOPHAGUS
        SPHINCTER, 1840
    HEPATIC VEIN THROMBOSIS, 5807*
        CALCIFICATION, 5039*
    INFLAMMATORY BOWEL DISEASES, 5757*
    INTESTINE, SMALL
        INFARCTION, 5656*
        ISCHEMIA, 5656*
    INTESTINES
        INFARCTION, 3217*
        ISCHEMIA, 3217*
    JAUNDICE
        HYPERSENSITIVITY, 1496
        PREGNANCY, 1496
    LIVER
        HEME, 1071
        HYPERPLASIA, 8297*
        NEOPLASMS, 7745*, 8293*
        NEOPLASMS, BENIGN, 6409*, 7767
        NEOPLASMS, MALIGNANT, 7126
        PORPHYRINS, 1071
    LIVER FUNCTION TESTS, 7426*
        SULFOBROMOPHTHALEIN, 597

CONTRAST MEDIA
    ALBUMINS
        BINDING, 3819
    BILE, 5432*
        CHOLESTEROL, 8069
    BILIARY TRACT
        AMINO ACIDS, 5525
        CHEMICAL COMPOSITION, 5525
        SECRETION, 4644
    CHEMICAL COMPOSITION
        KINETICS, 5525
    CHOLANGIOGRAPHY, 3915, 3952, 4014,
      4015, 6188
        ABSORPTION, 4612*
        CHOLAGOGUES AND CHOLERETICS, 2024
        CHOLECYSTOGRAPHY, 3490*
        COMPLICATIONS, 2203
        EXCRETION, 2023, 4612*
        PANCREAS, 3118
        REVIEW, 1248
        TECHNIQUES, 5542
        TRANSPORT, 4612*

CONTRAST MEDIA (continued)
- CHOLECYSTITIS
  - GALLBLADDER, 269
- CHOLECYSTOGRAPHY, 3915, 3952, 3953, 3954, 6189, 8130, 8140
  - TECHNIQUES, 7197*
  - TOLERANCE, 3953, 3962, 3963
- CHOLERESIS
  - SIMULATION, 2204
- COLONIC DISEASES
  - RADIOGRAPHY, 4008
- DIAGNOSIS
  - TECHNIQUES, 2394
- DUODENOSCOPY
  - CHOLANGIOGRAPHY, 3118
- DUODENUM
  - DYSPEPSIA, 6260
- ENDOSCOPY
  - DUODENUM, 6859
  - STOMACH, 6859
- ESOPHAGUS
  - DYSPEPSIA, 6260
- EXCRETION
  - KINETICS, 2024
- GALLBLADDER
  - BILE DUCTS, 748
  - BIOCHEMISTRY, 5522
  - TECHNIQUES, 3092
- GALLBLADDER DISEASES
  - DIAGNOSIS, 1585
  - TECHNIQUES, 1585
- GASTROENTEROGRAPHY, 2997
- GASTROINTESTINAL SYSTEM
  - SECRETION, 1101
- ILEUM
  - TECHNIQUES, 6851*
- INTESTINES
  - GALLBLADDER DISEASES, 5913*
- LIVER, 8070
  - CHROMATOGRAPHY, 7386*
  - CLEARANCE STUDY, 7386*
  - LYMPHOGRAPHY, 5516*
  - RADIOLOGY, 2201
  - TOLERANCE, 7386*
  - TOMOGRAPHY, 7741*
  - TRANSPORT, 7386*
- LIVER DISEASES
  - DIAGNOSIS, 7741*
  - LYMPHOGRAPHY, 5516*
- LIVER INJURY, 3090, 5071*
- OBSTRUCTION
  - DIAGNOSIS, 2394
- PANCREAS
  - ANGIOGRAPHY, 286
  - ENDOSCOPY, 281, 282, 1439*, 2218, 3113
  - MORPHOLOGY, 2159
  - PANCREATITIS, 2159, 2218
  - TECHNIQUES, 3113
  - ULTRASONOGRAPHY, 286
- PANCREATITIS
  - ENDOSCOPY, 1225
- PANCREATITIS, CHRONIC
  - ENDOSCOPY, 2221
- PANCREATOGRAPHY, 3980
- STOMACH
  - DYSPEPSIA, 6260
  - HEMORRHAGE, 1295
  - TECHNIQUES, 5552

CONTRAST MEDIA (continued)
- STOMACH DISEASES
  - RADIOLOGY, 316
- TOXICITY, 3090

COPPER
- BILE
  - BINDING, 6072*
  - TECHNIQUES, 4621*
  - WILSON'S DISEASE, 6072*
- CHOLESTASIS
  - METABOLISM, 224
  - SIMULATION, 224
  - SULFHYDRYL COMPOUNDS, 2540*
- HEPATITIS, CHRONIC
  - HEPATOCYTES, 2539*
  - MORPHOLOGY, 1488
- INTESTINE, LARGE
  - NEOPLASMS, 5613
- LIPODYSTROPHY, INTESTINAL
  - EXCRETION, 2466*
  - LIVER CIRRHOSIS, 2466*
  - LIVER DISEASES, 2466*
- LIVER
  - BINDING, 7434*
  - FETUS, 6805
  - ULTRASTRUCTURE, 595
  - WILSON'S DISEASE, 595
  - WOUNDS AND INJURIES, 2480*
- LIVER CIRRHOSIS
  - HEPATOCYTES, 2539*
  - RADIOLOGY, 2540*
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - DRUG EFFECTS ON, 6536*
  - HEPATITIS, CHRONIC, 1489
  - METABOLISM, 3469*
  - MORPHOLOGY, 1488
- LIVER DISEASES
  - OCCUPATIONAL FACTORS, 2480*
- LIVER DISEASES, ALCOHOLIC
  - HEPATOCYTES, 2539*
- NEOPLASMS
  - SERUM, 5613
- RESPIRATORY SYSTEM
  - NEOPLASMS, 5613
- SECRETION
  - BILE, 4621*
- STOMACH
  - NEOPLASMS, 5613
- WILSON'S DISEASE
  - DRUG EFFECTS ON, 4262*
  - EXCRETION, 6072*
  - INTESTINE, SMALL, 3404
  - METABOLISM, 6072*

CORTICOSTEROIDS
- SEE HORMONES, ADRENAL CORTEX

CRIGLER-NAJJAR SYNDROME
- SEE ALSO HYPERBILIRUBINEMIA, HEREDITARY
- BILIRUBIN
  - METABOLISM, 7135
- GENETICS
  - REVIEW, 543*

CROHN'S DISEASE
- SEE ALSO ENTERITIS, ENTERITIS, REGIONAL

CROHN'S DISEASE (continued)
- ADOLESCENCE
  - DRUG THERAPY, 5256*
  - GROWTH FACTORS, 4466*
  - PROGNOSIS, 4466*
  - SURGERY, 4466*
- AMYLOIDOSIS, 3583
- ANERGY
  - FAMILIAL FACTORS, 1438
- ANORECTUM
  - ELECTROPHYSIOLOGY, 8508*
- ANTIBIOTICS, 5977*
- ANTIBODIES
  - FAMILIAL FACTORS, 4962*
- ANTIGENS
  - ARTHRITIS, 7896*
  - GENETIC FACTORS, 1744
  - GENETICS, 8263*
- ANUS
  - COMPLICATIONS, 4474*
  - ELECTROPHYSIOLOGY, 8508*
  - EROSIONS, 1733*
  - FISTULA, 4474*, 5981*, 8514
  - NEOPLASMS, 5981*
  - PROCTITIS, 4474*
- BACTERIA
  - ENTERECTOMY, 4970
  - THERAPY, 6356
- BACTERIAL INFECTIONS
  - HYPERSENSITIVITY, 4481
- BILE
  - BILE ACIDS AND SALTS, 7280
- BILE ACIDS AND SALTS
  - METABOLISM, 4467*
- BONES
  - GRANULOMA, 1741
- CALCULI
  - URINARY SYSTEM, 4475*
- CHILD, 4478
  - EPIDEMIOLOGY, 844
  - GROWTH FACTORS, 4466*
  - PROGNOSIS, 4466*, 7275*
  - RECURRENCE, 7275*
  - SURGERY, 4466*, 7275*
- CHOLELITHIASIS
  - DISEASES ASSOCIATED WITH, 2325
  - EPIDEMIOLOGY, 2325
  - MECKEL'S DIVERTICULUM, 2325
  - OXALATES, 4475*
- CHYMOTRYPSIN
  - DIAGNOSIS, 4199*
- CLEARANCE STUDY
  - ALBUMINS, 4972
- COLITIS
  - BIOPSY, 5254*
  - PROGNOSIS, 5254*
  - REVIEW, 1739
- COLITIS, ULCERATIVE
  - CIRCULATION, 6350*
  - DIAGNOSIS, 4969, 6353
  - DRUG THERAPY, 6353
  - ENDOSCOPY, 512
  - IMMUNOGLOBULINS, 6350*
  - LYMPHOCYTES, 3580*
  - PREGNANCY, 4200*
- COLON
  - ANASTOMOSIS, 5257*
  - BIOPSY, 5254*
  - COMPLICATIONS, 2672*

CROHN'S DISEASE (continued)
- COLON (continued)
  - CONTRACEPTIVES, ORAL, 5757*
  - DIAGNOSIS, 5260, 8513
  - DRUG THERAPY, 8517
  - ENDOSCOPY, 512, 848
  - ENTERECTOMY, 5257*
  - ETIOLOGY, 5255*, 5757*
  - HORMONES, ADRENAL CORTEX, 8517
  - IMMUNOTHERAPY, 8516
  - NEOPLASMS, MALIGNANT, 2381
  - PATHOLOGY, 846, 1743
  - PERFORATION, 2672*
  - PROGNOSIS, 1742, 5254*
  - RADIOLOGY, 5260
  - REVIEW, 845
  - STEROIDS, 8517
  - SURGERY, 5257*
  - THERAPY, 8516
  - VIRUSES, 5255*
- COMPLICATIONS, 3319*, 4469*, 8514
  - ANUS, 1733*
  - ARTHRITIS, 6678
  - FISTULA, 7898
  - SPLENOMEGALY, 6674*
  - URINARY SYSTEM, 3578*
- CONNECTIVE TISSUE
  - REVIEW, 4476*
- DIAGNOSIS, 4900, 5259
  - CHILD, 7900
  - DRUG THERAPY, 6353
  - ELECTROPHORESIS, 7900
  - GRANULOCYTES, 7718*
  - LYMPHOCYTES, 7900
  - LYSOZYMES, 7718*
  - RADIOLOGY, 4969
  - REVIEW, 5767
- DIET
  - RISK FACTORS, 7284
  - THERAPY, 3527
- DIETARY FACTORS
  - CARBOHYDRATES, 850
- DISEASES ASSOCIATED WITH, 510*
  - HEMORRHOIDS, 4204
- DIVERTICULUM
  - COLON, 3579*
- DRUG METABOLISM
  - DIETARY FACTORS, 7283
- DRUG THERAPY, 1737, 3576*, 3581, 6671*, 8512
  - ANTI-INFLAMMATORY AGENTS, 1736, 7719
  - COMPLICATIONS, 7286
  - DRUG METABOLISM, 856
  - HORMONES, ADRENAL CORTEX, 8517
  - ILEUM, 7276*
  - IMMUNOTHERAPY, 7719
  - STEROIDS, 8517
  - SURGERY, 8266
- DUODENUM
  - DIAGNOSIS, 3582
  - DISEASES ASSOCIATED WITH, 3582
  - FISTULA, 8509*
  - NEOPLASMS, 3582
  - REVIEW, 3582, 5980*
- ENTERECTOMY
  - ANASTOMOSIS, 5257*
- ENTERITIS, REGIONAL
  - DUODENUM, 4473*

CROHN'S DISEASE (continued)

- ENTERITIS, REGIONAL (continued)
  - STOMACH, 4473*
- ENTEROCOLITIS
  - PARENTERAL ALIMENTATION, 4465*
  - THERAPY, 4465*
- ENZYMES, 5979*
- EPIDEMIOLOGY, 843
  - REVIEW, 5767, 7282
  - STATISTICAL STUDY, 847
- ESOPHAGITIS
  - ENTEROCOLITIS, 1740
  - RADIOLOGY, 4470*
- ESOPHAGUS
  - COLON, 5985
  - ENDOSCOPY, 4471*
- ETHNIC FACTORS, 5258*
- ETIOLOGY, 5977*
  - BACTERIAL INFECTIONS, 4480
  - PROSTAGLANDINS, 8510
  - REVIEW, 7282
  - VIRUSES, 5255*
- FAMILIAL FACTORS, 842
- FISTULA
  - THERAPY, 8509*
- GENETICS, 842
  - REVIEW, 7282
- ILEUM
  - ABSORPTION, 849
  - FISTULA, 7898, 8509*
  - IMMUNOGLOBULINS, 851, 1730*
  - PROTEINS, 851
  - WATER, 849
- IMMUNITY, 4482
  - IMMUNOSUPPRESSION, 855
  - LYMPHOCYTES, 1732*, 3321*
- IMMUNOGLOBULINS
  - SERUM, 5513*
  - SURGERY, 4183
  - THERAPY, 4183
- IMMUNOLOGY, 1735
  - SURGERY, 4183
  - THERAPY, 4183
- IMMUNOSUPPRESSION
  - DRUG THERAPY, 5978*
- IMMUNOTHERAPY, 8515, 8516
- INTEGUMENTARY SYSTEM
  - WOUNDS AND INJURIES, 2674
- INTESTINE, LARGE
  - AGE FACTORS, 1742
  - CIRCULATION, 3318*
  - MICROCIRCULATION, 3318*
  - PROGNOSIS, 1742
  - SURGERY, 1742
- INTESTINE, SMALL
  - NEOPLASMS, 5986, 7278
  - PRECANCEROUS CONDITIONS, 5986
  - SIMULATION, 7278
  - SURGERY, 2321
- INTESTINES
  - IMMUNOGLOBULINS, 852
- LAPAROTOMY
  - APPENDICITIS, 7277
- LYMPHOCYTES
  - ANTIBODIES, 4210
  - COLITIS, ULCERATIVE, 4468*
- LYSOZYMES, 7062*
  - DIAGNOSIS, 1731*, 4203*
  - SERUM, 1731*

CROHN'S DISEASE (continued)

- MECKEL'S DIVERTICULUM
  - DISEASES ASSOCIATED WITH, 2325
  - EPIDEMIOLOGY, 2325
- MORPHOMETRY, 5979*
- NEOPLASMS
  - ILEUM, 7278
  - REVIEW, 1739
- OXALATES
  - URINARY SYSTEM, 4475*
  - URINE, 4258*
- PARENTERAL ALIMENTATION
  - CHILD, 4866*
  - THERAPY, 3527
- PERFORATION, 6675*
- PERINEUM
  - ULCER, 4478
- PROCTOCOLITIS
  - BIOPSY, 5254*
  - EPIDEMIOLOGY, 1738
  - PROGNOSIS, 5254*
- PROGNOSIS, 5259
  - BIOPSY, 5254*
- PROTEINS
  - PLASMA, 4467*
- PSEUDOTUMORS
  - COLON, 5762*
- RADIOLOGY
  - DIAGNOSIS, 3932*
- RECTUM
  - BIOPSY, 5983*
  - DIAGNOSIS, 8513
  - DRUG THERAPY, 8517
  - HORMONES, ADRENAL CORTEX, 8517
  - MORPHOLOGY, 5982*
  - PROGNOSIS, 1742
  - STEROIDS, 8517
- RECURRENCE, 8511
- REVIEW
  - INFLAMMATORY BOWEL DISEASES, 2408
- SERUM
  - AMINO ACIDS, 2673
  - LYSOZYMES, 1745, 3076, 3077
- STOMACH, 4472*, 5604
  - COMPLICATIONS, 3932*
  - DUODENUM, 4473*
- SURGERY, 3581
  - AGE FACTORS, 1742
  - GROWTH FACTORS, 4466*
  - PROGNOSIS, 4466*
  - RECURRENCE, 6672
  - TECHNIQUES, 7899
- THERAPY, 3581, 5258*, 5255, 8515, 8516
  - DIET, 6671*
  - PARENTERAL ALIMENTATION, 4465*
  - REVIEW, 5767
- TRANSMISSION, 4477*, 5977*, 8507*
  - BACTERIAL INFECTIONS, 4481
- UROGENITAL SYSTEM
  - NEOPLASMS, 7285
  - WOUNDS AND INJURIES, 2674
- VIRUS DISEASES, 7279
- VIRUSES, 6673*
  - BIOCHEMISTRY, 2406*
  - FECES, 2671*
  - PARTICLES, 2671*
  - ULTRASTRUCTURE, 2671*, 5255*
- WATER, ELECTROLYTE BALANCE
  - BILE ACIDS AND SALTS, 3577*
  - ILEUM, 3577*

CROHN'S DISEASE (continued)
- YERSINIA
  - RADIOLOGY, 3220*

CRUVEILHIER-BAUMGARTEN SYNDROME
- SEE LIVER CIRRHOSIS

CRYOSURGERY
- HEMORRHOIDS
  - REVIEW, 2391

CRYOTHERAPY
- HEMORRHOIDS, 493

CUSHING'S SYNDROME
- LIVER
  - NEOPLASMS, 8291*

CYCLIC ADENOSINE MONOPHOSPHATE
- SEE ADENOSINE CYCLIC 3',5' MONOPHOSPHATE

CYCLIC GUANOSINE MONOPHOSPHATE
- SEE GUANOSINE CYCLIC 3',5' MONOPHOSPHATE

CYSTIC FIBROSIS
- ABSORPTION
  - BILE ACIDS AND SALTS, 4909*
  - IRON, 8268*
  - PROTEINS, 8268*
  - RADIONUCLIDES, 8268*
  - VITAMIN B12, 8268*
- BILE
  - CHEMICAL COMPOSITION, 2583
  - LIPIDS, 2583
- BILE ACIDS AND SALTS
  - BACTERIA, 7750*
- BREATH TEST
  - CARBON DIOXIDE, 4909*
- CECUM
  - OBSTRUCTION, 6364*
- COMPLICATIONS
  - FATTY LIVER, 7766
  - INTESTINAL OBSTRUCTION, 6364*
- ENTEROKINASE, 5700*
- FATTY LIVER
  - DISEASES ASSOCIATED WITH, 7766
- FECES
  - BILE ACIDS AND SALTS, 7750*
- GALLBLADDER DISEASES
  - CHOLECYSTOGRAPHY, 7236
- GLYCOPROTEINS
  - SYNTHESIS, 8090*
- ILEUM
  - OBSTRUCTION, 6364*
- INTESTINAL OBSTRUCTION
  - MECONIUM, 2413*
- INTESTINE, LARGE
  - OBSTRUCTION, 6364*
- INTESTINE, SMALL
  - OBSTRUCTION, 6364*
- IRON
  - ABSORPTION, 7749*
  - CHILD, 7749*
- JEJUNUM
  - OBSTRUCTION, 6364*
- LIVER
  - BILE ACIDS AND SALTS, 1483

CYSTIC FIBROSIS (continued)
- MECONIUM
  - DIAGNOSIS, 7127
- PANCREAS
  - CHILD, 4214*
  - CLEARANCE STUDY, 2414*
- RECTUM
  - GLYCOPROTEINS, 8090*
- REVIEW, 7654
- SECRETIN
  - FATS, 2414*
  - NITROGEN, 2414*
- SECRETION
  - GLYCOPROTEINS, 8090*
- TRANSPORT
  - GLYCOPROTEINS, 8090*

CYSTS
- ANUS
  - SURGERY, 7055
- BILE DUCTS, 3494*
  - CLASSIFICATION, 7849
  - DISEASE, 5914*
  - DISEASES ASSOCIATED WITH, 5053
  - GENETIC FACTORS, 5053
  - NEOPLASMS, MALIGNANT, 7849
  - SURGERY, 7849
- BILIARY TRACT
  - CHOLANGIOGRAPHY, 7841
  - CLASSIFICATION, 7849
  - DIAGNOSIS, 7841
  - NEOPLASMS, MALIGNANT, 6561*, 7849
  - RADIOLOGY, 5137*, 7841
  - SURGERY, 7849
- CHOLANGIOGRAPHY
  - DIAGNOSIS, 6547*
- COLON, 7014
  - GASES, 2338
- COMMON BILE DUCT
  - CHILD, 5146*
  - DIAGNOSIS, 5146*
  - DILATATION, 5165
  - ECHINOCOCCOSIS, 5956*
  - INFANT, 5146*
  - PERFORATION, 5956*
  - RADIOLOGY, 5146*
  - SCANNING, SCINTILLATION, 5146*
  - ULTRASONOGRAPHY, 5146*
- DIAGNOSIS
  - TECHNIQUES, 4747*
  - ULTRASOUND, 4456*
- DUODENUM
  - RADIOLOGY, 2326
- ECHINOCOCCOSIS
  - COMPLICATIONS, 5956*
  - LIVER, 553, 5833
  - PERFORATION, 553
  - THERAPY, 5956*
- GALLBLADDER
  - SCANNING, SCINTILLATION, 7235
- INTESTINE, LARGE
  - COLITIS, 481
- INTESTINE, SMALL
  - GASES, 2338
  - MESENTERY, 6305
- INTESTINES
  - INTUSSUSCEPTION, 480
- JAUNDICE, OBSTRUCTIVE
  - PANCREAS, 7228

CYSTS (continued)
- LIVER, 6429
  - ANGIOGRAPHY, 1249, 7759
  - CHILD, 5031*
  - CIRCULATION, 1484
  - DIAGNOSIS, 2175*, 4747*, 5828, 8132
  - DISEASES ASSOCIATED WITH, 5053
  - DRUG THERAPY, 1460*
  - ECHINOCOCCOSIS, 1724
  - GENETIC FACTORS, 5053
  - NEOPLASMS, 5031*
  - PARASITES AND PARASITIC DISEASES, 5965
  - RUPTURE, 1724
  - SCANNING, SCINTILLATION, 3045*
  - SCLEROSIS, 1460*
  - SURGERY, 5032*
  - THERAPY, 5828, 5841
  - ULTRASONOGRAPHY, 3045*, 7123, 8132
- MANOMETRY
  - SURGERY, 7198*
- PANCREAS
  - DIAGNOSIS, 3346, 7727
  - ENDOSCOPY, 7727
  - LIPASE, 3346
  - NEOPLASMS, BENIGN, 520*
  - PANCREATOGRAPHY, 3346, 7727
  - SCANNING, SCINTILLATION, 1442
  - ULTRASONOGRAPHY, 1231
- PANCREATIC DISEASES
  - CHILD, 5244*
- PARASITES AND PARASITIC DISEASES
  - DIAGNOSIS, 4456*
- RADIOLOGY
  - LIVER, 2175*
- RETROPERITONEAL SPACE
  - FATS, 6298
  - INTESTINAL OBSTRUCTION, 6298
- SALIVARY GLANDS
  - REVIEW, 5952
- SCANNING, SCINTILLATION
  - LIVER, 2175*
- SHUNT, INTESTINAL
  - COMPLICATIONS, 5651*
- STOMACH, 4813*
  - PNEUMATOSIS, 1257
- ULTRASONOGRAPHY
  - LIVER, 2175*

CYTOCHROMES
- ANESTHETICS
  - TOXICOLOGY, 2915
- CHOLELITHIASIS
  - CHENODEOXYCHOLIC ACID, 2587
  - ENZYMES, 2587
- CHOLERESIS
  - HORMONES, ADRENAL CORTEX, 1070
- CHOLESTASIS
  - DRUG METABOLISM, 1082
  - MONOAMINE OXIDASE, 6086*
- DRUG METABOLISM
  - CATECHOLAMINES, 2103*
- HEPATOCYTES, 7415*
- INSECTICIDES
  - METABOLISM, 3818
- INTESTINES
  - COBALT, 1012*

CYTOCHROMES (continued)
- LIVER
  - ANALGESICS AND ANTIPYRETICS, 5401*
  - BINDING, 1026
  - BIOCHEMISTRY, 3789
  - CARBON TETRACHLORIDE, 8022*
  - CELLS, 1764
  - COBALT, 1012*
  - DRUG EFFECTS ON, 5401*, 8025*
  - ENZYMES, 1025
  - HEXOBARBITAL, 5418*
  - INTERFERON, 2900
  - METABOLISM, 1026
  - NUTRITION DISORDERS, 2053
  - PHENOBARBITAL, 5401*
  - SELENIUM, 2053
  - SOLVENTS, 5401*
  - TOXICITY, 8022*
- LIVER CIRRHOSIS
  - MITOCHONDRIA, 7189*
- MICROSOMES
  - BINDING, 1026
  - SELENIUM, 2053
- SPLEEN
  - COBALT, 1012*
- STOMACH
  - MORPHOLOGY, 1911

CYTOLOGY, EXFOLIATIVE
- ESOPHAGUS
  - NEOPLASMS, MALIGNANT, 239
- LACTOSE INTOLERANCE
  - INFANT, 2364
- STOMACH DISEASES
  - ENDOSCOPY, 246

CYTOMEGALOVIRUSES
- COLITIS, ULCERATIVE, 4201*
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 1328
- HEPATITIS, INFECTIOUS
  - DIAGNOSIS, 5876*

DEFECATION
- SEE ALSO EXCRETION
- ANUS
  - INCONTINENCE, 1430
  - SPHINCTER, 861
- CHILD
  - INCONTINENCE, 1430
  - REVIEW, 7879
- INFECTION
  - ELECTROLYTES, 6629
- RECTUM
  - INCONTINENCE, 1430

DEFOLIANTS
- SEE HERBICIDES

DEGLUTITION
- ESOPHAGUS
  - PRESSURE STUDY, 2731*, 3643
  - SPHINCTER, 3643

DEGLUTITION DISORDERS
- ACHALASIA
  - ETIOLOGY, 3124*
  - FAMILIAL FACTORS, 3124*

DEGLUTITION DISORDERS (continued)
- CARDIOVASCULAR SYSTEM
  - ANOMALY, 3132
  - ANOMALY, CONGENITAL, 6873
- ESOPHAGUS
  - DIVERTICULUM, 4032
  - ETIOLOGY, 3132
  - SURGERY, 292*
- PHARYNX
  - SURGERY, 292*
- REVIEW, 8478
- SURGERY
  - COMPLICATIONS, 3126*

DEHYDRATION
- DIARRHEA
  - INFANT, 5934*, 5937*
  - SUCROSE, 5934*
  - THERAPY, 5934*, 5937*, 8453*
- GASTROENTERITIS
  - CHILD, 5202
  - VIRUSES, 5935*
- INFANT
  - THERAPY, 5937*

DEHYDROGENASES
- SEE OXIDOREDUCTASES

DERMATITIS HERPETIFORMIS
- ANTIGENS, 3267
- CELIAC DISEASE
  - ANTIGENS, 1378*
  - EPIDEMIOLOGY, 1378*
  - PERFORATION, 3266
- DIETARY FACTORS
  - GLUTEN, 4869*
- DRUG THERAPY, 4869*
- DUODENUM
  - EPITHELIUM, 3253*
  - MORPHOLOGY, 3253*
- GLUTEN
  - ANTIBODIES, 2355
- IMMUNOGLOBULINS
  - CELLS, 4869*
  - DIETARY FACTORS, 4869*
- JEJUNUM
  - EPITHELIUM, 3253*
  - MORPHOLOGY, 3253*
  - NEOPLASMS, 5655*

DETERGENTS
- ABSORPTION
  - LIPIDS, 7927
- HEPATITIS, TOXIC
  - LYSOSOMES, 3764*
- ILEUM
  - MORPHOLOGY, 3837
- LIVER
  - ENZYMES, 7438*
- MALABSORPTION SYNDROMES
  - FATS, 4915

DETOXIFICATION
- LIVER
  - DRUG THERAPY, 8317

DIABETES
- ABSORPTION
  - PEPTIDES, 6008
- DRUG-INDUCED
  - DRUG METABOLISM, 2903
- HEPATITIS, INFECTIOUS
  - DISEASES ASSOCIATED WITH, 8376
- INTESTINE, SMALL
  - CHILD, 5681
  - LIPIDS, 5681
- LIVER CIRRHOSIS
  - DISEASES ASSOCIATED WITH, 7816
  - ETIOLOGY, 703
- MALABSORPTION SYNDROMES
  - DISEASES ASSOCIATED WITH, 7644
- PANCREAS
  - ENZYMES, 7986*
  - INSULIN, 1747*
  - MORPHOLOGY, 1747*
  - SECRETION, 5168*
  - SIMULATION, 1747*
- PANCREATITIS, CHRONIC
  - COMPLICATIONS, 6379*
- PLASMA
  - SECRETIN, 5945
- PORPHYRIA
  - PHLEBOTOMY, 7753*
- STOMACH
  - MOTILITY, 6224*
- TRANSPORT
  - PEPTIDES, 6008
- VITAMIN D
  - CIRCULATION, 5294
  - SIMULATION, 5294

DIAPHRAGM
- HERNIA
  - DIAGNOSIS, 1279
  - STOMACH, 1304
  - SURGERY, 6215
  - WOUNDS AND INJURIES, 2616
- STOMACH
  - AGE FACTORS, 2279
  - DIAGNOSIS, 2279

DIARRHEA
- ABSORPTION
  - CARBOHYDRATES, 3537
  - FATS, 3537
  - SODIUM, 6816*
- ACHLORHYDRIA
  - BACTERIA, 2312*
- ANTIBACTERIALS, 1679
- ANTIBIOTICS, 3522*
  - ABSORPTION, 2641
  - AGE FACTORS, 3521*, 3523*
  - BACTERIAL INFECTIONS, 4421
  - COMPLICATIONS, 4421
  - GEOGRAPHICAL FACTORS, 3523*
  - SEX FACTORS, 3521*
- BACTERIAL INFECTIONS
  - REVIEW, 784
  - TOXINS, 3525*
- BILE
  - DIET, 1485
- BILE ACIDS AND SALTS
  - METABOLISM, 4467*
- CATHARTICS, 4391*
  - SECRETION, 1685

DIARRHEA (continued)
    CELIAC DISEASE
        CHILD, 1645*
    CHELATING AGENTS
        ABSORPTION, 4425
    CHILD
        ANTIBODIES, 6167
        ESCHERICHIA COLI, 4422
        GIARDIASIS, 1645*
        INFECTION, 7261
        INTESTINE, SMALL, 5169*
        LYMPHOCYTES, 2166*
        PATHOLOGY, 5169*
        REVIEW, 783, 6953
        THERAPY, 2639
    CLOSTRIDIUM
        ENTERITIS, 7268
    COLITIS, ULCERATIVE, 511
    COLON
        ABSORPTION, 5302
        BILE ACIDS AND SALTS, 5302
        NEOPLASMS, 7040
    DEHYDRATION
        INFANT, 5934*, 5937*
        SUCROSE, 5934*
        THERAPY, 5934*, 5937*, 8453*
    DIAGNOSIS
        BACTERIA, 2590*
        PARASITES AND PARASITIC DISEASES, 2590*
        PROTOZOA, 2590*
    DIURETICS, 4391*
    DRUG-INDUCED
        ANTIBIOTICS, 4180, 4932*
        ANTIDIARRHEALS, 7867
        ETIOLOGY, 4180
    DRUG THERAPY, 769*, 1678, 7030, 7897*
        AGE FACTORS, 2369*
        ANTIBACTERIALS, 2369*
        NEONATE, 4426
        NEOPLASMS, MALIGNANT, 4911*
        STEROIDS, 2642
        SURGERY, 4426
    ENTERECTOMY
        DRUG THERAPY, 7897*
    ENTERITIS, REGIONAL
        WATER, ELECTROLYTE BALANCE, 3577*
    ENTEROCOLITIS, NECROTIZING
        ESCHERICHIA COLI, 7272
    EPIDEMIOLOGY, 5170*, 5226, 7889
        SEASONAL FACTORS, 5200
        VIRUSES, 5200
    ESCHERICHIA COLI
        ENTEROTOXINS, 1681
        ETIOLOGY, 2640
        REVIEW, 1682
    ETIOLOGY, 5302
        BACTERIA, 5170*
        BILE ACIDS AND SALTS, 4180, 6816*, 7854*
        HORMONES, GASTROINTESTINAL, 5197
        ION TRANSPORT, 6816*
        MOTILITY, 5196
    FECES
        CHEMICAL COMPOSITION, 1392*
    FOOD, 8458
    GASTRECTOMY
        ETIOLOGY, 4743*

DIARRHEA (continued)
    GASTROENTERITIS
        NUTRITION DISORDERS, 7244
    GASTROINTESTINAL SYSTEM
        MOTILITY, 5196
    GIARDIASIS
        DRUG THERAPY, 2665
        ETIOLOGY, 2640
    GLUTEN
        THERAPY, 2362
    HORMONES
        NEOPLASMS, 782
        REVIEW, 782
    HORMONES, GASTROINTESTINAL
        WATER, ELECTROLYTE BALANCE, 4427
    ILEUM
        BREATH TEST, 5648*
    IMMUNOLOGY
        REVIEW, 7264
    IMMUNOSUPPRESSION
        PARASITES AND PARASITIC DISEASES, 393*
        PROTOZOA, 393*
    INFANT
        BILE ACIDS AND SALTS, 5198
        DIAGNOSIS, 5936*
        ETIOLOGY, 4910*
        INFECTION, 7261
        REVIEW, 7258, 7261
        THERAPY, 5936*, 7261
    INTESTINE, SMALL
        BACTERIA, 1353, 5169*, 7653
        ENZYMES, 7632
        GIARDIASIS, 3559
        MORPHOLOGY, 4695
        MOTILITY, 4424
    INTESTINES
        BILE ACIDS AND SALTS, 3799
    IRRITABLE COLON
        DIVERTICULUM, 1392*
    JAUNDICE
        NEONATE, 3406*
    JEJUNUM
        MORPHOLOGY, 2312*
    KWASHIORKOR
        DIETARY FACTORS, 5199
        LACTOSE, 5199
    LACTOSE INTOLERANCE
        EPIDEMIOLOGY, 5706
    MALABSORPTION SYNDROMES, 7642
        BILE ACIDS AND SALTS, 3250*, 4910*
        DIETARY FACTORS, 4423
        PROTEINS, 5716*
    NEONATE
        REVIEW, 8457
    NEOPLASMS, MALIGNANT
        THERAPY, 4911*
    NUTRITION DISORDERS, 4423
        BACTERIA, 1353
        INFANT, 7853*
    PANCREAS
        NEOPLASMS, 1686
        PSEUDOCYSTS, 4217
        ZOLLINGER-ELLISON SYNDROME, 1686
    PANCREATITIS
        COMPLICATIONS, 4217
    PARENTERAL ALIMENTATION
        ABSORPTION, 3537
        CHILD, 5946

DIARRHEA (continued)
- PARENTERAL ALIMENTATION (continued)
  - INFANT, 1684
- PATHOLOGY, 5226
  - REVIEW, 7264
- POTASSIUM
  - CHILD, 1683
- PROTEINS
  - INTOLERANCE, 5716*
  - PLASMA, 4467*
- PYLOROPLASTY
  - COMPLICATIONS, 6936
- RADIOTHERAPY
  - ETIOLOGY, 5648*
- RECTUM
  - NEOPLASMS, 7040
- SHIGELLOSIS
  - ETIOLOGY, 5171*
  - TOXINS, 5171*
- SHORT BOWEL SYNDROME
  - ANTISPASMODICS, 4125
- SPRUE, TROPICAL
  - EPIDEMIOLOGY, 4134*
- STRESS, 1979
- SUCROSE
  - MALABSORPTION SYNDROMES, 5706
- THERAPY
  - REVIEW, 783, 4428
  - SUCROSE, 2644
- TRANSMISSION
  - WATER, 5170*
- VAGOTOMY
  - BILE ACIDS AND SALTS, 7854*
  - COMPLICATIONS, 1289*, 2591*, 4044*, 4094, 6936
  - DRUG THERAPY, 2591*, 7854*
  - ETIOLOGY, 4842, 7854*
  - ION-EXCHANGE RESINS, 2591*
- VIBRIO
  - ETIOLOGY, 2640
- VIRUSES
  - ETIOLOGY, 2640
  - NEONATE, 785
- YERSINIA
  - CHILD, 8202
  - COMPLICATIONS, 8201
  - DISEASES ASSOCIATED WITH, 8202
  - ETIOLOGY, 2640

DIET
- ABSORPTION
  - PERFUSION, 3600*
- ACIDS
  - PROTEINS, 5463*
- AMINO ACIDS
  - DEFICIENCY, 6815*
  - DIGESTION, 6712*
- ASCARIASIS
  - CHILD, 6654
- BILE ACIDS AND SALTS
  - ABSORPTION, 6693*
  - TRANSPORT, 6693*
- CARBOHYDRATES
  - DISACCHARIDASES, 74
- CECUM
  - ACIDITY, 6139
  - BILE ACIDS AND SALTS, 4714*
  - DISTENTION, 4714*
  - MORPHOLOGY, 6140
  - MOTILITY, 6140

DIET (continued)
- CELIAC DISEASE
  - TOXICOLOGY, 1382
- CHOLELITHIASIS, 761
- CHOLESTEROL
  - ENZYMES, 5461
  - WOLMAN'S DISEASE, 4653
- COLITIS, ULCERATIVE
  - THERAPY, 3527
- COLON
  - NEOPLASMS, 8234*
  - SURGERY, 3284
- COLONIC DISEASES
  - CIRCULATION, 456
  - FIBERS, 456, 1415
  - THERAPY, 3283
- CROHN'S DISEASE
  - RISK FACTORS, 7284
  - THERAPY, 3527, 6671*
- DIARRHEA
  - BILE, 1485
- DISACCHARIDASES
  - INTESTINE, SMALL, 5449
- DIVERTICULITIS
  - COLON, 4404
  - THERAPY, 3279*
- DRUG METABOLISM
  - ENZYMES, 1037
  - SUCROSE, 5499
- DUODENUM
  - ULCER, 3174
- ENTERITIS
  - THERAPY, 3527
- EPIDEMIOLOGY
  - DISEASE, 6601
  - STATISTICAL STUDY, 6601
- FATS
  - WOLMAN'S DISEASE, 4653
- FATTY LIVER
  - LIPIDS, 6082*
- FECES
  - FIBERS, 2588*
- FIBERS, 8461
  - NEOPLASMS, 4401
  - REVIEW, 2637, 2638, 4402, 4403, 8467
- FISTULA
  - ACID SECRETION, 6040*
- GALLSTONES
  - SYNTHESIS, 6084*
- GASTRITIS, ATROPHIC
  - FERRITIN, 3174
- GASTROINTESTINAL DISEASES
  - CHILD, 7883
  - EPIDEMIOLOGY, 2636
  - ETIOLOGY, 2636
  - FIBERS, 457, 4400
  - INFANT, 7883
  - REVIEW, 2636
  - THERAPY, 1650, 3527
- GLYCOGENOSIS
  - THERAPY, 3396, 3397
- HEIDENHAIN POUCH
  - ACID SECRETION, 6040*
  - GASTRIN, 6040*
- HEPATECTOMY
  - AMMONIA, 2026
- HEPATITIS, INFECTIOUS
  - HORMONES, 7148*
  - THERAPY, 7148*

DIET (continued)

- ILEAL DISEASES
  - FATS, 2311*
- INTESTINE, LARGE
  - SURGERY, 7712
- INTESTINE, SMALL
  - MORPHOLOGY, 1119, 6140
  - MOTILITY, 6140
- INTESTINES
  - LYMPHANGIECTASIS, 3241
- IRON
  - ABSORPTION, 886, 6692*
  - SIMULATION, 6692*
- IRRITABLE COLON
  - THERAPY, 6332*
- LACTOSE INTOLERANCE, 5707
- LIVER
  - BILE ACIDS AND SALTS, 4640
  - GLUCOSE PHOSPHATE DEHYDROGENASE, 6120
  - LIPIDS, 4634*, 8020*
- LIVER DISEASES, ALCOHOLIC
  - IRON, 2530*
- MALABSORPTION SYNDROMES
  - THERAPY, 3259
- NEOPLASMS
  - EPIDEMIOLOGY, 7260
  - GASTROINTESTINAL SYSTEM, 1663
  - REVIEW, 7260
- PANCREAS
  - SECRETION, 1932, 5392
- PANCREATITIS
  - SECRETION, 529
  - THERAPY, 3527
- PARENTERAL ALIMENTATION
  - ELECTROLYTES, 3859*
- PROTEINS
  - ALBUMINS, 3860*
  - PEPTIDE HYDROLASES, 74
- SERUM
  - ACID SECRETION, 1902
  - GASTRIN, 1902
- SHIGELLOSIS
  - NEONATE, 1697
- SHORT BOWEL SYNDROME
  - THERAPY, 4891
- STATISTICAL STUDY
  - DISEASE, 6601
- STEATORRHEA
  - THERAPY, 7074
- STOMACH
  - MOTILITY, 2770
  - SEROTONIN, 6728*

DIGESTION

- AMINO ACIDS
  - DIET, 6712*
- BILE
  - FOOD, 2967
- CARBOHYDRATES
  - CHILD, 6993
  - ELECTROPHYSIOLOGY, 6699
  - PANCREAS, 7933
  - REVIEW, 6986
- CHILD
  - INTESTINE, SMALL, 6953
- ENZYMES, 7984*

DIGESTION (continued)

- FATS
  - CIRCULATION, 3017
  - ELECTROPHYSIOLOGY, 6699
  - LYMPH, 3017
- FOLIC ACID
  - CELIAC DISEASE, 1383
- GASES
  - GASTROINTESTINAL SYSTEM, 2635
  - REVIEW, 2635
- GASTROINTESTINAL SYSTEM
  - ANEMIA, 5220
- GLYCOPROTEINS
  - PEPSIN, 107
  - PEPTIDE HYDROLASES, 107
- HEPATOCYTES
  - FIBRIN, 4717*
- HORMONES, GASTROINTESTINAL
  - HORMONE CONTROL, 5187
  - ILEUM, 6820*
  - JEJUNUM, 6820*
- INTESTINE, SMALL
  - CARBOHYDRATES, 2725
  - DRUG EFFECTS ON, 2715
  - GLUCOSE, 2725
  - LACTOSE, 2725
  - PEPTIDE HYDROLASES, 1085*
- INTESTINES
  - FOOD, 2967
  - REVIEW, 2967
- LACTOSE
  - GENETIC FACTORS, 7646
  - REVIEW, 7646
- LIPASE
  - FATS, 6141
- LIPIDS
  - BILE ACIDS AND SALTS, 903
  - LIPASE, 903
  - REVIEW, 903
- PANCREAS
  - CATECHOLAMINES, 218
  - DRUG EFFECTS ON, 218
  - FOOD, 2967
  - PROTEINS, 1960
  - SECRETION, 1932
- PANCREATIC DUCT
  - SURGERY, 4605
- PANCREATITIS, CHRONIC, 7740, 8279
- PEPTIDE HYDROLASES
  - ILEUM, 1085*
  - JEJUNUM, 1085*
- PROTEINS, 6826
  - ELECTROPHYSIOLOGY, 6699
  - GASTROINTESTINAL SYSTEM, 20
  - INTESTINES, 1089
  - PANCREAS, 7933
  - REVIEW, 1089
- SJOGREN'S SYNDROME
  - SCLERODERMA, 3327*
- STOMACH, 2796
  - PATHOLOGY, 6043
- TRIGLYCERIDES
  - CIRCULATION, 3017
  - LYMPH, 3017

DISACCHARIDASES

- DEFICIENCY
  - BREATH TEST, 8136
  - DIAGNOSIS, 8136

DISACCHARIDASES (continued)
- DIET
  - CARBOHYDRATES, 74
- DUODENUM
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
  - ULCER, 370
- INTESTINE, SMALL
  - ANTIMETABOLITES, 1094
  - DIET, 5449
  - ENTERITIS, 8207
  - HORMONE EFFECTS ON, 2979
- INTESTINES
  - ENZYMES, 3261
- MALABSORPTION SYNDROMES
  - DEFICIENCY, 8136

DISACCHARIDES
- ALCOHOLS
  - ABSORPTION, 173*
- DUMPING SYNDROME
  - HYDROLYSIS, 4058
- INTESTINE, SMALL
  - HYDROLYSIS, 3849
- LIVER COMA
  - THERAPY, 5119*
- MALABSORPTION SYNDROMES
  - BREATH TEST, 8136
  - DIAGNOSIS, 8136

DISTENTION
- ACID SECRETION
  - ANTRUM, 2285*
  - NERVOUS CONTROL, 960
- ANTRUM
  - GASTRIN, 7971
- CECUM
  - DIET. 4714*
  - MICROORGANISMS, 4714*
- COLON
  - DRUG EFFECTS ON, 2742*
  - MOTILITY, 4543
  - NERVOUS CONTROL, 2742*
  - PHYSICAL FACTORS, 54
- DUODENUM
  - PHYSICAL FACTORS, 54
- ENTEROCOLITIS, NECROTIZING
  - INTESTINE, SMALL, 2192
- ESOPHAGUS
  - MOTILITY, 298, 4517*
  - NERVOUS CONTROL, 1838
  - SPHINCTER, 1838
- GASTROINTESTINAL SYSTEM
  - GASES, 1688
- INTESTINAL OBSTRUCTION
  - CECUM, 7709
  - GASES, 6292*
- INTESTINE, SMALL
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2963*
  - CIRCULATION, 4707*
  - OXYGEN, 4707*
  - SECRETION, 2963*
- INTESTINES
  - CIRCULATION, 3878
  - DRUG EFFECTS ON, 2742*
  - NERVOUS CONTROL, 2742*

DISTENTION (continued)
- JEJUNUM
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2963*
  - SECRETION, 2963*
- PLASMA
  - ANTRUM, 2285*
- SPHINCTER
  - NERVOUS CONTROL, 1838
- STOMACH
  - ACID SECRETION, 3673*, 3682, 4579, 5369*, 5624*
  - COMPLICATIONS, 4841
  - GASES, 6933
  - GASTRIN, 7971
  - HYPERCHLORHYDRIA, 3673*
  - SECRETION, 4579
  - VAGOTOMY, 6933
- ULCER, PEPTIC
  - ACID SECRETION, 2285*
  - ETIOLOGY, 4841
  - GASTRIN, 2285*

DITHIOCARBAMATES
- SEE THIOCARBAMATES

DIURESIS
- ASCITES
  - PROTEINS, 4346
- KERNICTERUS
  - GLUCAGON, 2473
  - INSULIN, 2473
- LIVER CIRRHOSIS
  - ASCITES, 2554, 4346

DIURETICS
- ASCITES
  - COMPLICATIONS, 6506*
  - DRUG THERAPY, 6506*
- BILE
  - BIOCHEMISTRY, 4628*
  - DRUG EFFECTS ON, 4647
- BILE ACIDS AND SALTS
  - DRUG EFFECTS ON, 4647
- BILIARY TRACT
  - SECRETION, 3814
- CALCIUM
  - TRANSPORT, 883
- CHOLERESIS
  - SIMULATION, 160
- DIARRHEA, 4391*
- INTESTINE, SMALL
  - PERMEABILITY, 5446
  - TRANSPORT, 1812
- LIVER
  - DRUG METABOLISM, 8029*
- LIVER CIRRHOSIS
  - ASCITES, 3481*
- LIVER INJURY
  - HORMONES, 2869*
- METABOLISM, 6527*
  - LIVER CIRRHOSIS, 6527*
  - LIVER DISEASES, 7091*
- PANCREAS
  - BICARBONATE SECRETION, 4590*
  - SECRETION, 4590*
- PANCREATITIS
  - ETIOLOGY, 4230

DIURETICS (continued)
    RECTUM
        ELECTROPHYSIOLOGY, 2756
        ION TRANSPORT, 2756
    SECRETION
        BILE, 4628*
    SODIUM
        ELECTRICAL CONTROL, 1812
        TRANSPORT, 883
    SULFOBROMOPHTHALEIN
        EXCRETION, 258
    TRANSPORT
        SODIUM, 1812

DIVERTICULITIS
    AGE FACTORS
        PROGNOSIS, 4947
        SURGERY, 4947
    BIOPSY, 7696
    CECUM, 6343
        SURGERY, 488
    COLON
        DIET, 4404
        FIBERS, 4404
        FISTULA, 7059
        SURGERY, 4946
    COMPLICATIONS
        REVIEW, 3299, 3301
        URINARY SYSTEM, 3578*
    DIAGNOSIS, 3297
        RADIOLOGY, 3301
    DISEASES ASSOCIATED WITH
        NEOPLASMS, MALIGNANT, 3297, 3301
        POLYPS, 3301
    DUODENUM
        DIVERTICULUM, 1367
    ETIOLOGY, 3300, 7696
    FIBERS
        REVIEW, 4404
        THERAPY, 3279*
    GEOGRAPHICAL FACTORS
        REVIEW, 3301
    HEREDITARY FACTORS
        REVIEW, 3301
    INTESTINE, LARGE, 6343
        DIAGNOSIS, 6346
        RADIOLOGY, 6346
        SURGERY, 489
    JEJUNUM
        PERFORATION, 1368
    RADIOLOGY, 3297
    SIGMOID, 6343
    THERAPY
        DIET, 3279*
        REVIEW, 3299
        SURGERY, 3302

DIVERTICULUM
    BILE DUCTS
        CHOLANGIOGRAPHY, 1626
        DIAGNOSIS, 3044*
        RADIOLOGY, 3044*
        SCANNING, SCINTILLATION, 3044*
    BLEEDING
        ARTERIOGRAPHY, 5687
        DIAGNOSIS, 5533, 5687
        EMBOLIZATION, 3278*

DIVERTICULUM (continued)
    BLEEDING (continued)
        PANCREATITIS, 5662
        PERFORATION, 5662
        RADIOLOGY, 5533
        THERAPY, 3278*
    COLON
        AGE FACTORS, 4947
        BLEEDING, 1391*, 4934*
        COLECTOMY, 5737
        COMPLICATIONS, 3299, 3301, 3303
        DIAGNOSIS, 3301, 4933*
        DIETARY FACTORS, 3299
        DISEASES ASSOCIATED WITH, 3301
        EPIDEMIOLOGY, 7060
        ETIOLOGY, 1391*, 3298
        FECALITH, 2386
        GEOGRAPHICAL FACTORS, 3301
        HEREDITARY FACTORS, 3301
        MOTILITY, 5720*
        MUSCLES, 3298
        NEOPLASMS, MALIGNANT, 2386, 3301
        PATHOLOGY, 1391*, 3303
        PERFORATION, 5754
        POLYPS, 3301
        PRESSURE STUDY, 5720*
        PROGNOSIS, 4947
        RADIOLOGY, 3301, 7692
        REVIEW, 3299, 3301, 7674
        SURGERY, 4947
        THERAPY, 3299
    COLONIC DISEASES
        FIBERS, 1415
    CROHN'S DISEASE
        COLON, 3579*
    DUODENUM, 4882, 7614
        BILE DUCTS, 523
        BLEEDING, 1367
        CHOLECYSTITIS, 4380
        CHROMOSOMES, 1366
        COMMON BILE DUCT CALCULI, 4883
        DIAGNOSIS, 8199
        DIVERTICULITIS, 1367
        ENDOSCOPY, 4883
        PANCREATIC DUCT, 523
        PERFORATION, 5662
        RADIOLOGY, 3233
    ENDOSCOPY
        TECHNIQUES, 1202
    ESOPHAGUS
        CHOLECYSTITIS, 4380
        CLASSIFICATION, 4032
        DEGLUTITION DISORDERS, 4032
        REVIEW, 8147*
        SIMULATION, 8147*
    ETHNIC FACTORS
        EPIDEMIOLOGY, 3280*
    FECES
        CHEMICAL COMPOSITION, 1392*
    FIBERS
        ETIOLOGY, 3280*
    HEMORRHAGE
        EMBOLIZATION, 3278*
        THERAPY, 3278*
    INTESTINE, LARGE, 487
        DIAGNOSIS, 6346
        EPIDEMIOLOGY, 1414
        RADIOLOGY, 6346
    INTESTINE, SMALL, 7615

DIVERTICULUM (continued)
  IRRITABLE COLON
    DIARRHEA, 1392*
    ETIOLOGY, 1392*
  JEJUNUM, 7613, 7615
    PERFORATION, 413
  PANCREATITIS
    DUODENUM, 2447, 5662
    REFLUX, 2447
  SIGMOID
    RADIOLOGY, 7692
  SOCIOECONOMIC FACTORS
    EPIDEMIOLOGY, 3280*
  STOMACH
    REVIEW, 4043*

DIVERTICULUM, ZENKER'S
  SEE ZENKER'S DIVERTICULUM

L-DOPA
  ABSORPTION
    GASTROINTESTINAL SYSTEM, 889
    PARASYMPATHOLYTICS, 889
  ACID SECRETION
    PARKINSON'S DISEASE, 1498
  DUODENUM
    ULCER, PEPTIC, 8189
  DYSTROPHY
    DRUG THERAPY, 3893
  INTESTINAL ABSORPTION, 7258*
  INTESTINE, SMALL
    NERVOUS CONTROL, 1084*
  KERNICTERUS
    DRUG THERAPY, 7763
  LIVER
    NEOPLASMS, 7474
  LIVER CIRRHOSIS
    DRUG THERAPY, 2561
  LIVER FUNCTION TESTS
    PARKINSON'S DISEASE, 1498
  STOMACH
    ULCER, PEPTIC, 8189
  ULCER, PEPTIC
    DRUG THERAPY, 8189

DOPAMINE
  ESOPHAGUS
    MOTILITY, 4520*
  ILEUM
    MOTILITY, 62
  INTESTINE, SMALL
    NERVOUS CONTROL, 1084*
  LIVER
    ALCOHOLS, 3807
    ALDEHYDES, 3807
    NEOPLASMS, 7474
  LIVER COMA
    METABOLISM, 5123*
    NERVOUS SYSTEM, 4665
    URINE, 5123*
  LIVER DISEASES
    KERNICTERUS, 7182*
  PANCREAS
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1947
    BICARBONATE SECRETION, 3740
    SECRETION, 3730, 4587*
    VASODILATOR AGENTS, 4587*

DOPAMINE (continued)
  STOMACH
    ACID SECRETION, 3740
  ULCER
    DUODENUM, 4860

DOWN'S SYNDROME
  AUSTRALIA ANTIGEN
    TRANSFUSION, 655
  HEPATITIS, INFECTIOUS
    ANTIGENS, 2486*
    EPIDEMIOLOGY, 2486*

DRAINAGE
  ABDOMEN
    VAGOTOMY, 318
  ABSCESS
    LIVER, 1473
    TECHNIQUES, 1473
  BILE
    TECHNIQUES, 3912
  BILE DUCTS
    CALCULI, 745
    OBSTRUCTION, 6580*
    TECHNIQUES, 8442
  BILIARY TRACT
    SEQUELAE, 735
    SURGERY, 735
  BILIARY TRACT DISEASES
    DIAGNOSIS, 8431*
  CHOLANGITIS
    JAUNDICE, 8422*
  CHOLECYSTECTOMY, 7833
    TECHNIQUES, 7226
  CHOLECYSTITIS
    CHOLECYSTECTOMY, 7226
    DIAGNOSIS, 6152*
  CHOLELITHIASIS
    DIAGNOSIS, 6152*
  DUODENUM
    DIAGNOSIS, 1185*
  GALLBLADDER DISEASES
    DIAGNOSIS, 1185*, 6152*
  INTESTINAL OBSTRUCTION, 4952
  JAUNDICE, OBSTRUCTIVE
    TECHNIQUES, 6579*
  LIVER
    TRANSPLANTATION, 3912, 7117*, 8307*
  PANCREATIC DUCT
    SURGERY, 2848
  PANCREATITIS
    LYMPH, 7990
    SURGERY, 528
  STOMACH
    LYMPH, 7365
  ULCER
    STRESS, 1153
  VAGOTOMY
    COMPLICATIONS, 4048

DRINKING
  HYPERTENSION, 5898*
  LIVER DISEASES, ALCOHOLIC, 5899

- DRUG DEPENDENCE
  - AUSTRALIA ANTIGEN
    - LIVER FUNCTION TESTS, 2500
  - CECUM
    - ULCER, 2372*
  - DISEASES ASSOCIATED WITH
    - LIVER DISEASES, ALCOHOLIC, 8285*
  - HEPATITIS
    - NARCOTICS, 7764
  - HEPATITIS, INFECTIOUS
    - ANTIBODIES, 2518
    - IMMUNOGLOBULINS, 2518
  - LIVER DISEASES
    - NARCOTICS, 7764

- DRUG-INDUCED
  - ACID SECRETION
    - HISTAMINE, 972
  - ACIDOSIS, 5932*
  - ALPHA FETOPROTEIN
    - LIVER INJURY, 3030
  - ASPIRIN
    - ULCER, 1877*
  - BILE
    - EXCRETION, 156
  - BLEEDING
    - PROSTAGLANDINS, 2141
    - STOMACH, 2141
  - CHOLELITHIASIS, 2584
    - REVIEW, 7851
  - CHOLERESIS
    - SIMULATION, 2917
  - CHOLESTASIS, 2483, 6445*
    - BIOCHEMISTRY, 8294*
    - ESTROGENS, 2049
    - HYPOGLYCEMIC AGENTS, 6444*
    - REVIEW, 8294*
  - COLITIS
    - ANTIBIOTICS, 482, 485, 2390, 4179, 4180, 4730, 4931*, 4932*, 5718*, 6329*, 7000*
    - DIAGNOSIS, 8261
    - DRUG THERAPY, 4730
    - EPIDEMIOLOGY, 6329*
    - ETIOLOGY, 4180, 4931*
    - GEOGRAPHICAL FACTORS, 6329*
    - IATROGENESIS, 4182
    - PATHOLOGY, 4179
    - REVIEW, 4179
    - THERAPY, 4179
  - COLON
    - NEOPLASMS, MALIGNANT, 3765*, 4696
  - DIABETES
    - DRUG METABOLISM, 2903
  - DIARRHEA
    - ANTIBIOTICS, 4180, 4932*
    - ANTIDIARRHEALS, 7867
    - ETIOLOGY, 4180
  - DUODENUM
    - ULCER, 97, 377, 2824, 3717, 6742
  - ENTEROCOLITIS, NECROTIZING
    - ANTIBIOTICS, 483, 484, 1411
    - STEROIDS, 483
  - EROSIONS
    - LIVER CIRRHOSIS, 1497
    - STOMACH, 1497
  - FATTY LIVER
    - ETIOLOGY, 7433*

- DRUG-INDUCED (continued)
  - GASTRITIS
    - ASPIRIN, 3179
    - H2 RECEPTOR ANTAGONISTS, 5488
    - HEMORRHAGE, 3179
    - PREVENTION, 977, 5488
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 6593
  - HEMORRHAGE
    - ANALGESICS AND ANTIPYRETICS, 3547
    - ASPIRIN, 2254, 3547
    - CHILD, 2254
    - DUODENUM, 3547
    - ESOPHAGUS, 3547
    - GASTROINTESTINAL SYSTEM, 2254
    - STOMACH, 3547
  - HEPATITIS
    - ANESTHETICS, 6447*
    - ANTIBIOTICS, 8340*
    - DRUG EFFECTS ON, 3929
    - GALACTOSAMINE, 3929, 7419*, 8028*
    - PREVENTION, 8028*
    - SURVIVAL, 3803
  - HEPATITIS, CHRONIC, 5069*
    - ANALGESICS AND ANTIPYRETICS, 6440*
    - SIMULATION, 6781*
  - HEPATITIS, NONVIRAL, 5069*
    - PREVENTION, 2482*
  - HEPATITIS, TOXIC, 5069*, 7780
    - AGE FACTORS, 8375
    - ASPIRIN, 5068*
    - GALACTOSAMINE, 7431*
  - HEPATOMEGALY
    - HYPOLIPEMIC AGENTS, 7454
    - PHENOBARBITAL, 5417*
  - HYPERBILIRUBINEMIA
    - BILIRUBIN, 5072*
    - DRUG EFFECTS ON, 3812
    - NEONATE, 7772*
    - PREGNANCY, 8336*
  - HYPERCHLORHYDRIA, 2828
  - HYPERTENSION, PORTAL
    - ALKALOIDS, 6450*
  - INTESTINAL OBSTRUCTION
    - BILE ACIDS AND SALTS, 7765
    - CHILD, 7765
  - INTESTINE, SMALL
    - WOUNDS AND INJURIES, 4127
  - INTESTINES
    - ULCER, 8102*
  - JAUNDICE
    - ANTIBIOTICS, 6446*
    - ETIOLOGY, 6446*
    - HEPATITIS, CHRONIC, 6443*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
    - NEONATE, 7772*
    - TOXICITY, 8344
  - JAUNDICE, CHOLESTATIC
    - SEDATIVES, 8346
  - LIVER
    - ANEURYSM, 7138*
    - CHOLECYSTITIS, 1589
    - FIBROSIS, 7139*
    - GRANULOMA, 7142*
    - HYPERPLASIA, 171
    - HYPERTROPHY, 171
    - NECROSIS, 1589, 4673, 7778
    - NEOPLASMS, 6799, 6800, 7474

DRUG-INDUCED (continued)
- LIVER (continued)
    - NEOPLASMS, BENIGN, 7767
- LIVER CIRRHOSIS
    - AGE FACTORS, 7139*
    - ALCOHOLS, 7139*
    - ANALGESICS AND ANTIPYRETICS, 6440*
    - CARBON TETRACHLORIDE, 4664
    - CLEARANCE STUDY, 4664
    - DRUG METABOLISM, 4664
    - PHENOBARBITAL, 4664
- LIVER COMA
    - ANALGESICS AND ANTIPYRETICS, 3416*
    - COMPLICATIONS, 3416*
- LIVER INJURY, 5069*, 5827*, 5848*, 5849
    - ALCOHOLS, 1511
    - ALKALOIDS, 6450*
    - ANALGESICS AND ANTIPYRETICS, 3416*, 6440*, 6441*, 6449*
    - ANESTHETICS, 7778
    - ANTI-INFLAMMATORY AGENTS, 7142*
    - BIOCHEMISTRY, 7136*
    - CARBON TETRACHLORIDE, 5416*
    - CHOLESTASIS, 1511
    - COLLAGEN, 8023*
    - COMPLICATIONS, 3416*
    - GALACTOSAMINE, 8028*
    - GLYCOSIDES, 1504
    - GROWTH SUBSTANCES, 1169
    - HEPATITIS, 1511
    - HORMONE EFFECTS ON, 1511
    - LEUKEMIA, 2464*
    - OXIDOREDUCTASES, 7406*
    - PREVENTION, 8028*
    - REVIEW, 1511, 7137*, 7141*
    - SEDATIVES, 8346
    - THERAPY, 7141*
    - TOXINS, 7137*
    - TRANQUILIZING AGENTS, 6126
    - TUBERCULOSIS, 7780
    - ULTRASTRUCTURE, 4279*
- MITOCHONDRIA
    - HEPATOCYTES, 6122
- NEOPLASMS
    - BILIARY TRACT, 6797
- NEOPLASMS, MALIGNANT
    - PREGNANCY, 6617
- PANCREAS
    - NECROSIS, 2854
    - NEOPLASMS, MALIGNANT, 3746, 4984
- PANCREATITIS
    - ACIDOSIS, 5787*
    - ANALGESICS AND ANTIPYRETICS, 3339*
    - CERULEIN, 4589*
    - HEMORRHAGE, 5787*
- PELIOSIS HEPATIS
    - ANDROGENS, 8299*
- PERITONITIS
    - ANTI-INFLAMMATORY AGENTS, 8102*
    - SCLEROSIS, 4110*
- PORPHYRIA
    - SIMULATION, 8026*
- PORPHYRINS
    - EMBRYOLOGY, 2948
    - LIVER, 2948
- PROCTITIS
    - COLITIS, 3275*
- RECTUM
    - NEOPLASMS, MALIGNANT, 4696

DRUG-INDUCED (continued)
- SALIVARY GLANDS, 5348
- STOMACH
    - ULCER, 1314, 5373, 6050
    - ULCER, PEPTIC, 3155
    - WOUNDS AND INJURIES, 1909, 2269
- ULCER
    - ALCOHOLS, 4089
    - AMINO ACIDS, 6050
    - ANTI-INFLAMMATORY AGENTS, 8102*
    - ASPIRIN, 2820
    - DRUG EFFECTS ON, 2147
    - DRUG THERAPY, 1921
    - DUODENUM, 4089
    - HORMONES, ADRENAL CORTEX, 5373
    - PEPSINOGEN, 5373
- ULCER, PEPTIC
    - ALCOHOLS, 3191
    - ASPIRIN, 2827
    - HEALING, 3191
    - MORPHOLOGY, 3191

DRUG METABOLISM
- ALCOHOLISM, 6515, 7803*
- ALCOHOLS, 6515
    - ENZYMES, 1020*, 1037
- ANALGESICS AND ANTIPYRETICS
    - NECROSIS, 2105*
    - SULFHYDRYL COMPOUNDS, 2105*
- ANTI-INFLAMMATORY AGENTS, 7508*
- BILIARY TRACT, 7848
- CATECHOLAMINES
    - CYTOCHROMES, 2103
    - OXIDATION, 2103
    - TOXICITY, 2103
- CHOLAGOGUES AND CHOLERETICS, 4630*
- CHOLESTASIS
    - CYTOCHROMES, 1082
    - DRUG EFFECTS ON, 6411*
    - ENZYMES, 1082
    - HYPERBILIRUBINEMIA, 5023*
    - HYPNOTIC AGENTS, 2047, 5025*
    - SEDATIVES, 5025*
    - SIMULATION, 1082
- COLITIS, ULCERATIVE
    - DRUG THERAPY, 856
- CROHN'S DISEASE
    - DIETARY FACTORS, 7283
- DIABETES
    - DRUG-INDUCED, 2903
- DIET
    - ENZYMES, 1037
    - SUCROSE, 5499
- DRUG EFFECTS ON, 7508*
    - ANTACIDS, 3615
- ENZYMES
    - SOLVENTS, 2901
- EXCRETION
    - KIDNEYS, 5500
    - LIVER, 5500
- GASTROINTESTINAL SYSTEM
    - DRUG EFFECTS ON, 3615
- GILBERT'S DISEASE
    - FAMILIAL FACTORS, 2478
    - PHENOBARBITAL, 7775
- HEPATITIS, INFECTIOUS, 5088*
- HEPATITIS, TOXIC
    - HYPNOTIC AGENTS, 2047

- DRUG METABOLISM (continued)
  - HEPATOCYTES
    - ALCOHOLS, 5398*
    - ANALGESICS AND ANTIPYRETICS, 2105*
    - CELL CULTURE, 4611*
  - HORMONE EFFECTS ON
    - ENZYMES, 8007*
  - INSECTICIDES
    - LIVER, 1981
    - MICROSOMES, 1981
  - INTESTINE, SMALL
    - HYPNOTIC AGENTS, 6396*
  - JEJUNUM, 2071
  - LIVER, 8066
    - AGE FACTORS, 125, 6080*
    - ANALGESICS AND ANTIPYRETICS, 4636, 8029*
    - ANTIBIOTICS, 1172
    - ANTIHYPERTENSIVE AGENTS, 8029*
    - BILIRUBIN, 1030
    - BIOCHEMISTRY, 1028
    - CATECHOLAMINES, 2103
    - CHELATING AGENTS, 8033*
    - DIURETICS, 8029*
    - DRUG EFFECTS ON, 4636, 7412*
    - ENZYMES, 599, 1020*, 1043, 1062, 2155, 2959, 3790, 4636, 8065
    - FUNGICIDES, 1034
    - GLUTATHIONE, 4658
    - HEPATITIS, 7477
    - HORMONE EFFECTS ON, 8007*
    - HORMONES, ADRENAL CORTEX, 2951
    - HYPNOTIC AGENTS, 2047
    - HYPOCHOLESTEREMIC AGENTS, 1170
    - INSECTICIDES, 1062
    - MICROSOMES, 4636, 8029*
    - NEOPLASMS, 7746*
    - PERFUSION, 8031*
    - PHENOBARBITAL, 5418*
    - PORPHYRIA, 586
    - PROTEINS, 3790
    - REVIEW, 599
    - SCHISTOSOMIASIS, 2958
    - SULFOBROMOPHTHALEIN, 4658
    - TECHNIQUES, 8031*
    - URINARY SYSTEM, 4451
  - LIVER CIRRHOSIS, 5088*
    - ANTICONVULSANTS, 7811*
    - DRUG EFFECTS ON, 6411*
    - DRUG-INDUCED, 4664
    - KINETICS, 8310
    - LIVER FUNCTION TESTS, 7746*
    - MICROSOMES, 4664
  - LIVER DISEASES
    - ANALGESICS AND ANTIPYRETICS, 601, 7084*
    - ANESTHETICS, LOCAL, 601
    - ENZYMES, 8034*
    - HYPERBILIRUBINEMIA, 5023*
    - INDOCYANINE GREEN, 1468
    - MARKER STUDY, 1468
    - PROTEINS, 8283*
    - REVIEW, 8283*
    - SEDATIVES, 8325
  - LIVER INJURY, 617
    - ENZYMES, 1081, 2155, 8034*
  - MICROSOMES
    - DISEASE, 2902
    - ENZYMES, 2902
    - LIVER, 2902

- DRUG METABOLISM (continued)
  - MOTILIN
    - PLASMA, 2984*
  - NEOPLASM METASTASIS
    - LIVER FUNCTION TESTS, 7746*
  - RETICULOENDOTHELIAL SYSTEM
    - ENZYMES, 2959
  - SCHISTOSOMIASIS
    - LIVER, 4674
  - SHUNT, INTESTINAL
    - OBESITY, 5673
  - STEROIDS
    - MICROSOMES, 1980
  - TRANQUILIZING AGENTS
    - ENZYMES, 1020*
  - URINE, 2601

- DRUG THERAPY
  - ACRODERMATITIS
    - ZINC, 6974
  - ALCOHOLISM
    - ASCITES, 6506*
  - AMEBIASIS, 3565, 5973
    - DYSENTERY, 6659
    - TOLERANCE, 3566
  - ANCYLOSTOMIASIS
    - CHILD, 839
  - ANTHELMINTICS
    - COMPLICATIONS, 6663
  - ANTIBACTERIALS
    - COLITIS, 2369*
    - DIARRHEA, 2369*
    - SEQUELAE, 2369*
  - ANTIBIOTICS
    - COMPLICATIONS, 3521*, 3522*, 3523*, 4936, 6532*
  - ASCARIASIS, 6644*, 8503
  - ASCITES
    - DIURETICS, 6506*
  - AUSTRALIA ANTIGEN
    - CARRIER STATE, 2487*
    - HEPATITIS, INFECTIOUS, 2487*
  - BILE ACIDS AND SALTS
    - CHILD, 7765
    - INTESTINAL OBSTRUCTION, 7765
  - BILE DUCTS
    - CALCULI, 8425*
  - BILIARY TRACT
    - INFECTION, 2582
  - BILIARY TRACT DISEASES
    - BACTERIAL INFECTIONS, 5140*
  - CALCULI
    - SOLUBILITY, 762
  - CATHARTICS
    - LIPIDS, 2643
  - CELIAC DISEASE
    - GLUTEN, 4141
  - CHOLANGITIS
    - SCLEROSIS, 6562*
  - CHOLECYSTITIS
    - ANTIBIOTICS, 1586
    - CHOLAGOGUES AND CHOLERETICS, 4365*
  - CHOLELITHIASIS, 761
    - CHENODEOXYCHOLIC ACID, 3498*, 3514, 4364*, 4670, 5922*, 7824*, 8429*
    - CHOLIC ACID, 4670, 5145*
    - SOLUBILITY, 762
    - SOLVENTS, 5144*, 5145*

DRUG THERAPY (continued)
    CHOLESTASIS
        COMPLICATIONS, 7765
        PHENOBARBITAL, 3517
    COLITIS, 3322
        DRUG-INDUCED, 4730
    COLITIS, ULCERATIVE
        ANEMIA, 5770
        ANTI-INFLAMMATORY AGENTS, 7719
        COMPLICATIONS, 5770, 6357
        CROHN'S DISEASE, 6353
        DIAGNOSIS, 6353
        DRUG METABOLISM, 856
        HYPERSENSITIVITY, 515
        IMMUNOTHERAPY, 7719
        METABOLISM, 6357
        SURGERY, 8266
    COLON
        CROHN'S DISEASE, 8517
        NEOPLASMS, 1135, 8233*
        NEOPLASMS, MALIGNANT, 5711*
        SPASM, 4721
    COMMON BILE DUCT CALCULI, 1630
        BILE ACIDS AND SALTS, 8425*
        CHOLIC ACID, 5145*
        HEPARIN, 8425*
        SOLVENTS, 5144*, 5145*
    CONSTIPATION
        PREGNANCY, 5195
        REVIEW, 2634
    CROHN'S DISEASE, 1737, 3576*, 3581, 6671*, 8512
        ADOLESCENCE, 5256*
        ANTI-INFLAMMATORY AGENTS, 1736, 7719
        COMPLICATIONS, 7286
        DIAGNOSIS, 6353
        DRUG METABOLISM, 856
        HORMONES, ADRENAL CORTEX, 8517
        ILEUM, 7276*
        IMMUNOSUPPRESSION, 5978*
        IMMUNOTHERAPY, 7719
        STEROIDS, 8517
        SURGERY, 8266
    DERMATITIS HERPETIFORMIS, 4869*
    DIARRHEA, 769*, 1678, 7030, 7897*
        AGE FACTORS, 2369*
        NEONATE, 4426
        STEROIDS, 2642
        SURGERY, 4426
    DUODENUM
        INFLAMMATION, 354
        ULCER, 354, 3195*, 3198*, 3202, 3204, 4073*, 4084
        ULCER, PEPTIC, 4833*, 6914*, 6917*, 7572*, 8189
    DYSENTERY
        AMEBIASIS, 824
        CHILD, 824, 6659
    DYSPEPSIA, 3170, 4826
    DYSTROPHY
        L-DOPA, 3893
    ENTERECTOMY
        DIARRHEA, 7897*
    ENTERITIS
        LACTASE, 3237
    ENTEROCOLITIS, 3544, 7004
    ESOPHAGUS
        REFLUX, 2749, 5309*

DRUG THERAPY (continued)
    ESOPHAGUS (continued)
        SPASM, 1264*
    FASCIOLIASIS, 5958, 5959
        SIMULATION, 1717
    FATTY LIVER
        ANTI-INFLAMMATORY AGENTS, 7121
    GALLSTONES
        CHEMICAL PROPERTIES, 8002*
        CHOLESTEROL, 1609
        CHOLIC ACID, 5145*
        SOLVENTS, 5144*, 5145*
    GASTRIN
        SERUM, 2294
    GASTRITIS
        ANTRUM, 3178
        HEMORRHAGE, 339, 1285*
        SECRETION, 6228
        VITAMIN E, 6228
    GASTROENTERITIS
        EOSINOPHILS, 788
    GASTROINTESTINAL DISEASES
        NEOPLASMS, 1323
    GASTROINTESTINAL SYSTEM
        BLEEDING, 2253
        HEMORRHAGE, 1286*, 7186*
        NEOPLASMS, MALIGNANT, 7858, 7876
        REVIEW, 7858
    GIARDIASIS, 5966, 7892*
        CHILD, 3569
        DIARRHEA, 2665
        TOLERANCE, 3569
    GILBERT'S DISEASE, 1506*
    H2 RECEPTOR ANTAGONISTS
        COMPLICATIONS, 6916*
    HELMINTHIASIS, 831, 833, 834, 835, 836, 837, 8503
        CHILD, 838
        IMMUNOLOGY, 832
        INTESTINES, 1720
        METABOLISM, 832
        NERVOUS CONTROL, 832
    HEPATITIS
        IMMUNOSUPPRESSION, 5091
        LIVER INJURY, 8374
    HEPATITIS, CHRONIC, 5105*
        ALKALINE PHOSPHATASE, 8387
        ANTI-INFLAMMATORY AGENTS, 2556
        BLOOD, 8387
        CHILD, 5883
        ENZYMES, 651
        HORMONES, ADRENAL CORTEX, 8384*, 8385*
        PROGNOSIS, 2524*, 8388
        TOXICITY, 2556
    HEPATITIS, INFECTIOUS, 2521, 5087*, 5851*
        CHILD, 668
        COENZYMES, 664
        COMA, 670
        ENZYMES, 651
        HORMONES, ADRENAL CORTEX, 667
        IMMUNOGLOBULINS, 7786*
        IMMUNOSUPPRESSION, 5091
        REVIEW, 5853*
        SIMULATION, 1176
    ILEITIS, 5989
    INTESTINES
        BACTERIA, 1670

- DRUG THERAPY (continued)
  - INTESTINES (continued)
    - GIARDIASIS, 3572
    - HELMINTHIASIS, 830
    - INFLAMMATION, 7719
    - NEOPLASMS, MALIGNANT, 470
    - PARASITES AND PARASITIC DISEASES, 1713
    - PROTOZOAL DISEASES, 3551, 3572
    - TUBERCULOSIS, 6588*
  - IRRADIATION
    - NEOPLASMS, MALIGNANT, 2631
  - IRRITABLE COLON
    - ADRENERGIC RECEPTOR AGONISTS, 5738
    - PARASYMPATHOLYTICS, 7671
  - JAUNDICE, 1506*
    - NEONATE, 7134
  - JAUNDICE, CHRONIC IDIOPATHIC, 1506*, 7773*
  - KERNICTERUS, 2536*
    - L-DOPA, 7763
  - LIPODYSTROPHY, INTESTINAL
    - ANTIBIOTICS, 5705*
  - LIVER
    - ABSCESS, 2449*
    - AMEBIASIS, 1472, 6660
    - CHOLECYSTITIS, 1589
    - CYSTS, 1460*
    - DETOXIFICATION, 8317
    - DYSTROPHY, 3930, 8074
    - NEOPLASM METASTASIS, 556
    - NEOPLASMS, 555, 3389, 7099*, 8289*
    - NEOPLASMS, MALIGNANT, 3388, 6403*
    - PORPHYRIA, 8311
    - TRANSPORT, 1159
  - LIVER CIRRHOSIS, 2536*, 7820, 7821
    - ALKALINE PHOSPHATASE, 8387
    - ANALYSIS, 2557
    - ANTI-INFLAMMATORY AGENTS, 2556
    - ASCITES, 5903*
    - BLOOD, 8387
    - CHENODEOXYCHOLIC ACID, 1555*
    - COMPLICATIONS, 5896*
    - L-DOPA, 2561
    - EDEMA, 5903*
    - KIDNEY DISEASES, 698*
    - PERITONITIS, 6507*
    - TOXICITY, 2556
  - LIVER CIRRHOSIS, OBSTRUCTIVE, 3469*
  - LIVER COMA
    - ANTIBIOTICS, 5119*
  - LIVER DISEASES, 2536*, 3454*, 8308
    - COMPLICATIONS, 7122
    - KINETICS, 7752*
  - LIVER DISEASES, ALCOHOLIC
    - ASCITES, 6506*
    - COMPLICATIONS, 5896*
    - HORMONES, ADRENAL CORTEX, 1549
    - RENIN, 1549
  - LIVER INJURY, 8074
    - NITROSAMINES, 1165
  - LYMPHANGIECTASIS
    - TRIGLYCERIDES, 4105*
  - MALLORY-WEISS SYNDROME
    - DIAGNOSIS, 1329
  - MEGACOLON
    - SURGERY, 495
  - MOVEMENT DISORDERS
    - BILIARY TRACT, 4369*

- DRUG THERAPY (continued)
  - NAUSEA
    - REVIEW, 8479
  - NEOPLASM METASTASIS
    - LIVER, 5019*
  - NEOPLASMS
    - REVIEW, 7247
    - SURGERY, 7247
  - NEOPLASMS, MALIGNANT
    - COMPLICATIONS, 4911*
    - DIARRHEA, 4911*
    - GASTROINTESTINAL SYSTEM, 771
    - LIVER, 557
    - MALABSORPTION SYNDROMES, 4911*
    - REVIEW, 771, 7858
    - SEQUELAE, 557
    - STEATORRHEA, 4911*
  - PANCREAS
    - INFLAMMATION, 2427
    - NEOPLASMS, 6373
    - NEOPLASMS, MALIGNANT, 6360*
  - PANCREATIC DISEASES
    - H2 RECEPTOR ANTAGONISTS, 2415*
  - PANCREATITIS, 3347, 3348, 4228
    - SIMULATION, 2436, 3736
  - PANCREATITIS, CHRONIC, 3348
    - CHOLECYSTOKININ, 5001
  - PARASITES AND PARASITIC DISEASES, 1721, 5252, 5496
    - ANTHELMINTICS, 6663
  - PERITONITIS
    - ANTIBIOTICS, 6507*
  - PORPHYRIA, 8300*
  - RECTUM
    - CROHN'S DISEASE, 8517
    - NEOPLASMS, 8233*
    - NEOPLASMS, MALIGNANT, 5711*, 7703, 7715
  - SALIVARY GLANDS
    - NEOPLASMS, MALIGNANT, 8452*
  - SALMONELLOSIS
    - ANTIBIOTICS, 8474, 8475
    - CARRIER STATE, 1700
  - SCHISTOSOMIASIS
    - ANALYSIS, 6669
    - CHILD, 1726
    - TECHNIQUES, 6661
  - SIGMOID
    - NEOPLASMS, MALIGNANT, 7715
  - SODIUM
    - DEFICIENCY, 6532*
  - STOMACH
    - DYSTROPHY, 3893
    - NEOPLASM METASTASIS, 6249
    - NEOPLASMS, 6877*
    - NEOPLASMS, MALIGNANT, 328, 3168
    - STASIS, 3145*
    - ULCER, 350, 354, 378, 3187, 3188, 3189, 3204
    - ULCER, PEPTIC, 5595*, 6270, 6915*, 6927, 7573*, 8189
  - STOMACH DISEASES, 317
  - ULCER
    - BLEEDING, 2290
    - DUODENUM, 2291, 5639
    - H2 RECEPTOR ANTAGONISTS, 5626*
    - REVIEW, 5639
    - STOMACH, 6880

- DRUG THERAPY (continued)
  - ULCER, PEPTIC, 2831, 3196*, 4083, 4721
    - ANTACIDS, 6914*, 7587, 8187
    - BISMUTH COMPOUNDS, 2811
    - CARBENOXOLONE, 1345, 1346
    - CHEMICAL PROPERTIES, 6928
    - COMPLICATIONS, 6927
    - DIETARY FACTORS, 2292
    - L-DOPA, 8189
    - EDEMA, 6927
    - GASTRIN, 2294
    - GASTRODUODENITIS, 6930
    - H2 RECEPTOR ANTAGONISTS, 2295, 5595*, 6904, 6916*, 6917*, 7357, 8188
    - HYPERTENSION, 6927
    - PROGNOSIS, 379
    - RECURRENCE, 1350
    - SECRETION, 2292
    - STRESS, 2292
    - VITAMINS, 388
  - VAGOTOMY
    - DIARRHEA, 2591*, 7854*
    - STASIS, 3145*
  - VOMITING
    - REVIEW, 8479
  - WILSON'S DISEASE
    - DIAGNOSIS, 5822*
  - ZOLLINGER-ELLISON SYNDROME
    - H2 RECEPTOR ANTAGONISTS, 5224

- DRUG TOXICITY
  - LIVER
    - ANTIBACTERIALS, 4281

- DUBIN-JOHNSON SYNDROME
  - SEE JAUNDICE, CHRONIC IDIOPATHIC

- DUMPING SYNDROME
  - ABSORPTION
    - GALACTOSE, 4058
    - GLUCOSE, 4058
    - MONOSACCHARIDES, 4058
  - ALCOHOLS
    - KININS, 5477*
  - ANTRUM
    - ETIOLOGY, 337
  - BLOOD
    - KININS, 5477*
  - DIAGNOSIS
    - KININS, 4044*
    - RADIOLOGY, 4059, 4825
    - REVIEW, 3169
  - DISACCHARIDES
    - HYDROLYSIS, 4058
  - DUODENUM
    - SURGERY, 4056
  - ETIOLOGY
    - NERVOUS CONTROL, 1302
    - RADIOLOGY, 4059
  - GASTRECTOMY, 6255
    - COMPLICATIONS, 4044*, 5598*
    - HORMONES, ADRENAL CORTEX, 7592
    - SURGERY, 2766
    - THERAPY, 2766
  - INTESTINE, SMALL
    - MOTILITY, 2754, 3655
    - THERAPY, 3655

- DUMPING SYNDROME (continued)
  - KININS
    - TECHNIQUES, 4044*
  - LACTOSE
    - HYDROLYSIS, 4058
  - MOTILITY
    - HUMORAL FACTORS, 2754
    - HYPERGLYCEMIA, 2754
  - OSMOTIC PRESSURE
    - NERVOUS CONTROL, 1302
  - PREVENTION
    - ANTIDIARRHEALS, 5598*
    - CARBOHYDRATES, 5598*
  - PYLOROPLASTY
    - COMPLICATIONS, 5598*
  - SERUM
    - PROTEINS, 4056
  - SIMULATION, 2754
  - STOMACH
    - MOTILITY, 4059
  - SURGERY
    - TECHNIQUES, 6892
    - THERAPY, 4057
  - THERAPY
    - ALCOHOLS, 5477*
    - HORMONES, GASTROINTESTINAL, 4057
    - REVIEW, 1303, 3169
    - SECRETIN, 4057
    - TRANSPLANTATION, 3655
  - ULCER, PEPTIC
    - SURGERY, 6918*
    - VAGOTOMY, 6918*, 6934
  - VAGOTOMY
    - COMPLICATIONS, 5598*
    - ULCER, 7322*

- DUODENECTOMY
  - GASTRIN
    - SOMATOSTATIN, 3225
  - HORMONES, GASTROINTESTINAL, 202

- DUODENITIS
  - BURNS, 415
  - CALCIFICATION
    - GALLBLADDER, 3507*
  - CHILD
    - DIAGNOSIS, 8205
    - ENDOSCOPY, 8206
  - CHOLECYSTITIS
    - DISEASES ASSOCIATED WITH, 4380
  - DIAGNOSIS
    - REVIEW, 8204
  - DISEASES ASSOCIATED WITH
    - REVIEW, 8204
  - DUODENUM
    - ULCER, PEPTIC, 4835*
  - ENDOSCOPY, 7616
    - PATHOLOGY, 414
  - ETIOLOGY
    - REVIEW, 8204
    - ULCER, 4884
  - GASTROINTESTINAL SYSTEM
    - HEMORRHAGE, 4436
  - GENETIC FACTORS
    - EPIDEMIOLOGY, 3234
  - GIARDIASIS
    - CHOLECYSTITIS, 5963

DUODENITIS (continued)
- HEARTBURN
  - ETIOLOGY, 4061
- INFLAMMATION
  - CELLS, 8191*
  - MORPHOLOGY, 8191*
- PYLOROPLASTY, 4835*
- REVIEW, 8208
- ULCER, 4095
- ULCER, PEPTIC
  - GENETIC FACTORS, 3234
- VAGOTOMY, 4835*

DUODENOSCOPY
- BILIARY TRACT DISEASES
  - DIAGNOSIS, 8439
  - THERAPY, 8439
- CHOLANGIOGRAPHY
  - CONTRAST MEDIA, 3118
- JAUNDICE, 4359*
- PANCREATIC DISEASES
  - DIAGNOSIS, 8439
  - THERAPY, 8439

DUODENOSTOMY
- GASTRITIS, 3716
- STOMACH
  - REFLUX, 3716

DUODENUM
- SEE ALSO ILEUM. INTESTINE, SMALL, JEJUNUM
- ABDOMEN
  - ADHESIONS, 3158
- ABSORPTION
  - AMINO ACIDS, 3236
  - IRON, 31
- ACID SECRETION
  - ULCER, 385
- ACIDITY
  - SECRETIN, 6819*
  - SECRETION, 1337*
- ACIDS, 3841
  - GLUCAGON, 953*
  - PERFUSION, 1873*
  - SECRETIN, 953*
  - SEROTONIN, 1873*
  - STOMACH, 3140*
  - ULCER, 4090
- ALKALIS, 2836*
- AMINO ACIDS, 3630*
  - ABSORPTION, 3601*
- AMINO PEPTIDASES
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
- ANGIOGRAPHY
  - HEMORRHAGE, 2252
- ANOMALY
  - AGE FACTORS, 7610, 7619
  - COMPRESSION, 416
  - ENDOSCOPY, 402, 1219
  - GENETIC FACTORS, 416
  - RADIOLOGY, 7610, 7619
  - SEX FACTORS, 7619
  - SURGERY, 402
- ANTRUM
  - REFLUX, 2278

DUODENUM (continued)
- ATRESIA
  - ALPHA FETOPROTEIN, 411
  - FETUS, 411
- BACTERIA, 7834
- BARIUM
  - TECHNIQUES, 2193
- BICARBONATE SECRETION
  - SECRETIN, 2287*
- BILE
  - SECRETION, 141
  - SURGERY, 141
- BILE ACIDS AND SALTS
  - AMINO ACIDS, 3601*
  - ANALYSIS, 2186
  - CHELATING AGENTS, 812
- BILE DUCTS
  - DIVERTICULUM, 523
- BINDING
  - VITAMIN D, 2974
- BLEEDING
  - STRESS, 343
  - ULCER, 355
- BRUNNER'S GLANDS
  - HYPERTROPHY, 8212
- BURNS
  - ULCER, 415
- CADMIUM
  - PERMEABILITY, 5337
- CALCIUM
  - ABSORPTION, 2700*, 2974
  - BINDING, 2974
  - CADMIUM, 5337
  - FECES, 2700*
  - PROTEINS, 2974
  - TRANSPORT, 2722, 5288*
  - ULTRASTRUCTURE, 6129*
- CALCULI
  - ENDOSCOPY, 3512
  - PERFORATION, 428
  - RADIOLOGY, 3512
- CARCINOID TUMOR
  - PROGNOSIS, 3272*
  - THERAPY, 3272*
- CELIAC DISEASE
  - BIOPSY, 2344*
  - ENDOSCOPY, 2344*
  - EPITHELIUM, 3253*
  - MORPHOLOGY, 3253*
- CELLS
  - EMBRYOLOGY, 7288*
  - HYPERPLASIA, 6979*
  - KINETICS, 3826
- CHOLANGIOGRAPHY
  - COMPLICATIONS, 2206
- CHOLECYSTOKININ
  - ENZYMES, 3999
  - RADIOIMMUNOASSAY, 3592
- CIRCULATION
  - ACIDITY, 5470*
  - HEMORRHAGE, 4704*
  - HORMONE EFFECTS ON, 4700*
  - HORMONES, GASTROINTESTINAL, 4700*
  - HYPOXIA, 1141
  - STRESS, 1141
- COBALT
  - KINETICS, 17*

DUODENUM (continued)

- COLON
  - FISTULA, 5668
  - NEOPLASMS, MALIGNANT, 5668
- CROHN'S DISEASE
  - DIAGNOSIS, 3582
  - DISEASES ASSOCIATED WITH, 3582
  - FISTULA, 8509*
  - NEOPLASMS, 3582
  - REVIEW, 3582, 5980*
  - STOMACH, 4473*
- CYSTS
  - RADIOLOGY, 2326
- CYTOLOGY
  - IRRADIATION, 5467*
  - RADIATION EFFECTS ON, 5467*
- DERMATITIS HERPETIFORMIS
  - EPITHELIUM, 3253*
  - MORPHOLOGY, 3253*
- DILATATION, 3232
- DISACCHARIDASES
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
- DISEASE
  - DIAGNOSIS, 243
- DISTENTION
  - PHYSICAL FACTORS, 54
- DIVERTICULUM, 4882, 7614
  - BLEEDING, 1367
  - CHOLECYSTITIS, 4380
  - CHROMOSOMES, 1366
  - COMMON BILE DUCT CALCULI, 4883
  - DIAGNOSIS, 8199
  - DIVERTICULITIS, 1367
  - ENDOSCOPY, 4883
  - PERFORATION, 5662
  - RADIOLOGY, 3233
- DRAINAGE
  - DIAGNOSIS, 1185*
- DRUG EFFECTS ON
  - SECRETIN, 3209
- DYSPEPSIA
  - BARIUM, 6260
  - CONTRAST MEDIA, 6260
  - ENDOSCOPY, 6260
  - ULCER, 2610
- ELECTRICAL CONTROL
  - SURGERY, 1849
- ELECTROPHYSIOLOGY
  - DRUG EFFECTS ON, 2761
  - ENDOSCOPY, 1823*
  - GLUCOSE, 2694*
  - HORMONES, GASTROINTESTINAL, 945
  - MOTILIN, 944, 2760
  - SURGERY, 1849
  - VAGOTOMY, 2765, 5324*
- ENDOSCOPY, 237, 6868, 6971
  - BIOPSY, 6164
  - COMPLICATIONS, 2320, 3931*, 3984, 8142
  - CONTRAST MEDIA, 6859
  - DIAGNOSIS, 3041*
  - REVIEW, 8142
  - TECHNIQUES, 2320, 3997
  - THERAPY, 4027
  - WOUNDS AND INJURIES, 2320
- ENTERITIS, REGIONAL
  - CROHN'S DISEASE, 4473*
  - STOMACH, 4473*

DUODENUM (continued)

- ENTEROKINASE
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
- ENZYMES
  - CADMIUM, 7507
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
  - FATTY ACIDS, 6763*
- EPITHELIUM
  - HISTOCHEMISTRY, 954
  - PENTAGASTRIN, 1343*
- ESOPHAGUS
  - ENDOSCOPY, 3931*
  - MOTILITY, 4687
- FATTY ACIDS
  - CALCIUM, 2700*
- FERRITIN
  - IRON, 2187
  - TRANSPORT, 7917*
- FETUS
  - MORPHOLOGY, 1762
  - ULTRASTRUCTURE, 1762
- FISTULA
  - DIAGNOSIS, 2328
  - NEOPLASMS, MALIGNANT, 5668
- GALLBLADDER
  - FISTULA, 766
- GARDNER'S SYNDROME
  - NEOPLASMS, 5654*
  - POLYPS, 5654*
- GASTRECTOMY
  - ELECTROPHYSIOLOGY, 2763
- GASTRIN
  - ANALYSIS, 1754*
  - PATHOLOGY, 323
  - RADIOIMMUNOASSAY, 3592
  - SURGERY, 2353
  - ULCER, 2271, 2602
  - VAGOTOMY, 4074*
- GASTROINTESTINAL DISEASES
  - GASTRIN, 2306
- GIARDIASIS
  - ENDOSCOPY, 4463
  - INTUBATION, 6658
  - ULTRASTRUCTURE, 2660*
- GLUCAGON, 4690
  - GASTRIN, 953*
  - HORMONE EFFECTS ON, 953*
  - HORMONES, GASTROINTESTINAL, 953*
- GLUCOSE
  - INSECTICIDES, 5299
  - TRANSPORT, 5299
- GLYCOSIDES
  - METABOLISM, 3599*
- HAMARTOMA
  - INTUSSUSCEPTION, 5659
- HEMATOMA
  - THERAPY, 4872*
- HEMORRHAGE, 4831
  - ANTICOAGULANTS, 2237*
  - DRUG-INDUCED, 3547
  - EMBOLIZATION, 315*
  - ENDOSCOPY, 4757
  - ETIOLOGY, 3213
  - FISTULA, 2328
  - RADIOLOGY, 4757
  - STRESS, 2237*
  - SURGERY, 3213
  - THERAPY, 5228, 5942

DUODENUM (continued)
- HERNIA
  - DIAGNOSIS, 4118
  - INTESTINAL OBSTRUCTION, 423
- HISTOLOGY
  - DIAGNOSIS, 3041*
- HORMONES
  - ACID SECRETION, 7344*
  - GROWTH FACTORS, 8085*
- HORMONES, ADRENAL CORTEX
  - GROWTH FACTORS, 8085*
- HORMONES, GASTROINTESTINAL, 1872*
  - INSULIN, 7956*
- HYPERPLASIA
  - CELIAC DISEASE, 6979*
- ILEAL DISEASES
  - BILE ACIDS AND SALTS, 2311*
- IMMUNOGLOBULINS
  - CHILD, 2345*
  - TRANSPORT, 7917*
- INFLAMMATION
  - ANGIOGRAPHY, 7608*
  - DRUG THERAPY, 354
  - ELECTROPHYSIOLOGY, 1823*
  - ENDOSCOPY, 1823*
- INTESTINAL OBSTRUCTION
  - ETIOLOGY, 7113*
  - NEONATE, 7113*
- INTESTINE, SMALL, 8197
- INTRINSIC FACTOR
  - ANEMIA, PERNICIOUS, 1377
- INTUSSUSCEPTION
  - HETEROTOPIA, 1375
- IRON
  - ABSORPTION, 1771*, 2703*
  - KINETICS, 17*
  - PROTEINS, 5459
  - STARCH, 1771*
- ISCHEMIA, 4690
  - BLEEDING, 4720
  - PATHOLOGY, 4720
- LAPAROSCOPY
  - TECHNIQUES, 3997
- MALABSORPTION SYNDROMES
  - BILE ACIDS AND SALTS, 3249*
- METALS
  - CADMIUM, 7507
- MITOSIS
  - IRRADIATION, 5467*
  - RADIATION EFFECTS ON, 5467*
- MORPHOLOGY
  - AMINES, 6742
  - ANALGESICS AND ANTIPYRETICS, 6884
  - ASPIRIN, 6884
  - DRUG EFFECTS ON, 6742, 6884
- MOTILIN, 2761, 4693
- MOTILITY
  - ACID-BASE BALANCE, 59
  - ALKALOIDS, 7941
  - AMINO ACIDS, 3653
  - ANTIEMETICS, 2740*
  - ASPIRIN, 2730*
  - CATECHOLAMINES, 7950
  - CHOLECYSTOKININ, 5314*
  - DRUG EFFECTS ON, 2730*, 2740*, 2761, 3209, 5314*, 7941, 7950
  - ELECTROPHYSIOLOGY, 920, 4541, 7938*
  - EPINEPHRINE, 7950

DUODENUM (continued)
- MOTILITY (continued)
  - FEEDING, 1148
  - HORMONES, 922
  - MORPHOLOGY, 7938*
  - NERVOUS CONTROL, 57, 5313*, 6698*
  - PARASYMPATHOLYTICS, 922
  - PROTEINS, 3653
  - REVIEW, 57
  - VAGOTOMY, 1148, 5324*
- MOVEMENT DISORDERS
  - CHOLECYSTITIS, 4380
- MUSCLES
  - ACETYLCHOLINE, 2759
  - MOTILIN, 2759, 2760
  - NERVOUS CONTROL, 5313*
- MYCOSES
  - RADIOLOGY, 4393*
- NEOPLASM METASTASIS
  - POLYPS, 6969
- NEOPLASMS, 3243, 4887
  - ANGIOGRAPHY, 3239
  - ENDOSCOPY, 6976
  - RADIOLOGY, 1222
  - TECHNIQUES, 1222
- NEOPLASMS, BENIGN, 8196
  - BRUNNER'S GLAND, 409
  - DIAGNOSIS, 8197
  - ENDOSCOPY, 8197
  - GASTRIN, 4102*
  - INTUSSUSCEPTION, 5659
- NEOPLASMS, MALIGNANT, 7631
  - CHILD, 8198
  - DIAGNOSIS, 4886, 6975
  - DISEASES ASSOCIATED WITH, 4099*
  - ENDOSCOPY, 8195
  - MORPHOLOGY, 3163
  - SURGERY, 3163, 8198
  - THERAPY, 4886, 6975
- NOREPINEPHRINE
  - METABOLISM, 2977
  - TRANSPORT, 2977
- OBSTRUCTION, 427, 8213
  - ADOLESCENCE, 1195
  - CHILD, 1195, 7611
  - GENETIC FACTORS, 1195
  - HEMATOMA, 426
  - NEONATE, 1372, 3229
  - PATHOLOGY, 4121
  - RADIOLOGY, 1195
  - SURGERY, 7611
  - SURVIVAL, 1372
  - WOUNDS AND INJURIES, 426
- PANCREAS
  - DISEASE, 7608*
  - HORMONE CONTROL, 2969
  - LIPIDS, 218
  - ULCER, 1348
- PANCREATIC DISEASES
  - ENZYMES, 7722*
- PANCREATIC DUCT
  - DIVERTICULUM, 523
  - SURGERY, 1614
- PANCREATITIS
  - BLEEDING, 5662
  - DIVERTICULUM, 2447, 5662
- PANCREATITIS, CHRONIC
  - COMPLICATIONS, 5790*

UODENUM (continued)
- PANCREOZYMIN
  - ENZYMES, 5511*
- PARASITES AND PARASITIC DISEASES
  - OBSTRUCTION, 8190*
- PATHOLOGY
  - ULCER, 6957
- PEPSIN
  - ULCER, 385
- PERFORATION
  - IATROGENESIS, 6545*
  - PROGNOSIS, 7595
  - SURGERY, 7595
  - SURVIVAL, 7595
  - THERAPY, 7595
- PERFUSION
  - ACIDS, 943
  - LIPIDS, 943
- PERISTALSIS
  - ACETYLCHOLINE, 2759
  - MOTILIN, 2759
- PEUTZ-JEGHER'S SYNDROME
  - POLYPS, 6969
- PHOSPHATES
  - TRANSPORT, 2722
- POLYPS
  - ENDOSCOPY, 4111
  - PEUTZ-JEGHER'S SYNDROME, 6969
  - SURGERY, 4111
- PROTEINS
  - CADMIUM, 7507
  - CALCIUM, 1124
  - VITAMIN D, 2079
- PSEUDO-OBSTRUCTION
  - MOTILITY, 2340
- PYLORUS
  - CALCULI, 427
- RADIOLOGY
  - BILIARY TRACT DISEASES, 6169
  - CRYPTS, 1352
  - DIAGNOSIS, 3041*
  - GLUCAGON, 1200
  - TECHNIQUES, 2170*
- REFLUX
  - ETIOLOGY, 4061
  - ULCER, 4811*
- RUPTURE
  - CHILD, 6306
- SECRETIN
  - ENZYMES, 3999, 5511*
  - GASTRIN, 953*
  - HORMONE EFFECTS ON, 953*
  - HORMONES, GASTROINTESTINAL, 953*
- SECRETION
  - ALKALINE PHOSPHATASE, 4690
  - CELLS, 7288*
  - ENTEROKINASE, 4690
  - ENZYMES, 5442*
  - GASTRIN, 189
  - HORMONE EFFECTS ON, 5442*
  - PROTEINS, 4690
  - ULCER, PEPTIC, 7594
- SEROTONIN
  - RADIOIMMUNOASSAY, 1873*
- SOMATOSTATIN, 3875, 4863
- STOMACH
  - ACID SECRETION, 7600
  - ELECTROPHYSIOLOGY, 3004, 7940*
  - EROSIONS, 6844

DUODENUM (continued)
- STOMACH (continued)
  - FISTULA, 351
  - HETEROTOPIA, 1375
  - INFLAMMATION, 354
  - MOTILITY, 58, 7940*
  - MUCOPOLYSACCHARIDES, 375
  - NERVOUS CONTROL, 3004
  - REFLUX, 943, 2278
  - SECRETION, 104, 1751*, 1874*
- STOMACH DISEASES
  - REFLUX, 5618
- SURGERY, 4387
  - CHOLANGIOGRAPHY, 2177*
  - DUMPING SYNDROME, 4056
  - ENDOSCOPY, 2177*
  - PANCREATOGRAPHY, 2177*
  - WOUNDS AND INJURIES, 2107*
- TISSUE CULTURE
  - ULTRASTRUCTURE, 4
- TRANSPLANTATION
  - HYPOTHERMIA, 1130
  - PANCREAS, 5482*
  - SIMULATION, 1129
- ULCER, 3213
  - ACID SECRETION, 359, 374, 1340*, 2304, 2804, 3206, 4549, 4580, 4855, 5636, 5641
  - ACIDITY, 5630
  - ALCOHOLS, 4089
  - ALKALINE PHOSPHATASE, 3205
  - AMINES, 6742
  - ANTACIDS, 2291
  - ATROPINE, 4073*, 5634
  - BLEEDING, 2290
  - BLOOD GROUPS, 369
  - CAFFEINE, 3667*
  - CALCIUM, 3086
  - CHLORIDES, 3207
  - CLASSIFICATION, 6266
  - COMPLICATIONS, 4095, 4830
  - DEFICIENCY, 3174
  - DIAGNOSIS, 3200
  - DIET, 3174
  - DISACCHARIDASES, 370
  - DISEASES ASSOCIATED WITH, 3214, 3215
  - DOPAMINE, 4860
  - DRUG EFFECTS ON, 377, 5631, 5634, 5645
  - DRUG-INDUCED, 97, 377, 2824, 3717, 4089, 6742
  - DRUG THERAPY, 354, 2291, 3195*, 3198*, 3202, 3204, 4073*, 4084, 5639
  - ELECTROLYTES, 3206
  - ENDOSCOPY, 3200, 4846
  - ENZYMES, 3205
  - ETIOLOGY, 2815, 2828, 4088, 4830
  - FERRITIN, 3174
  - GASTRIN, 372, 1334*, 1340*, 2804, 3197*, 3532, 3667*, 4580, 5634
  - GASTROENTEROSTOMY, 4834*
  - GENETIC FACTORS, 2303
  - GLUCAGON, 2309
  - GLUCOSE INTOLERANCE, 2309
  - H2 RECEPTOR ANTAGONISTS, 97, 3195*, 3197*, 3198*, 4073*, 5626*
  - HAPTOGLOBINS, 6284

DUODENUM (continued)
  ULCER (continued)
    HEALING, 3195*, 4072*, 4834*, 5631
    HERPESVIRUSES, 2815
    HISTAMINE, 3194*, 4069*, 4855
    HORMONE EFFECTS ON, 2300, 3876
    INSULIN, 2309
    MORPHOLOGY, 3208
    MOTILIN, 4858
    OBSTRUCTION, 2302
    PARASYMPATHOLYTICS, 4073*
    PEPSIN, 4092
    PEPSINOGEN, 3686
    PEPTIDES, 4578
    PERFORATION, 368, 6276
    PROGNOSIS, 3200
    PROTEINS, 5634
    PSYCHOLOGICAL FACTORS, 4846, 5645
    PYLOROPLASTY, 4855, 8181*
    PYLORUS, 5603
    RADIOLOGY, 4765
    RECURRENCE, 382
    REVIEW, 2291, 2298
    SECRETAGOGUES, 2804, 3876
    SECRETIN, 4070*
    SECRETION, 384, 387, 1343*, 3207
    SLEEP, 358*, 5630
    SMOKING, 2291, 4092
    SOCIOECONOMIC FACTORS, 4846
    SOMATOSTATIN, 4863, 7519
    STATISTICAL STUDY, 809
    STOMACH, 5647
    SURGERY, 809, 3199*, 4081, 4839,
      6267, 8276
    TECHNIQUES, 809
    THERAPY, 2291, 3876, 4079, 4081,
      5642
    VAGOTOMY, 2296, 2824, 3717, 4855,
      5189, 6275, 6280, 6281, 6282,
      8181*
    WATER, 2304
  ULCER, PEPTIC, 6925, 7599
    ACID SECRETION, 1341*, 5356*,
      5593*, 6926, 7976
    ACIDITY, 8180*
    AGE FACTORS, 6913*
    ANDROGENS, 7582
    ANOMALY, 7581
    ANTACIDS, 4833*
    ANTIGENS, 6911*
    ANTRECTOMY, 7576
    BICARBONATE SECRETION, 1341*
    COMPLICATIONS, 8488
    CYTOLOGY, 356*
    DIAGNOSIS, 6913*
    DISEASES ASSOCIATED WITH, 7581
    L-DOPA, 8189
    DRUG THERAPY, 4833*, 6914*, 6917*,
      7572*, 8189
    DUODENITIS, 4835*
    ENDOSCOPY, 6913*
    ETIOLOGY, 6911*
    FAMILIAL FACTORS, 6923
    GASTRECTOMY, 6934
    GASTRIN, 4560*, 4835*, 5593*, 7575,
      7598
    GASTRITIS, 4835*
    GENETIC FACTORS, 6911*

DUODENUM (continued)
  ULCER, PEPTIC (continued)
    H2 RECEPTOR ANTAGONISTS, 4833*,
      6917*, 7572*
    HEALING, 4850
    HORMONES, 7598
    HYPERCHLORHYDRIA, 7976
    INSULIN, 7598
    LIPASE, 7594
    PANCREAS FUNCTION TESTS, 6929
    PATHOLOGY, 367, 6921
    PENTAGASTRIN, 8180*
    PEPSIN, 7594
    PERFORATION, 4837*, 6920*, 7595
    PREVENTION, 7585
    PYLOROPLASTY, 4835*, 6918*
    SECRETION, 7594
    SEX FACTORS, 5627*, 7582
    STEROIDS, 7582
    STOMACH, 356*
    SURGERY, 6905, 6918*, 6919*, 6931,
      7576
    THERAPY, 6905, 6921, 6931, 7576,
      7580, 8186
    ULCER, 3210
    VAGOTOMY, 4835*, 5627*, 6905,
      6918*, 6919*, 6934, 7576, 7580,
      7585, 7600, 7604
  ULTRASTRUCTURE, 2687
    VAGOTOMY, 2686
  VAGOTOMY
    ELECTROPHYSIOLOGY, 2763, 5189
    MOTILITY, 5189
  VARICES
    ANGIOGRAPHY, 6291*
    BLEEDING, 4126, 6900
    CIRCULATION, 6291*
    DIAGNOSIS, 6900
    OBSTRUCTION, 6291*
    SURGERY, 6900
    THERAPY, 6900
  VEINS
    ENDOSCOPY, 429
  VITAMIN D
    PROTEINS, 5447
  WOUNDS AND INJURIES
    SECRETION, 1751*
    STOMACH, 2107*
    THERAPY, 4872*

DYES
  AMYLOIDOSIS
    LIVER FUNCTION TESTS, 3093
  CHOLECYSTOKININ
    BILE ACIDS AND SALTS, 1965*
  ESOPHAGUS
    VARICES, 8155
  GALLBLADDER
    CHOLECYSTOKININ, 1965*
    EXCRETION, 1965*
  ILEUM
    MOTILITY, 2982*
    VIABILITY, 2982*
  INTESTINE, SMALL
    MOTILITY, 2982*
    VIABILITY, 2982*
  JAUNDICE, CHOLESTATIC, 4383

DYES (continued)
- LIVER
  - BILE ACIDS AND SALTS, 5422*
  - BINDING, 1821
  - METABOLISM, 6094
  - MORPHOLOGY, 3091
  - SECRETION, 6094
  - TRANSPORT, 5422*
- LIVER CIRRHOSIS
  - LIVER FUNCTION TESTS, 3093
  - SCANNING, SCINTILLATION, 2213
- LIVER DISEASES
  - CELLS, 4291*
- PANCREAS
  - SCANNING, SCINTILLATION, 2833*
- ROTOR'S SYNDROME
  - KINETICS, 1508
- TEMPERATURE
  - STOMACH, 5330
- VARICES
  - DIAGNOSIS, 8155

DYSENTERY
- AMEBIASIS
  - CHILD, 6659
  - COMPLICATIONS, 5240*
  - DRUG THERAPY, 6659
  - INTESTINES, 6667
  - THERAPY, 5240*
- CHILD
  - ANTIBACTERIALS, 786
  - APPENDICITIS, 6338
  - DRUG THERAPY, 6659
- DRUG THERAPY
  - AMEBIASIS, 824
  - CHILD, 824
- ETIOLOGY, 4444
- GASTROINTESTINAL SYSTEM
  - DRUG EFFECTS ON, 2996
- LACTASE
  - DEFICIENCY, 4444

DYSKINESIA
- SEE MOVEMENT DISORDERS

DYSPEPSIA
- COMPUTERS
  - DIAGNOSIS, 1188, 2998
  - EPIDEMIOLOGY, 2998
- DIAGNOSIS
  - BARIUM, 5539
- DRUG THERAPY, 3170, 4826
- DUODENUM
  - BARIUM, 6260
  - CONTRAST MEDIA, 6260
  - ENDOSCOPY, 6260
- ENDOSCOPY
  - BARIUM, 6257
  - DIAGNOSIS, 1188
- ESOPHAGUS
  - BARIUM, 6260
  - CONTRAST MEDIA, 6260
  - ENDOSCOPY, 6260
- GASTRIN
  - ADRENERGIC RECEPTOR BLOCKADERS, 2271
- GASTRITIS, 2248
- REFLUX
  - BILE, 2248

DYSPEPSIA (continued)
- STOMACH
  - BARIUM, 6260
  - CONTRAST MEDIA, 6260
  - ENDOSCOPY, 6260
  - MUCOPOLYSACCHARIDES, 375
  - ULCER, 3171
- ULCER
  - BLOOD GROUPS, 369
  - DIAGNOSIS, 2610
  - DUODENUM, 2610
  - STOMACH, 2610
- ULCER, PEPTIC, 6919*

DYSPHAGIA
- SEE DEGLUTITION DISORDERS

DYSPLASIA
- CECUM
  - COLONOSCOPY, 2371*
  - DIAGNOSIS, 2371*
  - HEMORRHAGE, 2371*, 7657*
- CHOLELITHIASIS
  - GALLBLADDER, 1977*
- CHOLESTASIS
  - FAMILIAL FACTORS, 2450*
- COLON
  - DIAGNOSIS, 2370*
  - ENDOSCOPY, 2370*
  - SURGERY, 2370*
- HEMORRHAGE
  - COLONOSCOPY, 2371*
- HIRSCHSPRUNG'S DISEASE
  - COLON, 5721*
- ILEUM
  - HEMORRHAGE, 7657*
- INTESTINE, LARGE
  - HEMORRHAGE, 2371*
- JEJUNUM
  - HEMORRHAGE, 7657*
- MESENTERY
  - ANGIOGRAPHY, 7657*
  - HEMORRHAGE, 7657*
- STOMACH
  - ASPIRIN, 1915

DYSTROPHY
- DRUG THERAPY
  - L-DOPA, 3893
- ILEUM
  - CYTOLOGY, 212
- LIVER
  - DRUG THERAPY, 3930, 8074
  - FAMILIAL FACTORS, 5057
  - THERAPY, 8078
  - VITAMIN E, 8078
- NERVOUS SYSTEM
  - FAMILIAL FACTORS, 5057
- STOMACH, 6843
  - DRUG THERAPY, 3893
  - SIMULATION, 3893

ECHINOCOCCOSIS
- COMMON BILE DUCT
  - CYSTS, 5956*
- CYSTS
  - COMPLICATIONS, 5956*
  - LIVER, 553, 5833
  - PERFORATION, 553
  - THERAPY, 5956*

- ECHINOCOCCOSIS (continued)
  - DIAGNOSIS
    - TECHNIQUES, 7525*
  - EPIDEMIOLOGY, 5975
    - AGE FACTORS, 5243*
    - ANTHELMINTICS, 6656
    - GEOGRAPHICAL FACTORS, 5243*
    - SEX FACTORS, 5243*
    - SOCIOECONOMIC FACTORS, 8500*
    - STATISTICAL STUDY, 6656
    - TRANSMISSION, 4457, 8500*
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, 6628
  - IMMUNOLOGY
    - DIAGNOSIS, 5974
  - LIVER, 5834
    - CYSTS, 1724
    - DIAGNOSIS, 277
    - LAPAROSCOPY, 1723
    - PATHOLOGY, 1725
    - SURGERY, 619
  - LIVER DISEASES
    - AMEBIASIS, 820
  - SCANNING, SCINTILLATION
    - CHILD, 2212
    - LIVER, 2212
  - SERUM
    - PROTEINS, 8170
  - TRANSMISSION
    - ETHNIC FACTORS, 6643*
    - OCCUPATIONAL FACTORS, 6643*
    - RISK FACTORS, 6643*
    - SOCIOECONOMIC FACTORS, 8500*
    - STATISTICAL STUDY, 6656

- ECHOGRAPHY
  - SEE ULTRASONOGRAPHY

- EDEMA
  - GASTROINTESTINAL SYSTEM
    - LIVER CIRRHOSIS, 1556*
  - LIVER CIRRHOSIS
    - ALCOHOLISM, 1556*
    - ASCITES, 5903*
    - DRUG THERAPY, 5903*
    - HYPERTENSION, PORTAL, 1556*
    - MORPHOLOGY, 1556*
    - VARICES, 1556*
  - LIVER DISEASES
    - SIMULATION, 4668
    - THERAPY, 4668
  - ULCER, PEPTIC
    - DRUG THERAPY, 6927

- ELECTRICAL CONTROL
  - ANTRUM
    - GASTRIN, 1863
  - DIURETICS
    - SODIUM, 1812
  - DUODENUM
    - SURGERY, 1849
  - ESOPHAGUS
    - SPHINCTER, 1828*
  - GALLBLADDER
    - CALCIUM, 912*
  - GLUCOSE
    - SODIUM, 1812
  - HORMONES, GASTROINTESTINAL
    - INTESTINES, 1826*

- ELECTRICAL CONTROL (continued)
  - INTESTINE, SMALL
    - ADENOSINE TRIPHOSPHATE, 1854
    - INSULIN, 1825*
    - MOTILITY, 55, 2752
    - PURINES, 1854
  - INTESTINES, 3639
    - TECHNIQUES, 1822*
  - PANCREAS
    - PARASYMPATHOMIMETICS, 4594*
  - STOMACH
    - ACIDS, 1862
    - ANALGESICS AND ANTIPYRETICS, 1884*
    - BICARBONATES, 1862
    - DRUG EFFECTS ON, 1884*
    - GLUCAGON, 1864
    - PENTAGASTRIN, 1862, 1864
    - PROSTAGLANDINS, 1865
    - SECRETION, 1875*
    - ULCER, 978

- ELECTROLYTES
  - ABSORPTION
    - CIRCULATION, 4503*
    - INTESTINES, 900
    - REVIEW, 900
  - ALCOHOLISM
    - MUSCLES, 6610
  - BILE DUCTS
    - SURGERY, 736
  - COLON
    - ABSORPTION, 4506*
    - ACIDOSIS, 4501*
    - ALKALOSIS, 4501*
    - MUSCLES, 1859
    - TRANSPORT, 4506*
  - DUODENUM
    - ULCER, 3206
  - ENEMA
    - COMPLICATIONS, 7683
  - ESOPHAGUS
    - METABOLISM, 8152
    - STENOSIS, 8152
  - GALLBLADDER
    - ELECTROPHYSIOLOGY, 905
  - GASTRITIS, 3206
  - GASTROENTERITIS
    - GLUCOSE, 4431
    - SUCROSE, 4431
  - GASTROINTESTINAL SYSTEM
    - INFECTION, 6629
  - HEPATITIS
    - HEMOLYSIS, 545*
  - ILEUM
    - ABSORPTION, 4499*
    - SECRETION, 4499*
    - TRANSPORT, 4498*, 4499*, 7313
  - INFECTION
    - DEFECATION, 6629
  - INTESTINE, SMALL
    - ABSORPTION, 4500*
    - ELECTROPHYSIOLOGY, 29
    - TRANSPORT, 18*, 4500*
  - INTESTINES
    - ABSORPTION, 4503*
    - BACTERIAL INFECTIONS, 1364
    - TRANSPORT, 3617
  - JEJUNUM
    - ABSORPTION, 6012
    - TRANSPORT, 4498*, 7313

LECTROLYTES (continued)
- LIVER CIRRHOSIS
  - CELLS, 4345
  - HEMOLYSIS, 545*
  - HORMONE EFFECTS ON, 4345
- LIVER INJURY
  - BLOOD, 3366*
- MUSCLES
  - MOTILITY, 1859
- PANCREAS
  - SECRETION, 992, 1951, 4590*
- PANCREATIC DISEASES
  - ABSORPTION, 4391*
  - SECRETION, 4391*
- PARENTERAL ALIMENTATION
  - BODY COMPOSITION, 3859*
  - DIET, 3859*
- SALIVARY GLANDS
  - SECRETION, 946*
- SHUNT, INTESTINAL
  - OBESITY, 4895
  - SERUM, 7625
- SPRUE, TROPICAL
  - TRANSPORT, 6982*
- STOMACH
  - DRUG EFFECTS ON, 3154
  - REVIEW, 3616
  - ULCER, 3206

LECTRON TRANSPORT
- SEE ALSO ION TRANSPORT
- LIVER
  - IMMUNOLOGY, 865

LECTROPHORESIS
- AUSTRALIA ANTIGEN, 8379
- BILE
  - LIPOPROTEINS, 6775*
- CELIAC DISEASE
  - DIAGNOSIS, 7900
- CROHN'S DISEASE
  - DIAGNOSIS, 7900
- ESCHERICHIA COLI
  - ENTEROTOXINS, 2647
- INFLAMMATORY BOWEL DISEASES
  - DIAGNOSIS, 7900

LECTROPHYSIOLOGY
- AMINO ACIDS
  - JEJUNUM, 2699*
- ANTRUM
  - HORMONES, GASTROINTESTINAL, 945
  - MOTILITY, 4541
- CECUM
  - TECHNIQUES, 2757
- COLON, 1856, 1857, 4505*
  - AMINO ACIDS, 1766*
  - GROWTH FACTORS, 1766*
  - INFANT, 1766*
  - ION TRANSPORT, 2696*
  - MOTILITY, 923, 935, 5190
  - MUSCLES, 923
  - NEONATE, 1766*
  - SURGERY, 5190
- CROHN'S DISEASE
  - ANORECTUM, 8508*
  - ANUS, 8508*

ELECTROPHYSIOLOGY (continued)
- DIGESTION
  - CARBOHYDRATES, 6699
  - FATS, 6699
  - PROTEINS, 6699
- DUODENUM
  - DRUG EFFECTS ON, 2761
  - ENDOSCOPY, 1823*
  - GLUCOSE, 2694*
  - HORMONES, GASTROINTESTINAL, 945
  - INFLAMMATION, 1823*
  - MOTILIN, 944, 2760
  - MOTILITY, 920, 4541, 7938*
  - SURGERY, 1849
  - VAGOTOMY, 2765, 5324*
- ESOPHAGUS
  - EPITHELIUM, 6
  - MOTILITY, 53, 6703, 6705
  - SPHINCTER, 1837
  - TECHNIQUES, 6703
- GALLBLADDER
  - ABSORPTION, 905
  - ELECTROLYTES, 905
  - TRANSPORT, 1767*
  - ULTRASTRUCTURE, 5997
- GASTRECTOMY
  - DUODENUM, 2763
  - STOMACH, 2763
- GASTRITIS, 3138*
- GASTROINTESTINAL DISEASES
  - MOTILITY, 1187
- GASTROINTESTINAL SYSTEM
  - CALCIUM, 5306*
  - CHOLECYSTECTOMY, 1835
  - MOTILITY, 3641, 5190, 5334, 6700
  - SURGERY, 5190
  - TECHNIQUES, 916, 3641, 5334, 7320*
  - VAGOTOMY, 363
- GLUCAGON
  - STOMACH, 4536
- HELMINTHIASIS
  - INTESTINES, 5251
- HEPATECTOMY
  - MEMBRANES, 2016
- HEPATOCYTES
  - PRIMATES, 5992
- HIRSCHSPRUNG'S DISEASE
  - DIAGNOSIS, 3934*
- ILEUM
  - GLUCOSE, 2694*
  - ION TRANSPORT, 4504*, 7925
  - RADIOLOGY, 2729*
  - TECHNIQUES, 2757
- INTESTINAL OBSTRUCTION
  - DISEASES ASSOCIATED WITH, 4109*
  - NERVOUS CONTROL, 3627*
  - PERISTALSIS, 4109*
- INTESTINE, LARGE
  - DRUG EFFECTS ON, 7922, 7951
  - MUSCLES, 7328
  - VASODILATOR AGENTS, 7951
- INTESTINE, SMALL, 3626*, 7920*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 56
  - BILE ACIDS AND SALTS, 1794
  - CARBOHYDRATES, 29
  - DRUG EFFECTS ON, 56, 5311*
  - ELECTROLYTES, 29
  - FATTY ACIDS, 213

- ELECTROPHYSICLOGY (continued)
  - INTESTINE, SMALL (continued)
    - FEEDING, 3654
    - GLUCOSE, 2695*
    - HORMONES, 206
    - ION TRANSPORT, 7925
    - MOTILITY, 4525*, 4526*, 4528*, 5190, 7938*
    - MUSCLES, 4528*
    - NERVOUS CONTROL, 2*
    - PENTAGASTRIN, 3651
    - SOMATOSTATIN, 6711
    - SURGERY, 5190, 6697*
    - TECHNIQUES, 2737*
    - TRANSPORT, 2695*
  - INTESTINES
    - CALCIUM, 5306*
    - PERFUSION, 2123
    - PSEUDO-OBSTRUCTION, 6290*
    - TECHNIQUES, 1822*, 3642
  - IRRITABLE COLON
    - MOTILITY, 3281*
  - JEJUNUM
    - BACTERIA, 7323
    - CELLS, 2065
    - GLUCOSE, 2694*
    - MOTILITY, 4129*, 7323
    - RADIOLOGY, 2729*
    - TRANSPORT, 7308*
  - LACTASE
    - DEFICIENCY, 5210
  - LIVER
    - ADENOSINE TRIPHOSPHATE, 8041*
    - ANOXIA, 8041*
    - MORPHOLOGY, 14
    - ULTRASTRUCTURE, 1755*
  - NERVOUS SYSTEM
    - HEPATECTOMY, 3036
  - ODDI'S SPHINCTER
    - ALCOHOLS, 2745*
    - CERULEIN, 69
    - DRUG EFFECTS ON, 2745*
    - MOTILITY, 65
    - VAGOTOMY, 2745*
  - PANCREAS
    - BLOOD, 1224
    - CIRCULATION, 1224
  - PERMEABILITY
    - BILE ACIDS AND SALTS, 888
  - PYLORUS
    - MOTILITY, 4541
  - RECTUM
    - DIURETICS, 2756
    - DRUG EFFECTS ON, 2756, 7955
    - NERVOUS CONTROL, 7955
    - PARASYMPATHOMIMETICS, 7955
    - STEROIDS, 2756
    - TECHNIQUES, 2756
  - STOMACH, 3138*
    - ACID SECRETION, 5325*
    - ANALGESICS AND ANTIPYRETICS, 6552*, 7333
    - ANESTHESIA, 6552*
    - ANESTHETICS, 7315
    - ANOXIA, 2992*
    - ANTIEMETICS, 47*
    - ASPIRIN, 3699, 7333, 7334
    - BICARBONATES, 3699
    - CALCIUM, 5306*

- ELECTROPHYSIOLOGY (continued)
  - STOMACH (continued)
    - CERULEIN, 3632*
    - CHOLECYSTECTOMY, 6552*
    - CHOLECYSTOKININ, 3632*
    - DRUG EFFECTS ON, 2761, 2786*, 3699, 7315, 7333, 7334
    - DUODENUM, 3004, 7940*
    - EPITHELIUM, 9
    - FATS, 7940*
    - FOOD, 3636*
    - GLUCAGON, 3636*
    - GLUCOSE, 7940*
    - H2 RECEPTOR ANTAGONISTS, 91, 7334
    - HORMONE CONTROL, 1895
    - HORMONES, 206
    - ISCHEMIA, 4569*
    - MOTILIN, 944
    - MOTILITY, 68, 920, 1833*, 3644, 4541, 5190, 7333, 7334
    - OXYGEN, 3006
    - PANCREOZYMIN, 3632*
    - PHOSPHOLIPIDS, 6726*
    - PROSTAGLANDINS, 2807
    - SPHINCTER, 6882
    - SURGERY, 5190
    - TECHNIQUES, 3991
    - ULCER, PEPTIC, 6909
    - VAGOTOMY, 2765, 3636*, 5324*, 6909
  - TRANSPORT
    - MONOSACCHARIDES, 1813
  - ULCER
    - VAGOTOMY, 6282
  - ULCER, PEPTIC
    - VAGOTOMY, 363
  - VAGOTOMY
    - DRUG EFFECTS ON, 3658
    - DUODENUM, 2763, 5189
    - HYPOGLYCEMIA, 3658
    - STOMACH, 2763, 5189
    - TECHNIQUES, 6243

- EMESIS
  - SEE VOMITING

- EMPHYSEMA
  - ENDOSCOPY
    - PERITONEUM, 1199
  - GALLBLADDER
    - CHOLECYSTITIS, 1590, 1591
  - STOMACH
    - GASTRITIS, 1257
    - PNEUMATOSIS, 1257

- EMULSIFIERS
  - INTESTINAL ABSORPTION
    - TRIGLYCERIDES, 7493*

- ENDOCRINE DISEASES
  - BILE DUCTS
    - HYPOPLASIA, 4259*
  - GASTROENTERITIS, 6966
  - INFLAMMATORY BOWEL DISEASES
    - ADOLESCENCE, 7287
    - CHILD, 7287

ENDOCRINE GLANDS
- CHENODEOXYCHOLIC ACID
  - DRUG EFFECTS ON, 7401*
- NEOPLASMS, BENIGN
  - REVIEW, 3540
- STOMACH
  - ULTRASTRUCTURE, 10

ENDOCRINE SYSTEM
- GASTROINTESTINAL SYSTEM
  - MORPHOLOGY, 3*
- INTESTINES
  - DISEASE, 6036
  - HORMONES, GASTROINTESTINAL, 6036
  - REVIEW, 6036
- LIVER CIRRHOSIS
  - COMPLICATIONS, 5896*
- LIVER DISEASES, ALCOHOLIC
  - COMPLICATIONS, 5896*
- STOMACH
  - DISEASE, 6036
  - HORMONES, GASTROINTESTINAL, 6036
  - REVIEW, 6036

ENDOMETRIOSIS
- COLON
  - PERFORATION, 7001*
- COMPLICATIONS
  - PERFORATION, 7001*
- ILEUM
  - STENOSIS, 5653*
  - THERAPY, 7617
- INTESTINE, SMALL
  - THERAPY, 7617
- SIGMOID
  - PERFORATION, 7001*

ENDOSCOPY
- ANTRUM
  - ULCER, 3993
- APPENDECTOMY
  - SURGERY, 1402
- ARTERIES
  - GASES, 4758
- BARIUM
  - DIAGNOSIS, 4742*
  - TECHNIQUES, 2193
- BEZOARS
  - THERAPY, 346
- BILE DUCTS
  - CHOLANGIOGRAPHY, 6860
  - CHOLANGIOPANCREATOSCOPY, 3115
  - DIAGNOSIS, 6860
  - DILATATION, 2581*
  - LAPAROTOMY, 3115
- BILIARY TRACT
  - CALCULI, 8437
  - NEOPLASMS, 5524
  - REVIEW, 1223
  - TECHNIQUES, 265, 5524
- BILIARY TRACT DISEASES
  - CHOLANGIOGRAPHY, 283
  - DIAGNOSIS, 3049*, 7071
  - PANCREAS, 283
  - REVIEW, 4018
  - THERAPY, 3049*

ENDOSCOPY (continued)
- BLEEDING
  - ANALYSIS, 5555
  - CLOTTING, 2280*
  - GASTROINTESTINAL SYSTEM, 2589*
  - SURVIVAL, 2589*
- CECUM
  - ANOMALY, 2373
- CELIAC DISEASE
  - DIAGNOSIS, 4916
  - DUODENUM, 2344*
- CHILD
  - REVIEW, 6953
  - THERAPY, 1647
- CHOLANGIOGRAPHY
  - BILIARY TRACT, 282
  - COMPLICATIONS, 6545*, 7071, 7195*, 8142
  - REVIEW, 7539, 8142
  - TECHNIQUES, 281, 3049*, 3113, 3114, 6186, 7195*
- CHOLANGITIS
  - TECHNIQUES, 7201*
  - THERAPY, 7201*
- COLITIS, 3296
  - DIAGNOSIS, 3320*, 4009
- COLITIS, ULCERATIVE
  - BIOPSY, 7065
  - CYTOLOGY, 4968
  - DIAGNOSIS, 3320*
  - RADIOLOGY, 6355
- COLON, 6166, 7675
  - COMPLICATIONS, 2196, 3285, 5708*
  - CROHN'S DISEASE, 848
  - DYSPLASIA, 2370*
  - ELECTROCARDIOGRAPHY, 1400
  - HEMANGIOMA, 3073
  - NEOPLASMS, 3290, 7704
  - NEOPLASMS, MALIGNANT, 4940, 7681
  - OBSTRUCTION, 1421
  - PERFORATION, 1199, 3285, 5708*
  - PIGMENTATION, 1410
  - POLYPS, 254, 504, 506, 1254, 3069, 3285, 7544, 7679, 7681, 7682
  - PRECANCEROUS CONDITIONS, 7681
  - REVIEW, 7677
  - SURGERY, 459
  - TECHNIQUES, 2181, 3064, 4005, 5744
  - THERAPY, 459
- COLONIC DISEASES
  - DIAGNOSIS, 458, 7694
  - REVIEW, 3067
- COMMON BILE DUCT
  - SURGERY, 2177*, 2205
  - TECHNIQUES, 280, 8424*
- COMMON BILE DUCT CALCULI
  - COMPLICATIONS, 4883
  - DIAGNOSIS, 8424*
  - TECHNIQUES, 7201*
  - THERAPY, 6551*, 7201*
- COMPLICATIONS
  - MEGACOLON, 5751
  - PERFORATION, 6545*
  - REVIEW, 7536
- CONTRAST MEDIA
  - DUODENUM, 6859
  - STOMACH, 6859

ENDOSCOPY (continued)
- CROHN'S DISEASE
  - COLITIS, ULCERATIVE, 512
  - COLON, 512
  - ESOPHAGUS, 4471*
- DIAGNOSIS
  - POLYPS, 1254
  - ULCER, 4742*
- DIVERTICULUM
  - TECHNIQUES, 1202
- DUODENITIS, 7616
  - CHILD, 8206
  - PATHOLOGY, 414
- DUODENUM, 237, 6868, 6971
  - ANOMALY, 402, 1219
  - BIOPSY, 6164
  - CALCULI, 3512
  - COMPLICATIONS, 2320, 3931*, 3984, 8142
  - DIAGNOSIS, 3041*
  - DIVERTICULUM, 4883
  - DYSPEPSIA, 6260
  - ELECTROPHYSIOLOGY, 1823*
  - HEMORRHAGE, 4757
  - INFLAMMATION, 1823*
  - NEOPLASMS, 6976
  - NEOPLASMS, BENIGN, 8197
  - NEOPLASMS, MALIGNANT, 8195
  - POLYPS, 4111
  - REVIEW, 8142
  - SURGERY, 2177*
  - TECHNIQUES, 2320, 3997
  - THERAPY, 4027
  - ULCER, 3200, 4846
  - VEINS, 429
  - WOUNDS AND INJURIES, 2320
- DYSPEPSIA
  - BARIUM, 6257
  - DIAGNOSIS, 1188
- ENTEROCOLITIS
  - DIAGNOSIS, 2313*
  - MORPHOLOGY, 2313*
  - YERSINIA, 2313*
- ESOPHAGEAL DISEASES, 3061
- ESOPHAGEAL REFLUX
  - MORPHOLOGY, 4019*
- ESOPHAGITIS
  - BIOPSY, 3040*
  - DIAGNOSIS, 7560, 7561
  - HEALING, 2165*
  - REFLUX, 238
  - TECHNIQUES, 3040*
- ESOPHAGUS, 237, 6868
  - ANESTHESIA, 4759
  - BACTERIAL INFECTIONS, 4388*, 5560*
  - BIOPSY, 3040*
  - CHILD, 1237
  - COMPLICATIONS, 3136, 3931*, 3984, 4388*, 4760, 5560*, 6158
  - DUODENUM, 3931*
  - DYSPEPSIA, 6260
  - HEMORRHAGE, 4757
  - HERNIA, 6161
  - NEOPLASMS, 3061, 3149
  - NEOPLASMS, MALIGNANT, 239, 3040*, 4792*
  - OBSTRUCTION, 6201
  - PERFORATION, 3136
  - REFLUX, 294*

ENDOSCOPY (continued)
- ESOPHAGUS (continued)
  - REVIEW, 6218
  - SEPSIS, 4388*
  - STOMACH, 3931*
  - TECHNIQUES, 3040*
  - THERAPY, 4027
  - ULCER, PEPTIC, 3989
  - VARICES, 4024*
- GASTRECTOMY
  - NEOPLASMS, MALIGNANT, 6226*
- GASTRITIS
  - ANTRUM, 3178
  - BIOPSY, 6253
  - DIAGNOSIS, 3993, 4060, 6253
  - MORPHOLOGY, 3173
- GASTRITIS, ATROPHIC
  - MORPHOLOGY, 3173
- GASTROINTESTINAL DISEASES
  - BARIUM, 1241
  - BIOPSY, 7537
  - CYTOLOGY, 7537
  - DIAGNOSIS, 2596, 7537, 7538, 7541
  - RADIOLOGY, 7538
  - REVIEW, 3039*, 7537, 7538, 7541
  - STOMACH, 244
- GASTROINTESTINAL SYSTEM, 1190, 6155, 6156
  - AGE FACTORS, 4754
  - ARTERIES, 4758
  - BACTERIAL INFECTIONS, 4388*
  - BIOPSY, 6157
  - BLEEDING, 233, 1191, 1213, 2180, 2280*, 2614, 3056, 3985, 4437, 4438, 4756, 6159, 6198*, 6212, 6734, 6899, 4439
  - CHILD, 2169*, 4755
  - COMPLICATIONS, 1646, 3984, 4388*, 6157, 7536
  - DIAGNOSIS, 3180
  - HEMORRHAGE, 2280*, 4757, 5530, 6212
  - INFANT, 2169*
  - REVIEW, 1223, 1242, 7532, 7533, 7534, 7540, 8144
  - SEPSIS, 4388*
  - SURGERY, 3055
  - TECHNIQUES, 7533, 7534, 7540
- GIARDIASIS
  - DIAGNOSIS, 4463
  - DUODENUM, 4463
- HEMORRHAGE
  - CLOTTING, 2280*
  - DIAGNOSIS, 5530
- ILEUM
  - COMPLICATIONS, 1373
  - PERFORATION, 1373
  - PNEUMATOSIS, 1373
- INFLAMMATORY BOWEL DISEASES
  - DIAGNOSIS, 3320*
- INTESTINAL OBSTRUCTION
  - CHOLELITHIASIS, 5924*
- INTESTINE, LARGE, 4004
  - BARIUM, 1240
  - DIAGNOSIS, 3288
  - POLYPS, 1416, 7669
- INTESTINE, SMALL
  - BLEEDING, 3985
  - CHILD, 395

ENDOSCOPY (continued)
  INTESTINE, SMALL (continued)
    COMPLICATIONS, 2319, 2320, 6158
    OBSTRUCTION, 2319
    REVIEW, 7535
    STRANGULATION, 2319
    TECHNIQUES, 2320, 5528
    WOUNDS AND INJURIES, 2320
  INTESTINES
    BIOPSY, 396, 3065
    COMPLICATIONS, 3066
    PROTEIN-LOSING ENTEROPATHIES, 3065
    TECHNIQUES, 3997
  JAUNDICE, OBSTRUCTIVE
    NEOPLASM METASTASIS, 5926*
  JEJUNUM
    ULCER, 3201
  LIVER
    CALCULI, 6571*
    NEOPLASMS, 263, 5524
    TECHNIQUES, 5524
  LIVER CIRRHOSIS, 263
    HEMORRHAGE, 2562
  MALLORY-WEISS SYNDROME, 7563
    COMPLICATIONS, 1256
  ODDI'S SPHINCTER
    STENOSIS, 5774*
  PANCREAS, 3120, 3950
    ACIDS, 2843
    ANOMALY, 1219, 2410*, 6179
    CONTRAST MEDIA, 281, 282, 1439*, 2218, 3113
    CYSTS, 7727
    FISTULA, 6376
    NEOPLASMS, 3050*, 5523, 6362*
    NEOPLASMS, MALIGNANT, 5771*, 6361*, 7073, 7725*
    PANCREATOGRAPHY, 6151*, 6359*
    PSEUDOCYSTS, 6366*
    RADIOLOGY, 2217
    REVIEW, 1223
    SECRETIN, 2843
    SECRETION, 2843, 3117
    SURGERY, 4980, 6154
    TECHNIQUES, 280, 3117, 5523
  PANCREATIC DISEASES
    CHOLANGIOGRAPHY, 283
    DIAGNOSIS, 3049*, 5774*, 6151*, 6359*, 7071
    PANCREAS, 283
    PANCREATOGRAPHY, 6359*
    REVIEW, 4018
    THERAPY, 3049*
  PANCREATIC DUCT, 3120
    SURGERY, 3116
  PANCREATITIS
    CAROLI'S DISEASE, 4221*
    CONTRAST MEDIA, 1225
    DIAGNOSIS, 5774*
    THERAPY, 4996
  PANCREATITIS, CHRONIC
    CONTRAST MEDIA, 2221
    DIAGNOSIS, 4997, 5790*, 7082
    PROGNOSIS, 4995
    THERAPY, 4995, 4996
  PANCREATOGRAPHY
    CHOLANGIOGRAPHY, 3049*, 7539
    COMPLICATIONS, 3049*, 5790*, 6545*, 7071, 7195*, 8142

ENDOSCOPY (continued)
  PANCREATOGRAPHY (continued)
    COMPUTERS, 3979
    REVIEW, 8142
    TECHNIQUES, 3049*, 7195*
  PERITONEUM
    COMPLICATIONS, 235
    DIAGNOSIS, 235
    EMPHYSEMA, 1199
  POLYPS
    SURGERY, 507
  PYLORUS
    ULCER, 3993
  RADIOLOGY
    CHILD, 2169*
  RECTUM
    AGE FACTORS, 3042*
    BIOPSY, 3042*
    BLEEDING, 4006
    DISEASE, 4006
    INFANT, 3042*
    INFLAMMATION, 3307
    NEOPLASMS, 4006
  SALIVARY GLANDS
    COMPLICATIONS, 1648, 5617
  SCHISTOSOMIASIS
    REVIEW, 3287
  SERUM
    LIPASE, 3947*
  STENOSIS
    TECHNIQUES, 7201*
    THERAPY, 7201*
  STOMACH, 237, 6174
    ANEMIA, PERNICIOUS, 6173
    ANOMALY, 1219, 7072
    ANTACIDS, 7973
    BACTERIAL INFECTIONS, 4388*
    BIOPSY, 3040*, 4817
    BLEEDING, 3985
    CHILD, 1237
    COMPLICATIONS, 3053, 3931*, 3984, 4388*, 4760, 6158
    DIAGNOSIS, 3079
    DYSPEPSIA, 6260
    EROSIONS, 4812*
    GASTRECTOMY, 5601
    HEMORRHAGE, 4757, 6897
    LYMPHOMA, 4041*
    NEOPLASMS, 1235, 2222, 3149, 3156, 3992, 4054, 4807*
    NEOPLASMS, BENIGN, 2410*
    NEOPLASMS, MALIGNANT, 245, 3040*, 3160, 6887, 6901, 8174, 8175
    POLYPS, 2399, 3992
    PRECANCEROUS CONDITIONS, 2222
    REFLUX, 294*
    SEPSIS, 4388*
    SURVIVAL, 3053
    TECHNIQUES, 3040*, 5221
    THERAPY, 4027
    ULCER, 1234, 3040*, 3993, 4076, 4812*, 5478*
  STOMACH DISEASES, 8166
    CYTOLOGY, EXFOLIATIVE, 246
    DIAGNOSIS, 243
  SURGERY, 6154
    POLYPS, 1254

- ENDOSCOPY (continued)
  - TECHNIQUES, 5551
    - PANCREAS, 2843
    - PROGNOSIS, 2589*
    - REVIEW, 7533, 7534, 7535, 7540, 7541
  - THERAPY, 6154
  - ULCER, PEPTIC, 3201, 7586
    - AGE FACTORS, 6913*
    - DIAGNOSIS, 6913*, 7590
    - DISEASES ASSOCIATED WITH, 4453
    - DUODENUM, 6913*
    - STOMACH, 6913*
  - VAGOTOMY, 6154
  - VATER'S AMPULLA, 4775
    - CALCULI, 3512
    - DIAGNOSIS, 6857
    - DISEASE, 6857
    - GASTRECTOMY, 2317*
    - NEOPLASMS, MALIGNANT, 3083
    - SURGERY, 6857

- ENDOTOXINS
  - BRADYKININ
    - INTESTINES, 5454
  - GASTRITIS
    - ETIOLOGY, 4809*
  - INTESTINAL ABSORPTION, 8101*
  - INTESTINE, SMALL
    - ABSORPTION, 2708*
  - INTESTINES
    - ABSORPTION, 2708*
  - JAUNDICE, OBSTRUCTIVE
    - BILE ACIDS AND SALTS, 2579*
  - LIVER
    - BILE, 7996*
    - CARDIOVASCULAR SYSTEM, 6540*
    - ENZYMES, 6778*
    - METABOLISM, 3784
    - SALMONELLOSIS, 8039*
    - STEROIDS, 6123
    - ZINC, 2957
  - LIVER CIRRHOSIS
    - ANTIBIOTICS, 712
    - ASCITES, 6530*
    - BLOOD, 4337*
    - GASTRITIS, 4809*
    - KIDNEYS, 4809*
    - PLASMA, 6530*
  - LIVER DISEASES
    - ETIOLOGY, 5815*
    - REVIEW, 5815*
  - STOMACH
    - CIRCULATION, 6006*
    - ION TRANSPORT, 6006*

- ENEMA
  - ABSORPTION
    - STEROIDS, 509*
  - BARIUM
    - COMPLICATIONS, 2200, 2396
    - PROGNOSIS, 1178*
    - TECHNIQUES, 1178*, 4925*
  - COLITIS
    - STEROIDS, 509*
  - COLON
    - BARIUM, 2190, 2396
    - RADIOLOGY, 6165

- ENEMA (continued)
  - COMPLICATIONS
    - INFANT, 7683
  - ELECTROLYTES
    - COMPLICATIONS, 7683
  - ILEUM
    - BARIUM, 6851*
  - INTESTINE, LARGE
    - APPENDIX, 8239
    - BARIUM, 1240, 8239
  - INTESTINE, SMALL
    - TECHNIQUES, 7526*
  - INTUSSUSCEPTION
    - THERAPY, 4953
  - PHOSPHATES
    - COMPLICATIONS, 7683
  - POLYPS
    - BARIUM, 7002*
  - RECTUM
    - MORPHOLOGY, 4148*

- ENTERECTOMY
  - ABSORPTION
    - AMINO ACIDS, 5305
    - OXALATES, 5703*
    - PEPTIDES, 5305
  - ACID SECRETION, 3718
  - ADAPTATION, 7503
  - BACTERIA
    - COLITIS, ULCERATIVE, 4970
    - CROHN'S DISEASE, 4970
  - BILE ACIDS AND SALTS
    - SYNTHESIS, 6762*
  - COLON
    - CROHN'S DISEASE, 5257*
  - COMPLICATIONS
    - ANEURYSM, 7686
    - SEPSIS, 7686
    - UROGENITAL SYSTEM, 7714
  - CROHN'S DISEASE
    - ANASTOMOSIS, 5257*
  - DIARRHEA
    - DRUG THERAPY, 7897*
  - HEIDENHAIN POUCH
    - ACID SECRETION, 5370*
  - HYPERCHLORHYDRIA, 4573*
  - HYPERPLASIA
    - HUMORAL FACTORS, 4698
  - ILEUM
    - AUTORADIOGRAPHY, 4709*
    - CELLS, 4709*
    - GROWTH SUBSTANCES, 5443*
    - OXALATES, 5703*
  - INTESTINE, SMALL
    - ADAPTATION, 7501*
    - MITOSIS, 4708*
    - NUCLEIC ACIDS, 4708*
  - LIVER FUNCTION TESTS, 6783*
  - OSTEOMALACIA
    - THERAPY, 7641
    - VITAMIN D, 7641
  - PANCREAS
    - SECRETION, 3741, 5443*
  - PEPTIDES
    - CLEARANCE STUDY, 3828*
  - RECTUM
    - COMPLICATIONS, 7714
  - REGENERATION, 4675*

- ENTERECTOMY (continued)
    - SECRETION
        - GASTRIN, 4573*
    - SERUM
        - GASTRIN, 3690, 3718, 5370*
    - SHORT BOWEL SYNDROME
        - CHILD, 4891
        - INFANT, 4891
        - OSTEOMALACIA, 7641
    - SIGMOID
        - COMPLICATIONS, 7686
    - STOMACH
        - ACID SECRETION, 5370*
    - TRANSPORT
        - BILE ACIDS AND SALTS, 7915*
        - OXALATES, 5703*
    - ULCER, PEPTIC
        - COMPLICATIONS, 7584

- ENTERITIS
    - ABSORPTION
        - AMINO ACIDS, 3236
    - ANTIBACTERIALS
        - CHILD, 787
    - BACTERIAL INFECTIONS
        - REVIEW, 795
        - YERSINIA, 4900
    - CIRCULATION, 7857
    - CLASSIFICATION, 8208
    - DIARRHEA
        - CLOSTRIDIUM, 7268
    - DIET
        - THERAPY, 3527
    - ENZYMES
        - DRUG EFFECTS ON, 3235
    - ESCHERICHIA COLI
        - IMMUNOLOGY, 418
        - NEONATE, 418
    - ETIOLOGY, 3238
        - AMEBIASIS, 3543
        - GEOGRAPHICAL FACTORS, 4433
        - NEOPLASMS, MALIGNANT, 3543
    - HEMORRHAGE, 7857
    - INTESTINE, SMALL
        - DISACCHARIDASES, 8207
        - INTUSSUSCEPTION, 6297
        - MYCOSES, 4393*
    - IRRADIATION
        - RADIOLOGY, 417
    - ISCHEMIA, 5698
    - LACTASE
        - DRUG THERAPY, 3237
        - THERAPY, 3237
    - LIPIDS
        - BLOOD, 792
    - NEONATE
        - NECROSIS, 419
        - SURVIVAL, 419
    - PARENTERAL ALIMENTATION
        - THERAPY, 3527
    - PATHOLOGY, 3238, 3543
    - PERFORATION, 3238
    - REVIEW, 8208
    - THERAPY, 3235
    - VIRUS DISEASES
        - INTESTINE, SMALL, 2962*
        - JEJUNUM, 2962*
    - VIRUSES
        - NEONATE, 229

- ENTERITIS (continued)
    - VIRUSES (continued)
        - SIMULATION, 229
        - ULTRASTRUCTURE, 229
    - YERSINIA
        - DIAGNOSIS, 4900

- ENTERITIS, REGIONAL
    - SEE ALSO CROHN'S DISEASE
    - CHOLELITHIASIS
        - DIAGNOSIS, 854
    - COMPLICATIONS, 4469*
        - URINARY SYSTEM, 6677*
    - CROHN'S DISEASE
        - DUODENUM, 4473*
        - STOMACH, 4473*
    - ETIOLOGY, 5984
    - GLOBULINS, 7281
    - IMMUNOLOGY, 5984
    - LYMPHOCYTES, 5984
    - NUTRITION DISORDERS
        - VITAMIN C, 853
    - STOMACH
        - DUODENUM, 4473*
    - WATER, ELECTROLYTE BALANCE
        - BILE ACIDS AND SALTS, 3577*
        - DIARRHEA, 3577*
        - ILEUM, 3577*
    - YERSINIA
        - RADIOLOGY, 3220*

- ENTEROCOLITIS
    - ADENOSINE TRIPHOSPHATE, 3545
    - CROHN'S DISEASE
        - PARENTERAL ALIMENTATION, 4465*
        - THERAPY, 4465*
    - DIAGNOSIS
        - REVIEW, 2389
    - DRUG THERAPY, 3544, 7004
    - ENDOSCOPY
        - DIAGNOSIS, 2313*
        - MORPHOLOGY, 2313*
    - ENZYMES, 3545
    - ESOPHAGITIS
        - CROHN'S DISEASE, 1740
    - ETIOLOGY, 4444
    - HEPATITIS
        - MICROORGANISMS, 3033
    - HIRSCHSPRUNG'S DISEASE, 7061
    - HYPERSENSITIVITY
        - MILK, 2327
    - LACTASE
        - DEFICIENCY, 4444
    - MALABSORPTION SYNDROMES, 3545
    - RADIOLOGY
        - DIAGNOSIS, 2313*
        - MORPHOLOGY, 2313*
    - RENAL INSUFFICIENCY, 8091*
    - THERAPY
        - REVIEW, 2389
    - YERSINIA
        - ANTIBIOTICS, 2388
        - ENDOSCOPY, 2313*
        - MORPHOLOGY, 2313*
        - PATHOLOGY, 2388
        - RADIOLOGY, 2313*

- ENTEROCOLITIS, NECROTIZING
  - ANTIBIOTICS
    - DRUG-INDUCED, 484
  - BACTERIAL INFECTIONS
    - ESCHERICHIA COLI, 4432
    - NEONATE, 4432
  - CARBOHYDRATES
    - MALABSORPTION SYNDROMES, 1384
  - COLON
    - ATRESIA, 2374
    - STENOSIS, 2374
  - DIAGNOSIS, 2192
  - DISEASES ASSOCIATED WITH
    - EPIDEMIOLOGY, 2592*
  - DRUG-INDUCED
    - ANTIBIOTICS, 483, 1411
    - STEROIDS, 483
  - ESCHERICHIA COLI
    - DIARRHEA, 7272
  - ETIOLOGY, 3238
  - GASES
    - VEINS, 1689
  - HEMATOLOGY
    - REVIEW, 7265
  - HUMORAL FACTORS
    - REVIEW, 7257
  - INFANT, 7255
    - BREAST FEEDING, 8469
    - DIAGNOSIS, 5696
    - PROGNOSIS, 5696
    - THERAPY, 5696
  - INTESTINE, SMALL
    - DISTENTION, 2192
  - INTESTINES
    - GANGRENE, 4185
  - LIVER
    - VEINS, 1689
  - NEONATE
    - DIAGNOSIS, 5696
    - DISEASES ASSOCIATED WITH, 2592*
    - EPIDEMIOLOGY, 2592*
    - GANGRENE, 4185
    - INFANT, 793
    - PARENTERAL ALIMENTATION, 5183
    - PROGNOSIS, 5696
    - REVIEW, 2611
    - RISK FACTORS, 5697
    - THERAPY, 5183, 5694, 5696
    - VITAMIN A, 5201
  - PATHOLOGY, 3238
  - PERFORATION, 3238
  - PNEUMATOSIS
    - INTESTINES, 1689
    - PREMATURITY, 1689
  - PREMATURITY
    - REVIEW, 794
  - REVIEW, 5695
  - UROGENITAL SYSTEM
    - SURGERY, 8246

- ENTEROKINASE
  - CELIAC DISEASE, 5700*
  - CYSTIC FIBROSIS, 5700*
  - DEFICIENCY
    - NEONATE, 1369
  - DUODENUM
    - CHEMICAL PROPERTIES, 7506
    - CHROMATOGRAPHY, 7506
    - SECRETION, 4690

- ENTEROKINASE (continued)
  - INTESTINE, SMALL
    - BLOOD GROUPS, 7490*
    - CHEMICAL COMPOSITION, 7490*
    - DEFICIENCY, 1369
    - SECRETION, 4690
    - VILLI, 7490*
  - JEJUNUM
    - SECRETION, 4690
  - PANCREAS
    - HYPOPLASIA, 5700*

- ENTEROTOXINS
  - ADENYL CYCLASE
    - BACTERIA, 1091
  - CHOLERA
    - WATER, ELECTROLYTE BALANCE, 2085
  - ESCHERICHIA COLI, 1680
    - CHILD, 1681
    - DIARRHEA, 1681
    - ELECTROPHORESIS, 2647
  - INTESTINE, SMALL
    - BIOCHEMISTRY, 187
    - CHOLERA, 2084
    - MOTILITY, 1850
    - MUSCLES, 1851
  - INTESTINES
    - CHOLERA, 2083
    - SECRETION, 2083
  - JEJUNUM
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2060*
    - ANTI-INFLAMMATORY AGENTS, 2059*
    - CHOLERA, 2059*, 2060*
    - ION TRANSPORT, 2059*
    - WATER, ELECTROLYTE BALANCE, 2059*
  - SECRETION
    - CHOLERA, 186

- ENTEROVIRUSES
  - PANCREATITIS
    - ETIOLOGY, 4222*

- EOSINOPHILS
  - COLITIS, ULCERATIVE
    - INFLAMMATION, 4208
  - ESOPHAGUS
    - GASTROENTERITIS, 4871*
  - GASTROENTERITIS
    - DRUG THERAPY, 788
  - GASTROINTESTINAL SYSTEM
    - CHILD, 2613
  - HEPATITIS
    - GRANULOMA, 4459*
  - SCHISTOSOMIASIS
    - IMMUNITY, 2670
  - STOMACH
    - INFLAMMATION, 6235

- EPINEPHRINE
  - COLON
    - ION TRANSPORT, 6015
    - MOTILITY, 7950
    - PERISTALSIS, 919
  - DUODENUM
    - MOTILITY, 7950
  - NEOPLASMS, MALIGNANT
    - GASTROINTESTINAL SYSTEM, 234
    - HEMODYNAMICS, 234

EPINEPHRINE (continued)
- PANCREAS
  - SECRETION, 3730
- SALIVARY GLANDS
  - METABOLISM, 948
- SECRETION
  - PEPSIN, 8171
- STOMACH
  - ACID SECRETION, 8171
  - GASTRIN, 7972
- ULCER, PEPTIC
  - URINE, 5221

EROSIONS
- ACID SECRETION
  - STRESS, 6052
- ASPIRIN
  - AMINO ACIDS, 2144
  - PREGNANCY, 2144
  - STOMACH, 2144
- BLEEDING
  - HEALING, 82
  - STOMACH, 82
- CROHN'S DISEASE
  - ANUS, 1733*
- DRUG-INDUCED
  - LIVER CIRRHOSIS, 1497
  - STOMACH, 1497
- PRIMATES
  - COLON, 3022
- STOMACH
  - ACID SECRETION, 365
  - ASPIRIN, 1315
  - BILE ACIDS AND SALTS, 2807
  - DRUGS, 1918
  - DUODENUM, 6844
  - ENDOSCOPY, 4812*
  - HEALING, 1315
  - POLYPS, 2259
  - PREGNANCY, 3009
  - PROSTAGLANDINS, 2807
  - PSYCHOLOGICAL FACTORS, 2817
  - RADIOLOGY, 4812*
  - SIMULATION, 2817
  - STRESS, 1317, 1919
  - THERAPY, 4812*
  - ULTRASTRUCTURE, 1315
  - VAGOTOMY, 4812*

ERYTHROCYTES
- BILIARY TRACT DISEASES
  - MEMBRANES, 613
  - METABOLISM, 7758
  - PHOSPHOLIPIDS, 630
- CHOLESTASIS
  - PHOSPHOLIPIDS, 630
- INTESTINE, SMALL
  - IMMUNOLOGY, 2985*
- LIPIDS, 6085*
- LIVER
  - EMBRYOLOGY, 11
- LIVER CIRRHOSIS
  - CARBOHYDRATES, 7812*
  - PROTEINS, 7812*
- LIVER DISEASES
  - MEMBRANES, 613
  - METABOLISM, 7758
  - PHOSPHOLIPIDS, 630

ERYTHROCYTES (continued)
- LIVER DISEASES, ALCOHOLIC
  - ANEMIA, HEMOLYTIC, 8390*
- LIVER INJURY
  - LIPIDS, 5414*
  - LIPOPROTEINS, 5414*
- SPLEEN
  - IMMUNOLOGY, 2985*
- ZIEVE'S SYNDROME
  - MEMBRANES, 8390*
  - METABOLISM, 8390*

ESCHERICHIA COLI
- DIARRHEA
  - CHILD, 4422
  - ETIOLOGY, 2640
  - REVIEW, 1682
- ELECTROPHORESIS
  - ENTEROTOXINS, 2647
- ENTERITIS
  - IMMUNOLOGY, 418
  - NEONATE, 418
- ENTEROCOLITIS, NECROTIZING
  - BACTERIAL INFECTIONS, 4432
  - DIARRHEA, 7272
- ENTEROTOXINS, 1680
  - CHILD, 1681
  - DIARRHEA, 1681
- GASTROINTESTINAL SYSTEM
  - MORPHOLOGY, 2685*
  - ULTRASTRUCTURE, 2685*
- INTESTINE, SMALL
  - MOTILITY, 1850
  - MUSCLES, 1851
- INTESTINES
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2131
  - ANTIBODIES, 8100*
  - EPITHELIUM, 1761
  - MORPHOLOGY, 2685*
  - ULTRASTRUCTURE, 2685*
- PROTEINS
  - DIETARY FACTORS, 2646
- SALMONELLOSIS
  - IMMUNITY, 2652
- STOMACH
  - MORPHOLOGY, 2685*
  - ULTRASTRUCTURE, 2685*

ESOPHAGEAL DISEASES
- ACHALASIA
  - ETIOLOGY, 3124*
  - FAMILIAL FACTORS, 3124*
- COMPLICATIONS, 6223
- DARIER'S DISEASE
  - RADIOLOGY, 4390*
- DIAGNOSIS, 1266, 6223
  - REVIEW, 4029
  - SCANNING, SCINTILLATION, 3128
- DILATATION
  - DISEASES ASSOCIATED WITH, 5566
- ENDOSCOPY, 3061
- EPIDEMIOLOGY
  - RADIOLOGY, 6870
- NEOPLASMS
  - DIAGNOSIS, 3128
- REVIEW, 1274

ESOPHAGEAL DISEASES (continued)
- SPASM
  - CLASSIFICATION, 5567*
  - DRUG EFFECTS ON, 5567*
  - MANOMETRY, 5567*
  - PARASYMPATHOMIMETICS, 5567*
- THERAPY, 6223

ESOPHAGEAL REFLUX
- ACHALASIA
  - SURGERY, 6205
- CHILD
  - DIAGNOSIS, 5564*
- COMPUTERS
  - ANALYSIS, 6210
- DIAGNOSIS, 5565*
- ENDOSCOPY
  - MORPHOLOGY, 4019*
- EPIDEMIOLOGY
  - STATISTICAL STUDY, 2261
- ESOPHAGITIS
  - REVIEW, 6219
  - SURGERY, 5572
  - THERAPY, 7562
- ESOPHAGUS
  - MANOMETRY, 7554*
  - MOTILITY, 7554*
  - SPHINCTER, 7358, 7554*
  - STRICTURE, 6865
- ETIOLOGY
  - STATISTICAL STUDY, 2261
- HIATAL HERNIA
  - BARIUM, 5577
  - EPIDEMIOLOGY, 5577
  - SURGERY, 6863*
- INFANT
  - DIAGNOSIS, 5564*
- MANOMETRY, 5565*
  - ESOPHAGITIS, 7554*
  - RADIOLOGY, 299
- MOTILITY
  - ESOPHAGITIS, 7554*
  - SURGERY, 1265*
- NERVOUS CONTROL
  - GANGLION CELLS, 2225
- PATHOLOGY
  - REVIEW, 6217
- PREGNANCY
  - ETIOLOGY, 5563*
  - MANOMETRY, 5563*
  - PRESSURE STUDY, 5563*
- SPHINCTER
  - ACHALASIA, 6205
  - PRESSURE STUDY, 2230, 4801
  - SURGERY, 6205
- STOMACH
  - ACID SECRETION, 7358
  - CHILD, 4801
- SURGERY
  - COMPLICATIONS, 7521
  - ERUCTATION, 7521
  - VOMITING, 7521
- VITAMIN C
  - DEFICIENCY, 6208

ESOPHAGITIS
- ACIDITY, 3127*
  - PREVENTION, 1261*

ESOPHAGITIS (continued)
- ANTRUM
  - GASTRIN, 5177*
- BILE
  - REFLUX, 3134
- CROHN'S DISEASE
  - ENTEROCOLITIS, 1740
  - RADIOLOGY, 4470*
- DIAGNOSIS
  - BIOPSY, 7560
  - ENDOSCOPY, 7560, 7561
- ENDOSCOPY
  - BIOPSY, 3040*
  - TECHNIQUES, 3040*
- ESOPHAGEAL REFLUX
  - REVIEW, 6219
  - SURGERY, 5572
  - THERAPY, 7562
- ESOPHAGUS
  - MANOMETRY, 7554*
  - MOTILITY, 7554*
  - SPHINCTER, 7554*
- ETIOLOGY
  - GASTRECTOMY, 3134
- HEALING
  - ENDOSCOPY, 2165*
- HERPESVIRUSES
  - MYCOSES, 305
- HIATAL HERNIA
  - COMPLICATIONS, 5574
  - HEMORRHAGE, 5571
  - PROGNOSIS, 6867
  - REVIEW, 6867
  - SURGERY, 5574, 6867
  - THERAPY, 6867
- IATROGENESIS
  - HIATAL HERNIA, 6206
- LIVER DISEASES
  - MANOMETRY, 1261*
- MANOMETRY
  - ESOPHAGEAL REFLUX, 7554*
- MOTILITY
  - ESOPHAGEAL REFLUX, 7554*
- MYCOSES
  - EPIDEMIOLOGY, 3125*
- PAIN, 3127*
- PERISTALSIS
  - DIAGNOSIS, 4793*
- REFLUX, 3127*
  - ENDOSCOPY, 238
  - ETIOLOGY, 2697*
- REVIEW, 3133
- SPHINCTER
  - PENTAGASTRIN, 1832*
  - PRESSURE STUDY, 1832*
- STOMACH
  - GASTRIN, 5177*
- SURGERY
  - COMPLICATIONS, 5574, 5599
  - REFLUX, 5599
  - ULCER, 5599

ESOPHAGUS
- ABSORPTION
  - HYDROGEN, 7301*
- ACHALASIA
  - DIAGNOSIS, 4020*, 4029
  - DRUG EFFECTS ON, 4030
  - PARASYMPATHOLYTICS, 1276

SOPHAGUS (continued)
  ACHALASIA (continued)
    RADIOLOGY, 4788*
    SURGERY, 303, 3126*, 6872
    THERAPY, 4020*, 4029
    THYROCALCITONIN, 3135
  ALCOHOLS, 3531
  ANESTHESIA
    PRESSURE STUDY, 5582
    SPHINCTER, 5582
  ANOMALY
    GASTRIN, 4799
    HIATAL HERNIA, 2233
    MORPHOLOGY, 4799
    PEPSIN, 4799
    PEPSINOGEN, 4799
    REFLUX, 306
  ANTI-INFLAMMATORY AGENTS
    PRESSURE STUDY, 6031
  ANTIEMETICS
    MOTILITY, 2224*
  ANTRUM
    PRESSURE STUDY, 4518*
  ATRESIA
    CLASSIFICATION, 2226
    FISTULA, 1267
    MOTILITY, 4790*
    NEONATE, 6211
    SIMULATION, 6211
    SURGERY, 304, 4790*, 7555
    SURVIVAL, 304
  BARIUM
    PRESSURE STUDY, 914*
    SPHINCTER, 914*
    TECHNIQUES, 2193
  BARRETT'S SYNDROME
    DISEASES ASSOCIATED WITH, 6862*
    NEOPLASMS, MALIGNANT, 6862*
    RADIOLOGY, 5561*
  BLEEDING
    SCLEROSIS, 4025*
  BURNS
    SURGERY, 4791*
    THERAPY, 4791*
  BURNS, CHEMICAL
    PATHOLOGY, 1280
    STENOSIS, 8152
    THERAPY, 4724
  CARCINOEMBRYONIC ANTIGEN
    STOMACH, 5557*
  CELIAC DISEASE
    SURGERY, 2358
  CELLS
    ULTRASTRUCTURE, 4483*
  CIRCULATION
    HEMORRHAGE, 4704*
    MORPHOMETRY, 7901*
  CONNECTIVE TISSUE
    DISEASE, 2230
  CROHN'S DISEASE
    COLON, 5985
    ENDOSCOPY, 4471*
  DEGLUTITION
    PRESSURE STUDY, 3643
  DEGLUTITION DISORDERS
    ETIOLOGY, 3132
    SURGERY, 292*
  DEVELOPMENT
    AGE FACTORS, 4026

ESOPHAGUS (continued)
  DILATATION
    BACTERIAL INFECTIONS, 5560*
    COMPLICATIONS, 5560*
  DISEASE
    CHILD, 5191
  DISTENTION
    NERVOUS CONTROL, 1838
  DIVERTICULUM
    CHOLECYSTITIS, 4380
    CLASSIFICATION, 4032
    DEGLUTITION DISORDERS, 4032
    REVIEW, 8147*
    SIMULATION, 8147*
  DUODENUM
    ENDOSCOPY, 3931*
  DUPLICATION
    COMPLICATIONS, 2227
  DYSPEPSIA
    BARIUM, 6260
    CONTRAST MEDIA, 6260
    ENDOSCOPY, 6260
  ELECTROLYTES
    METABOLISM, 8152
  ELECTROPHYSIOLOGY
    TECHNIQUES, 6703
  ENDOSCOPY, 237, 6868
    ANESTHESIA, 4759
    BACTERIAL INFECTIONS, 4388*, 5560*
    BIOPSY, 3040*
    CHILD, 1237
    COMPLICATIONS, 3136, 3931*, 3984, 4388*, 4760, 5560*, 6158
    OBSTRUCTION, 6201
    PERFORATION, 3136
    REVIEW, 6218
    SEPSIS, 4388*
    TECHNIQUES, 3040*
    THERAPY, 4027
  EPITHELIUM
    ELECTROPHYSIOLOGY, 6
    NERVOUS CONTROL, 6
  FISTULA
    DIAGNOSIS, 3130
    GENETIC FACTORS, 4798
    MOTILITY, 4790*
    NEOPLASMS, MALIGNANT, 308
    PROSTHESIS, 4033
    RADIOLOGY, 3130
    RESPIRATORY SYSTEM, 307
    SURGERY, 307, 308, 4790*
    THERAPY, 3130
  GASTRIN
    ATROPINE, 4540
    PARASYMPATHOMIMETICS, 4789*
    PRESSURE STUDY, 915*
  GASTROENTERITIS
    EOSINOPHILS, 4871*
  HEMORRHAGE
    BURNS, 5229
    DRUG-INDUCED, 3547
    ENDOSCOPY, 4757
    ETIOLOGY, 3213
    HYPERTENSION, PORTAL, 6200*
    PROGNOSIS, 6200*
    RADIOLOGY, 4757
    THERAPY, 8156, 8157
  HERNIA
    DIAGNOSIS, 6161

ESOPHAGUS (continued)
- HERNIA (continued)
  - ENDOSCOPY, 6161
  - OBSTRUCTION, 1306
  - RADIOLOGY, 6161
- HISTOCHEMISTRY
  - LIPIDS, 4484*
  - MUCUS, 4484*
- HORMONE EFFECTS ON
  - GASTRIN, 7936*
  - SOMATOSTATIN, 7936*
- HYDROGEN
  - ALCOHOLS, 7301*
  - BILE ACIDS AND SALTS, 7301*
- HYPERTENSION, PORTAL
  - HEMORRHAGE, 6533*
  - MORPHOMETRY, 7901*
  - SURGERY, 4608*
- HYPERTROPHY
  - MORPHOLOGY, 2234
  - RUPTURE, 8148*
- IMMUNOLOGY, 5267
- INTESTINE, SMALL
  - ANTRECTOMY, 6030
  - SURGERY, 6030
- ION TRANSPORT
  - PEPSIN, 2697*
- LIVER CIRRHOSIS
  - BLEEDING, 3483*
  - HEMORRHAGE, 3483*
  - VARICES, 7185*
- MANOMETRY
  - ESOPHAGEAL REFLUX, 7554*
  - ESOPHAGITIS, 7554*
  - INFANT, 2223*
  - REFLUX, 2223*
  - TECHNIQUES, 2184, 4537, 5308*, 6701, 6702
- MORPHOMETRY, 297
- MOTILITY, 4122
  - AMINES, 6707
  - BICARBONATES, 50
  - CALCIUM, 4449
  - CHOLECYSTOKININ, 4519*
  - DISTENTION, 298, 4517*
  - DOPAMINE, 4520*
  - DRUG EFFECTS ON, 2733*, 3625*, 4520*, 5309*, 6707, 6708
  - DUODENUM, 4687
  - ELECTROPHYSIOLOGY, 53, 6703, 6705
  - ESOPHAGEAL REFLUX, 7554*
  - ESOPHAGITIS, 7554*
  - FEEDING, 50
  - GASTRECTOMY, 4539
  - GASTRIN, 4031, 6709, 7936*
  - H2 RECEPTOR ANTAGONISTS, 928, 2733*, 3625*
  - HORMONE EFFECTS ON, 4524*, 6709, 7936*
  - HORMONES, GASTROINTESTINAL, 927, 4524*
  - MANOMETRY, 6701, 6702
  - MORPHOLOGY, 302
  - MUSCLES, 6705, 6706, 7937*
  - NERVOUS CONTROL, 931, 1839, 4516*, 4519*, 6706, 6707, 7937*
  - PARASYMPATHOLYTICS, 52
  - PRESSURE STUDY, 4514*, 4519*, 4524*

ESOPHAGUS (continued)
- MOTILITY (continued)
  - PROSTAGLANDINS, 927
  - RADIOLOGY, 6869
  - REFLUX, 6708
  - REVIEW, 926, 4029
  - SCLERODERMA, 2236
  - SOMATOSTATIN, 7936*
  - SPHINCTER, 50, 927, 4449
  - SURGERY, 925
  - TEMPERATURE, 4515*, 4516*, 6704
  - VAGOTOMY, 7574*
  - ZOLLINGER-ELLISON SYNDROME, 4449
- MOVEMENT DISORDERS
  - CHOLECYSTITIS, 4380
- MUSCLES
  - POTASSIUM, 5295
  - TEMPERATURE, 1847, 4515*
- MUSCULOSKELETAL SYSTEM
  - MORPHOLOGY, 7, 2615
  - PHARYNX, 2615
  - STOMACH, 7
- NEOPLASM METASTASIS, 3129
  - PROGNOSIS, 4022*
  - SURGERY, 4022*
- NEOPLASMS
  - ALCOHOLS, 6213
  - BIOPSY, 3149
  - DIAGNOSIS, 1259*, 3149
  - ENDOSCOPY, 3061, 3149
  - EPIDEMIOLOGY, 6870
  - HIATAL HERNIA, 5573
  - NERVOUS CONTROL, 2225
  - NITROSAMINES, 6213
  - RADIOLOGY, 1259*, 3131, 5558*, 6870
  - RADIOTHERAPY, 4021*
  - REVIEW, 6216
  - STRICTURE, 5573
  - THERAPY, 6216
  - ULTRASONOGRAPHY, 5756
- NEOPLASMS, BENIGN
  - DIAGNOSIS, 1259*
- NEOPLASMS, MALIGNANT, 3129, 6222
  - BIOPSY, 4792*
  - COMPLICATIONS, 3130
  - CYTOLOGY, EXFOLIATIVE, 239
  - DIAGNOSIS, 1277, 4792*
  - DISEASES ASSOCIATED WITH, 6862*
  - ENDOSCOPY, 239, 3040*, 4792*
  - PROGNOSIS, 7564
  - RADIOLOGY, 239, 1258*
  - RADIOTHERAPY, 7564
  - SURGERY, 1268, 5575, 6202
  - SURVIVAL, 1268, 5575
  - THERAPY, 7564
  - VEINS, 1258*
- NERVOUS CONTROL
  - REVIEW, 858
- NERVOUS SYSTEM
  - REVIEW, 858, 5227
- OBSTRUCTION
  - FOOD, 6199*
  - GLUCAGON, 6199*
  - HEMATOMA, 310
  - INTESTINAL OBSTRUCTION, 4800
  - MUSCLES, 309
  - THERAPY, 6199*

SOPHAGUS (continued)
  PARASITES AND PARASITIC DISEASES
    MUSCLES, 6662
  PEPSINOGEN, 5267
  PERFORATION, 300
    ANTIBIOTICS, 313
    IATROGENESIS, 5585
    THERAPY, 6204
  PERISTALSIS
    MANOMETRY, 5308*
    MUSCLES, 7937*
    NERVOUS CONTROL, 6028, 7937*
    PRESSURE STUDY, 4514*
  PERMEABILITY
    PEPSIN, 2697*
  POTASSIUM
    DEFICIENCY, 8152
  PRESSURE STUDY
    ACID SECRETION, 4521*
    ASCITES, 3474*
    DEGLUTITION, 2731*
    GASTRIN, 4521*
    HORMONE EFFECTS ON, 4521*
    TECHNIQUES, 6029
  PSEUDO-OBSTRUCTION
    MOTILITY, 4881*
    PERISTALSIS, 2340
  RADIOLOGY
    INTEGUMENTARY SYSTEM, 1275
  REFLUX
    ACID SECRETION, 4550*
    ACIDITY, 3127*, 4550*
    ANTIEMETICS, 5309*
    CHILD, 4034, 4795*
    DIAGNOSIS, 294*, 4035, 4795*
    DISEASES ASSOCIATED WITH, 4034
    DRUG EFFECTS ON, 6708
    DRUG THERAPY, 2749, 5309*
    ENDOSCOPY, 294*
    GASTRIN, 3532
    HYPOGLYCEMIA, 4550*
    MANOMETRY, 1260*, 4523*, 4550*
    PAIN, 3127*
    PARASYMPATHOMIMETICS, 4794*
    POSTURAL FACTORS, 4036
    PRESSURE STUDY, 4523*, 4550*,
      4794*
    RADIOLOGY, 4034
    REVIEW, 4035
    SCANNING, SCINTILLATION, 1260*
    STOMACH, 2223*
    SURGERY, 3126*
    THERAPY, 1270, 4035
  RESPIRATORY SYSTEM
    FISTULA, 6203
    NEOPLASMS, 2235
  RUPTURE, 7566
    DIAGNOSIS, 1271
    PROGNOSIS, 2231
    THERAPY, 1271
  SCLERODERMA
    DIAGNOSIS, 4029
    RADIOLOGY, 4788*
    THERAPY, 4029
  SCLEROSIS, 3137
  SPASM
    CHOLECYSTITIS, 4380
    DIAGNOSIS, 4029
    DRUG THERAPY, 1264*

ESOPHAGUS (continued)
  SPASM (continued)
    FAMILIAL FACTORS, 2232
    GASTRIN, 4031
    NERVOUS CONTROL, 2225
    NITRITES, 1264*
    THERAPY, 4029
  SPHINCTER
    ACIDITY, 1831*
    AMINES, 6707
    ANTIEMETICS, 2224*, 5327
    ATROPINE, 1841
    CHOLAGOGUES AND CHOLERETICS, 1830*
    CHOLECYSTOKININ, 4519*
    CONTRACEPTIVES, ORAL, 1840
    DEGLUTITION, 3643
    DISTENTION, 1838
    DRUG EFFECTS ON, 1829*, 1846,
      2224*, 2749, 4538, 5309*, 6707
    ELECTRICAL CONTROL, 1828*
    ELECTROPHYSIOLOGY, 1837
    ESOPHAGEAL REFLUX, 7358, 7554*
    ESOPHAGITIS, 7554*
    GASTRIN, 915*, 1832*, 1841, 2734*,
      4396*, 4540, 5559*, 6709, 7936*
    GLUCAGON, 1842
    H1 RECEPTOR ANTAGONISTS, 1843,
      2750
    H2 RECEPTOR ANTAGONISTS, 929,
      1829*, 2732*, 2750
    HISTAMINE, 1843
    HORMONE EFFECTS ON, 1830*, 4396*,
      4522*, 6709, 7936*
    IMMUNOLOGY, 5267
    MANOMETRY, 1830*, 4523*, 4537,
      5569, 7554*
    MORPHOLOGY, 5268
    MOTILIN, 1830*, 1831*, 2735*,
      4522*
    MOTILITY, 2731*, 2733*, 5309*
    NERVOUS CONTROL, 930, 1839, 4519*,
      6707
    PARASYMPATHOMIMETICS, 4789*
    PENTAGASTRIN, 1832*, 1844
    PEPSINOGEN, 5267
    PRESSURE STUDY, 1832*, 1837, 2224*,
      2230, 2731*, 2733*, 2749, 3474*,
      3625*, 4030, 4396*, 4518*, 4519*,
      4521*, 4522*, 4523*, 4524*, 4537,
      4538, 4539, 4550*, 4687, 4789*,
      5309*, 5327, 5559*, 5569, 6031,
      7936*
    REFLUX, 51, 2229
    SMOKING, 4538
    SOMATOSTATIN, 1845, 7936*
    SPASM, 8150
    VAGOTOMY, 7574*
  STENOSIS, 5584
    BLEEDING, 7556
    DIAGNOSIS, 7556
    DISEASES ASSOCIATED WITH, 7557
    ELECTROLYTES, 8152
    ETIOLOGY, 7556
    POTASSIUM, 8152
    SURGERY, 8151
  STOMACH
    ANOMALY, 4797
    BEZOARS, 2235
    CIRCULATION, 7901*

ESOPHAGUS (continued)
  STOMACH (continued)
    ENDOSCOPY, 3931*
    NEOPLASMS, MALIGNANT, 5575
    REFLUX, 51
    SURGERY, 1272, 5575
    SURVIVAL, 5575
  STRICTURE, 3874
    COMPLICATIONS, 2235
    DILATATION, 6214
    DISEASES ASSOCIATED WITH, 5570
    ESOPHAGEAL REFLUX, 6865
    REVIEW, 6865
    SURGERY, 5570, 6214, 8114, 8153
    THERAPY, 4724
  SURGERY, 301, 1273, 3874, 4796
    REVIEW, 5586
    TECHNIQUES, 6871
  TUBERCULOSIS
    HEMORRHAGE, 4023*
    ULCER, 4023*
  ULCER, PEPTIC
    BIOPSY, 3989
    DIAGNOSIS, 3989
    ENDOSCOPY, 3989
    RADIOLOGY, 3989
    STENOSIS, 8151
    SURGERY, 8151, 8154
  ULTRASTRUCTURE, 296
  VARICES, 3213, 8159
    BARIUM, 5231
    BLEEDING, 311, 798, 3474*, 4802, 5568*, 7558
    CHILD, 8157
    DIAGNOSIS, 4024*, 8155
    DISEASES ASSOCIATED WITH, 5578
    DRUG EFFECTS ON, 4024*
    DYES, 8155
    ENDOSCOPY, 4024*
    ETIOLOGY, 3474*
    HEMORRHAGE, 3137, 6200*, 6897, 8156, 8157
    HYPERTENSION, PORTAL, 4608*, 6200*
    MUSCLE RELAXANTS, 4024*
    PRESSURE STUDY, 3474*
    PROGNOSIS, 6200*
    RADIOLOGY, 4024*
    SCLEROSIS, 4037
    SHUNT, 574
    SPLENORENAL SHUNT, 8158
    SURGERY, 312, 4608*, 8158
    THERAPY, 5568*, 7558, 8156, 8157, 8158
    THYROID GLAND, 5578
  VEINS
    EMBOLIZATION, 8402*
  WOUNDS AND INJURIES
    BURNS, 4791*
    DIAGNOSIS, 5576
    EPIDEMIOLOGY, 5576
    THERAPY, 5576
  ZENKER'S DIVERTICULUM
    BLEEDING, 2228
  ZOLLINGER-ELLISON SYNDROME
    PRESSURE STUDY, 4396*

ESOPHAGUS, ARTIFICIAL
  CECUM, 8160

ESOPHAGUS, ARTIFICIAL (continued)
  COLON, 8153
    BURNS, 6209
    MOTILITY, 4028
  ILEUM, 8160
  INTESTINE, LARGE, 8160, 8161
  INTESTINE, SMALL, 8153, 8160
  INTESTINES
    MOTILITY, 295
  STOMACH
    CIRCULATION, 3873
    MOTILITY, 295

ESTROGENS
  BILE
    CIRCULATION, 4650
    METABOLISM, 7463
  BILIRUBIN
    METABOLISM, 8077
  CHOLELITHIASIS
    ETIOLOGY, 3778
  CHOLESTASIS
    BILE ACIDS AND SALTS, 7399*
    DRUG-INDUCED, 2049
  CHOLESTEROL
    BILE, 3778
  CIRCULATION
    ANTIBIOTICS, 4650
    DRUG EFFECTS ON, 4650
  ILEUM
    MOTILITY, 7952
  INTESTINE, SMALL
    MOTILITY, 7952
  INTESTINES
    CIRCULATION, 4650
  LIVER
    BINDING, 7481
    CARBOHYDRATES, 8008*
    CIRCULATION, 4650
    FATTY ACIDS, 8003*
    GLUCAGON, 8008*
    INSULIN, 8008*
    LIPIDS, 8008*
    STEROIDS, 2950
  LIVER CIRRHOSIS, 3489, 5135
    ASCITES, 2551
    METABOLISM, 2551
  SECRETION
    BILE ACIDS AND SALTS, 8004*
    CHOLESTEROL, 8004*
EVOLUTION
  CALCULI
    CYSTIC DUCT, 1596
    INFUNDIBULUM, 1596
  COLITIS, ULCERATIVE
    CYTOLOGY, 4968
  GALLBLADDER
    CALCULI, 1596
  GASTROINTESTINAL DISEASES
    PSYCHOSOMATIC FACTORS, 1655
  HEPATITIS, INFECTIOUS
    HEPATITIS, CHRONIC, 2512

EXCRETION
  SEE ALSO DEFECATION
  ALBUMINS
    ALCOHOLS, 1282*
    GASTRITIS, 1282*
    GASTRITIS, ATROPHIC, 1282*

- XCRETION (continued)
  - ALKALOIDS, 6803
  - BILE
    - DRUG-INDUCED, 156
    - PHYSICAL FACTORS, 907
  - BILE ACIDS AND SALTS
    - ABSORPTION, 5424*
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1597
    - FECES, 3755*
    - GLUCURONIDASE, 2046
    - KIDNEYS, 3362*
    - KINETICS, 7430*
    - LIVER, 3774
    - URINE, 2577*
  - BILIARY TRACT
    - BILE ACIDS AND SALTS, 38
    - CADMIUM, 6066
    - DRUGS, 4355*
  - BILIARY TRACT DISEASES
    - MONOSACCHARIDES, 6425
  - CALCIUM
    - MARKER STUDY, 1798
  - CELIAC DISEASE
    - SEROTONIN, 6996
  - CHILD
    - REVIEW, 7879
  - CHOLANGIOGRAPHY
    - CONTRAST MEDIA, 2023, 4612*
    - ENZYMES, 268
  - CHOLESTASIS
    - BILE, 567
    - BILE ACIDS AND SALTS, 2046, 6523*
    - HYPNOTIC AGENTS, 2047
  - CHOLESTEROL
    - INTESTINES, 1005*
  - CONTRAST MEDIA
    - KINETICS, 2024
  - DRUG METABOLISM
    - KIDNEYS, 5500
    - LIVER, 5500
    - TOXICITY, 7777*
  - GALACTOSE
    - OROTIC ACID, 2034
  - GALLBLADDER
    - DYES, 1965*
  - GASTROINTESTINAL SYSTEM
    - SODIUM, 2095
  - GILBERT'S DISEASE
    - INDOCYANINE GREEN, 4246*
    - SULFOBROMOPHTHALEIN, 4246*
  - HEPATITIS
    - INDOCYANINE GREEN, 4246*
    - SULFOBROMOPHTHALEIN, 4246*
  - HEPATITIS, TOXIC
    - HYPNOTIC AGENTS, 2047
  - ILEAL DISEASES
    - CHOLIC ACID, 2311*
  - INFANT
    - CALCIUM, 1798
  - INFLAMMATORY BOWEL DISEASES
    - OXALATES, 6586*
  - KIDNEYS
    - KINETICS, 7385*
  - LIPODYSTROPHY, INTESTINAL
    - COPPER, 2466*
  - LIVER
    - BILE, 567, 2954
    - CARBON TETRACHLORIDE, 145

- EXCRETION (continued)
  - LIVER (continued)
    - GALACTOSE, 2034
    - GLUCOSE, 2552
    - HYPNOTIC AGENTS, 2047
    - KINETICS, 7385*
    - POLLUTION, 3810
    - SULFOBROMOPHTHALEIN, 2865*, 3820
  - LIVER CIRRHOSIS
    - ALCOHOLS, 714
  - LIVER DISEASES
    - MONOSACCHARIDES, 6425
  - MALABSORPTION SYNDROMES
    - OXALATES, 6586*
  - ODDI'S SPHINCTER
    - BILIRUBIN, 2021
  - PANCREAS
    - CADMIUM, 6066
    - FATS, 6371
  - PANCREATIC DISEASES
    - OXALATES, 6586*
  - PANCREATITIS, CHRONIC
    - SECRETIN, 4240
  - PERMEABILITY
    - URINE, 5276*
  - PORPHYRINS
    - DRUG EFFECTS ON, 8025*
    - PORPHYRIN, 7754*
    - URINE, 8025*
  - PROTEINS
    - ALCOHOLS, 1282*
    - GASTRITIS, 1282*
    - GASTRITIS, ATROPHIC, 1282*
  - RADIOPROTECTIVE AGENTS
    - MARKER STUDY, 1786
    - PLASMA, 1786
  - RESPIRATORY SYSTEM
    - BILE, 2954
  - SULFOBROMOPHTHALEIN
    - DIURETICS, 258
    - INDOCYANINE GREEN, 4246*
  - URINE
    - ENZYMES, 268
  - WILSON'S DISEASE
    - COPPER, 6072*

- FASCIOLIASIS
  - ANTIGENS
    - DIAGNOSIS, 5504
  - BILE DUCTS
    - OBSTRUCTION, 3568
  - DRUG THERAPY, 5958, 5959
    - SIMULATION, 1717
  - IMMUNITY, 5489
  - LIVER
    - CYTOLOGY, 3822
  - SCHISTOSOMIASIS
    - IMMUNITY, 7467

- FATS
  - SEE ALSO LIPIDS, TRIGLYCERIDES
  - ABSORPTION
    - AMINO ACIDS, 3609*
    - CALCIUM, 6003*
    - CARCINOID TUMOR, 4100*
    - CIRCULATION, 3017
    - DIETARY FACTORS, 3604*
    - EMBRYOLOGY, 7312
    - FECES, 4681*

FATS (continued)

- ABSORPTION (continued)
    - FETUS, 7312
    - LYMPH, 3017
    - MAGNESIUM, 6003*
    - NEONATE, 7312
- BILE
    - BILE ACIDS AND SALTS, 7998*
- BILE ACIDS AND SALTS
    - DIETARY FACTORS, 7998*
- BILIARY TRACT
    - SECRETION, 7390*
- BILIARY TRACT DISEASES
    - BILE, 5139*
- CHOLESTEROL
    - METABOLISM, 4619*
- CYSTIC FIBROSIS
    - SECRETIN, 2414*
- DIARRHEA
    - ABSORPTION, 3537
- DIET
    - WOLMAN'S DISEASE, 4653
- DIGESTION
    - CIRCULATION, 3017
    - ELECTROPHYSIOLOGY, 6699
    - LYMPH, 3017
- FECES
    - BILE ACIDS AND SALTS, 7998*
- FEEDING
    - ENTEROCYTES, 2971
    - INTESTINE, SMALL, 2971
- GIARDIASIS
    - MALABSORPTION SYNDROMES, 5242*
- HEPATECTOMY
    - METABOLISM, 7462
    - REGENERATION, 7462
- ILEAL DISEASES
    - DIET, 2311*
- INTESTINAL ABSORPTION
    - TRIGLYCERIDES, 7493*
- INTESTINE, SMALL
    - ABSORPTION, 3827*, 6003*, 7312
    - CIRCULATION, 2971
    - HYPERPLASIA, 2971
- INTESTINES
    - ABSORPTION, 2727, 6695
- JEJUNUM, 3630*
    - ABSORPTION, 6003*
    - CALCIUM, 6003*
    - MAGNESIUM, 6003*
- LIPASE
    - DIGESTION, 6141
- LIVER
    - CELLS, 1971*
    - DIETARY FACTORS, 8015*
    - LIPIDS, 8020*
    - REGENERATION, 7462
    - SCANNING, SCINTILLATION, 3970
- LIVER DISEASES
    - METABOLISM, 7793
- MALABSORPTION SYNDROMES
    - BILE ACIDS AND SALTS, 3249*
    - BREATH TEST, 5510*
    - DETERGENTS, 4915
    - DIAGNOSIS, 3248*, 5510*
    - OXALATES, 5704*
    - THERAPY, 4915
- METABOLISM
    - CARCINOID TUMOR, 4100*

FATS (continued)

- METABOLISM (continued)
    - CHOLECYSTOKININ, 5445*
    - PANCREOZYMIN, 5445*
    - SHUNT, INTESTINAL, 7630
    - SOMATOSTATIN, 5445*
- OBESITY
    - SURGERY, 6942*
- PANCREAS
    - BICARBONATE SECRETION, 5358*
    - EXCRETION, 6371
    - NECROSIS, 3326*
- PANCREATIC DISEASES
    - NECROSIS, 7732
- PANCREATITIS, CHRONIC
    - ALCOHOLS, 6385
    - FECES, 7740
- PROTEINS
    - ABSORPTION, 3603*
- PYLOROPLASTY
    - ANALYSIS, 5635
- RETROPERITONEAL SPACE
    - CYSTS, 6298
- SECRETION
    - GASTRIN, 5358*
    - HORMONES, GASTROINTESTINAL, 5358*
    - SECRETIN, 5358*
- SERUM
    - GASTRIN, 3696
- STEROLS
    - DIETARY FACTORS, 7998*
- STOMACH
    - ACID SECRETION, 3696, 5358*, 7390*
    - ELECTROPHYSIOLOGY, 7940*
    - HORMONES, GASTROINTESTINAL, 3696
    - MOTILITY, 3630*, 3647, 7940*
    - SURGERY, 7638*
- VAGOTOMY
    - ANALYSIS, 5635

FATTY ACIDS

- ABSORPTION, 7934
    - AMINO ACIDS, 3609*
    - DRUGS, 1782
- ALBUMINS
    - BINDING, 6764*, 7771*
- BILIRUBIN
    - ALBUMINS, 6764*, 7771*
    - BINDING, 7771*
- CALCIUM
    - DUODENUM, 2700*
- CECUM
    - METABOLISM, 2772*
    - TRANSPORT, 5283*
- CHOLELITHIASIS
    - SERUM, 3501*
- CHOLESTASIS, 3385
    - PREGNANCY, 2451*
- CHOLESTEROL
    - PHOSPHOLIPIDS, 7398*
- COLON
    - ADENYL CYCLASE, 2074
- DEFICIENCY
    - PANCREATITIS, 7080
- DUODENUM
    - ENZYMES, 6763*
- GALLBLADDER
    - TRANSPORT, 2930

FATTY ACIDS (continued)
    GLUCOSE
        ABSORPTION, 28
    GLYCEROPHOSPHATES
        LIVER, 3780
        SYNTHESIS, 3780
    GLYCOLIPIDS
        INTESTINE, SMALL, 7496*
    HEPATOCYTES
        ACIDS, 4648
        METABOLISM, 7444*
    ILEUM
        ABSORPTION, 3602*
    INTESTINE, SMALL, 7926
        ABSORPTION, 1775*, 3602*, 7316, 7317, 7505
        ALKALINE PHOSPHATASE, 7486*, 7487*
        ELECTROPHYSIOLOGY, 213
        HYPEREMIA, 3767
        LYMPHATIC SYSTEM, 7926
        PHOSPHOLIPIDS, 1775*
    INTESTINES, 3848
        ABSORPTION, 2727
        METABOLISM, 8096
        PHOSPHOLIPASE, 4679*
    JAUNDICE
        BREAST FEEDING, 7771*
    JEJUNUM
        ABSORPTION, 7317
        SECRETION, 2087
    LIPIDS
        LIVER, 138
    LIPOGENESIS
        DIETARY FACTORS, 5412*
    LIPOPROTEINS
        SYNTHESIS, 1059
    LIVER
        ADENYL CYCLASE, 1058
        BINDING, 2931
        CHOLESTEROL, 8003*
        EMBRYOLOGY, 7452
        ENZYMES, 132, 2032, 2932
        ESTROGENS, 8003*
        HYPOLIPEMIC AGENTS, 1039
        LIPIDS, 1168
        LIPOGENESIS, 7417*
        LIPOPROTEINS, 1060
        METABOLISM, 132, 1039, 5412*, 7452, 7482
        NUCLEOTIDASE, 1058
        OXIDATION, 3760*, 7482
        SYNTHESIS, 2033, 2932, 5412*, 7441*
    LIVER CIRRHOSIS, 3385
    LIVER COMA
        AMMONIA, 571
        CHROMATOGRAPHY, 7751*
    LYMPHATIC SYSTEM, 7926
    MEMBRANES
        PERMEABILITY, 1782
    METABOLISM, 6124
        EMBRYOLOGY, 7452
    NEOPLASMS
        LIVER, 1167
        METABOLISM, 1167
        TRANSPORT, 1167
    OBESITY
        SHUNT, INTESTINAL, 444

FATTY ACIDS (continued)
    OXIDATION
        AGE FACTORS, 1996
        ENZYMES, 1996
        LIVER, 1996
    PANCREAS
        ALCOHOLISM, 3743
        METABOLISM, 2772*
        SECRETION, 3743
    RECTUM
        ABSORPTION, 3624
    SALIVARY GLANDS
        DEFICIENCY, 6720
    SERUM
        STRESS, 1919
    STARVATION
        LIVER, 1027
        METABOLISM, 1027
    STOMACH
        PROSTAGLANDINS, 101
    SYNTHESIS
        DIETARY FACTORS, 7441*
    TRANSPORT
        PANCREATIC DISEASES, 7316
    VITAMIN B12
        LIVER, 138

FATTY LIVER
    ACIDS
        HYPOLIPEMIC AGENTS, 6809
    ALCOHOLS
        BIOCHEMISTRY, 2052
        CARBOXYLASES, 5116
        DIETARY FACTORS, 5116
        METABOLISM, 150
        NICOTINIC ACIDS, 1019*
        OXIDATION, 5116
        SIMULATION, 150, 1018*
    AMINO ACIDS
        DEFICIENCY, 8017*
        DIETARY FACTORS, 1995
    ANTI-INFLAMMATORY AGENTS
        DRUG THERAPY, 7121
    BIOPSY
        ENZYMES, 5798*
        MORPHOLOGY, 4267
    BLOOD
        LIPOPROTEINS, 2534
    CATALASE
        DRUG EFFECTS ON, 2881*
    COLLAGEN
        ENZYMES, 8296*
    CYSTIC FIBROSIS
        COMPLICATIONS, 7766
    DIAGNOSIS
        RADIONUCLIDES, 6514*
    DISEASES ASSOCIATED WITH
        CYSTIC FIBROSIS, 7766
    DRUG-INDUCED
        ETIOLOGY, 7433*
    EPIDEMIOLOGY, 5897
    ETIOLOGY
        REVIEW, 577
    FUNGI
        ANDROGENS, 6787
        HORMONE EFFECTS ON, 6787
    GALACTOSAMINE
        ETIOLOGY, 579

- FATTY LIVER (continued)
  - HEPATITIS, INFECTIOUS
    - BIOPSY, 4267
    - DISEASES ASSOCIATED WITH, 8376
  - HEPATOCYTES
    - ULTRASTRUCTURE, 6504*
  - IMMUNOLOGY, 3051*
  - IRON
    - ALCOHOLS, 4725
    - METABOLISM, 4725
  - LIPIDS
    - DIET, 6082*
    - TRANSPORT, 6802
  - LIPOPROTEINS
    - SYNTHESIS, 6083*
  - LIVER CIRRHOSIS
    - REVIEW, 577
  - LIVER DISEASES, ALCOHOLIC
    - BIOCHEMISTRY, 4320*
    - DIAGNOSIS, 7804*
    - DRUG EFFECTS ON, 2873*
    - IMMUNOGLOBULINS, 7804*
    - REVIEW, 7807*
  - LIVER INJURY
    - AGE FACTORS, 8281*
  - METALS
    - ANDROGENS, 6787
    - HORMONE EFFECTS ON, 6787
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 6504*
  - OROTIC ACID
    - SEX FACTORS, 163
  - PROTEINS
    - DEFICIENCY, 6802
    - SYNTHESIS, 1972*
  - SHUNT, INTESTINAL
    - COMPLICATIONS, 7630
  - TRIGLYCERIDES
    - DRUG EFFECTS ON, 2881*
- FECES
  - ABSORPTION
    - FATS, 4681*
  - AMINO ACIDS
    - CHEMICAL COMPOSITION, 6713*
  - ANEMIA
    - TECHNIQUES, 1186*
  - BACTERIA, 7510*
    - CHOLESTEROL, 185
    - DIETARY FACTORS, 5188
    - NEONATE, 185
  - BACTERIAL INFECTIONS
    - YERSINIA, 3247
  - BILE ACIDS AND SALTS
    - CATHARTICS, 2403
    - CYSTIC FIBROSIS, 7750*
    - DIETARY FACTORS, 7998*
    - EXCRETION, 3755*
    - FATS, 7998*
    - METABOLISM, 1116
    - MICROORGANISMS, 3755*
  - BLOOD
    - ANALYSIS, 1194
    - TECHNIQUES, 1186*, 2164*
    - TRACER STUDY, 2164*
  - CALCIUM
    - DUODENUM, 2700*
  - CECUM
    - PERFORATION, 500
- FECES (continued)
  - CHENODEOXYCHOLIC ACID
    - METABOLISM, 1969*
    - TRACER STUDY, 1969*
  - CHOLELITHIASIS
    - DIAGNOSIS, 3344*
  - COLITIS, ULCERATIVE
    - BILE ACIDS AND SALTS, 7717*
    - CHOLESTEROL, 7717*
  - COLON
    - FIBERS, 1389*
    - NEOPLASMS, 8234*
    - NEOPLASMS, MALIGNANT, 6324*
    - PERFORATION, 501
  - COLONIC DISEASES
    - BACTERIA, 455
  - CROHN'S DISEASE
    - VIRUSES, 2671*
  - DIARRHEA
    - CHEMICAL COMPOSITION, 1392*
  - DIETARY FACTORS
    - BACTERIA, 6713*
    - NITROGEN, 6713*
  - DIVERTICULUM
    - CHEMICAL COMPOSITION, 1392*
  - FIBERS
    - DIET, 2588*
  - GASTROINTESTINAL DISEASES
    - BIOCHEMISTRY, 6168
    - DIAGNOSIS, 6168
  - HEPATITIS, INFECTIOUS
    - TRANSMISSION, 5873*
    - VIRUSES, 5090*, 5873*
  - ILEOSTOMY
    - ANTIDIARRHEALS, 4097*
  - INTESTINE, LARGE, 2736*
  - INTESTINES, 2736*
    - BILE ACIDS AND SALTS, 3799
    - STEROLS, 3799
  - IRRITABLE COLON
    - CHEMICAL COMPOSITION, 1392*
  - NEOPLASMS, MALIGNANT
    - BLOOD, 1193
  - OBESITY
    - SURGERY, 6942*
  - PANCREAS FUNCTION TESTS
    - CHYMOTRYPSIN, 3122
  - PANCREATITIS, CHRONIC
    - FATS, 7740
  - PEPTIDASE
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - SCHISTOSOMIASIS
    - DIAGNOSIS, 3573
  - STEATORRHEA
    - LIPIDS, 2197
  - TRYPSIN
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - WATER
    - FIBERS, 2588*
  - ZINC
    - TECHNIQUES, 3612*

- FEEDING
  - ABSORPTION
    - ALCOHOLS, 5303
    - H2 RECEPTOR ANTAGONISTS, 4405

- FEEDING (continued)
  - ACID SECRETION
    - GASTRIN, 961
    - OXYNTIC GLAND, 5365*
    - TRYPSINOGEN, 2809
  - BILE
    - SECRETION, 605
  - BILE ACIDS AND SALTS
    - SERUM, 635
  - BILIARY TRACT
    - BILE, 1636
  - CECUM
    - ACIDITY, 6139
  - COLON
    - MITOSIS, 2986*
  - DUODENUM
    - MOTILITY, 1148
  - ESOPHAGUS
    - MOTILITY, 50
  - FATS
    - ENTEROCYTES, 2971
    - INTESTINE, SMALL, 2971
  - GASTRECTOMY
    - LIVER, 620
  - GASTRITIS
    - GASTRIN, 6177
  - GASTROINTESTINAL SYSTEM
    - HORMONES, 72
  - GLUCONEOGENESIS
    - DRUG EFFECTS ON, 1999
  - GLYCOGEN PHOSPHORYLASE
    - CIRCADIAN RHYTHM, 2039
  - ILEUM
    - MITOSIS, 2986*
  - INFANT
    - TECHNIQUES, 6638
  - INTESTINE, SMALL
    - ELECTROPHYSIOLOGY, 3654
    - EPITHELIUM, 1759
    - GUANYL CYCLASE, 2090
    - NEONATE, 2066
    - REGENERATION, 1759
  - INTESTINES
    - HELMINTHIASIS, 1712
  - JEJUNUM
    - GLUCONEOGENESIS, 191
    - MITOSIS, 2986*
  - LIVER
    - BILIRUBIN, 1053
    - LIPIDS, 2001
    - PENTOSIDES, 2911
    - REGENERATION, 2894
    - SECRETION, 605
  - LIVER FUNCTION TESTS
    - BILE ACIDS AND SALTS, 608
  - MOTILITY
    - VAGOTOMY, 1148
  - NEONATE
    - TECHNIQUES, 2066
  - NERVOUS CONTROL
    - PATHOLOGY, 2822
  - PANCREAS
    - ENZYMES, 997
    - SECRETION, 3735
    - TRYPSIN, 1636
  - PROTEINS
    - INTESTINES, 2081
  - SECRETION
    - GASTRIN, 959, 1334*, 7364

- FEEDING (continued)
  - SERUM
    - GASTRIN, 6177
  - STOMACH
    - ACID SECRETION, 92, 374, 7364
    - ADENOSINE TRIPHOSPHATASE, 108
    - CARBONIC ANHYDRASE, 108
    - GASTRIN, 7364
    - INTESTINES, 1137
    - MOTILITY, 1137
    - SEROTONIN, 6728*
  - TECHNIQUES
    - ANALYSIS, 6638
  - TRYPSINOGEN
    - SECRETION, 2809
  - ULCER, PEPTIC
    - ACID SECRETION, 2830
    - GASTRIN, 372

- FERRITIN
  - DUODENUM
    - IRON, 2187
    - TRANSPORT, 7917*
    - ULCER, 3174
  - GASTRITIS, ATROPHIC
    - DEFICIENCY, 3174
    - DIET, 3174
  - HEMOCHROMATOSIS
    - HEPATOCYTES, 5906*
  - HEPATOCYTES
    - METABOLISM, 6772*
  - ILEUM
    - TRANSPORT, 7917*
  - INTESTINAL ABSORPTION
    - PROTEINS, 7917*
  - INTESTINES
    - ABSORPTION, 884
  - LIVER
    - SYNTHESIS, 1010*
  - LIVER CIRRHOSIS
    - HEPATOCYTES, 5906*
  - STOMACH
    - SURGERY, 5614

- FETOPROTEIN, ALPHA
  - SEE ALPHA FETOPROTEIN

- FETUS
  - ABSORPTION
    - FATS, 7312
    - PROTEINS, 7309
  - ALCOHOLISM, 7442*
  - AMNIOTIC FLUID
    - BILE ACIDS AND SALTS, 5007*
  - CARBOHYDRATES
    - LIVER, 2910
    - METABOLISM, 2910
  - CHOLECYSTOKININ
    - CELLS, 4489*
  - COLON
    - ENZYMES, 1423
    - GLYCOPROTEINS, 3853
  - DUODENUM
    - ATRESIA, 411
    - MORPHOLOGY, 1762
    - ULTRASTRUCTURE, 1762
  - GALLBLADDER
    - BILE ACIDS AND SALTS, 7396*

FETUS (continued)

- GASTRIN
  - CELLS, 4489*
- GASTROINTESTINAL SYSTEM
  - SOMATOSTATIN, 814
- INTESTINE, SMALL
  - ABSORPTION, 7309, 7312
  - PERFORATION, 6962
- INTESTINES
  - ALKALINE PHOSPHATASE, 6137
  - BILE ACIDS AND SALTS, 7396*
  - GLYCOPROTEINS, 3852
- JEJUNUM
  - ABSORPTION, 7309
  - PROTEINS, 7309
- LIPIDS
  - LIVER, 3785
- LIVER
  - ALBUMINS, 1967*
  - ALCOHOLS, 6121
  - ALPHA FETOPROTEIN, 1967*
  - BILE ACIDS AND SALTS, 1078
  - BILIRUBIN, 3776
  - CIRCULATION, 7184*
  - COPPER, 6805
  - ENZYMES, 133, 6807, 7402*
  - HEMATOPOIESIS, 1155
  - MORPHOLOGY, 5999
  - ULTRASTRUCTURE, 7461
  - ZINC, 6805
- LIVER CIRRHOSIS
  - CIRCULATION, 7184*
- NEOPLASMS
  - ENZYMES, 1423
- PANCREAS
  - NERVOUS CONTROL, 6747*
  - PARASYMPATHOMIMETICS, 1943
  - SECRETION, 6747*
  - VEINS, 5998
- STOMACH, 866
  - MORPHOLOGY, 3002
  - SECRETION, 3002

FIBERS

- ABSORPTION
  - IRON, 5339
- BILE ACIDS AND SALTS
  - BINDING, 143
  - DIETARY FACTORS, 143
  - FUNGI, 143
- COLON
  - FECES, 1389*
  - MOTILITY, 1389*
  - NEOPLASMS, 4401, 8234*
  - NEOPLASMS, MALIGNANT, 2377
- COLONIC DISEASES
  - DIET, 456, 1415
  - DIVERTICULUM, 1415
- DIET, 8461
  - NEOPLASMS, 4401
  - REVIEW, 2637, 2638, 4402, 4403, 8467
- DIVERTICULITIS
  - COLON, 4404
  - REVIEW, 4404
  - THERAPY, 3279*
- DIVERTICULUM
  - ETIOLOGY, 3280*

FIBERS (continued)

- FECES
  - DIET, 2588*
  - WATER, 2588*
- GASTROINTESTINAL DISEASES
  - DIET, 457, 4400
  - REVIEW, 2636, 2637, 2638, 4400
- GASTROINTESTINAL SYSTEM
  - REVIEW, 2638
- INTESTINES
  - MOTILITY, 2376
  - REVIEW, 2376

FIBRIN

- HEPATOCYTES
  - DIGESTION, 4717*
- LIVER DISEASES
  - CLOTTING, 616
  - HEMATOLOGY, 709

FIBRINOGEN

- HEPATITIS, CHRONIC
  - KINETICS, 7813*
- HEPATITIS, TOXIC
  - GALACTOSAMINE, 7431*
- LIVER, 6102
  - ANTINEOPLASTIC AGENTS, 43
- LIVER CIRRHOSIS
  - KINETICS, 7813*
  - SERUM, 3473*
- LIVER DISEASES
  - CLOTTING, 616
  - HEMATOLOGY, 709
  - METABOLISM, 7744*
- TISSUE CULTURE
  - LIVER, 134
  - ULTRASTRUCTURE, 134
- ULCER, PEPTIC
  - SERUM, 7597

FIBRINOLYSIS

- GALLBLADDER, 4372
- LIVER
  - PERFUSION, 1174
  - REGENERATION, 8038*
- LIVER CIRRHOSIS
  - NICOTINIC ACIDS, 710
- LIVER DISEASES, ALCOHOLIC
  - HEPARIN, 3462*
- PANCREATITIS
  - BLOOD, 532
- PROTEIN-LOSING ENTEROPATHIES
  - ETIOLOGY, 2989*

FIBROSIS

- COLITIS, ULCERATIVE
  - URINARY SYSTEM, 4967*
- HEPATITIS, CHRONIC
  - LIVER CIRRHOSIS, 8288*
  - PRECANCEROUS CONDITIONS, 8288*
- HYPERTENSION, PORTAL
  - LIVER, 4257*
- LIVER
  - AGE FACTORS, 7139*
  - ALCOHOLS, 7139*
  - ALPHA 1 ANTITRYPSIN, 5005*
  - CARBON TETRACHLORIDE, 1013*
  - COLLAGEN, 1013*
  - DRUG-INDUCED, 7139*

FIBROSIS (continued)
    LIVER (continued)
        ETIOLOGY, 8396*
        FAMILIAL FACTORS, 6414*
        HYPERTENSION, PORTAL, 6414*
        ISOENZYMES, 2198
        MONOAMINE, 2198
        MORPHOLOGY, 8396*
        OBESITY, 3555
        SURGERY, 2455*
        ULTRASONOGRAPHY, 8330
    SCHISTOSOMIASIS
        LIVER, 5972
    WOUNDS AND INJURIES
        HEALING, 1291

FISSURE
    ABDOMEN
        THERAPY, 1690
    ANORECTUM
        NEOPLASMS, MALIGNANT, 7672
    ANUS, 7672
        ETIOLOGY, 4165, 4948
        PSYCHOLOGICAL FACTORS, 4184
        REVIEW, 4165
        SEX FACTORS, 4165
    INTESTINES
        ATRESIA, 7015
    LIVER
        SCANNING, SCINTILLATION, 7130
    STOMACH
        ATRESIA, 7015

FISTULA
    ACID SECRETION
        DIET, 6040*
        DRUG EFFECTS ON, 6058
        PROTEINS, 6040*
    ANUS
        CROHN'S DISEASE, 8514
        REVIEW, 491
    BILE
        CHEMICAL COMPOSITION, 4370*
    BILE DUCTS
        CHOLELITHIASIS, 765
        OBSTRUCTION, 766
        TECHNIQUES, 1973*
    BILIARY TRACT, 7828
        DIAGNOSIS, 4358*
        SURGERY, 8441
        THERAPY, 4358*
    COLON, 7584
        DIVERTICULITIS, 7059
        IATROGENESIS, 7713
        NEOPLASMS, MALIGNANT, 5668
        SURGERY, 7627
        UROGENITAL SYSTEM, 7705
    CROHN'S DISEASE
        ANUS, 4474*, 5981*
        COMPLICATIONS, 7898
        DUODENUM, 8509*
        ILEUM, 8509*
        THERAPY, 8509*
    DUODENUM
        COLON, 5668
        DIAGNOSIS, 2328
        NEOPLASMS, MALIGNANT, 5668

FISTULA (continued)
    ESOPHAGUS
        ATRESIA, 1267
        DIAGNOSIS, 3130
        GENETIC FACTORS, 4798
        MOTILITY, 4790*
        NEOPLASMS, MALIGNANT, 308
        PROSTHESIS, 4033
        RADIOLOGY, 3130
        RESPIRATORY SYSTEM, 307, 6203
        SURGERY, 307, 308, 4790*
        THERAPY, 3130
    GALLBLADDER
        DUODENUM, 766
        RADIOLOGY, 1627
    GASTRIN
        DIET, 6040*
    GASTROINTESTINAL SYSTEM
        COMPLICATIONS, 5207
        DISEASES ASSOCIATED WITH, 5207
        ETIOLOGY, 5207
        HEMORRHAGE, 1628, 2328
        NEOPLASMS, MALIGNANT, 2243
        PROGNOSIS, 5207
        THERAPY, 5207
    HEMORRHAGE
        DUODENUM, 2328
    ILEUM
        CROHN'S DISEASE, 7898
        SIGMOID, 7898
        SURGERY, 8211
        THERAPY, 8211
    INTESTINE, SMALL
        ENZYMES, 3590
        INFANT, 7618
        PARENTERAL ALIMENTATION, 7618
        RADIOLOGY, 1627
        TECHNIQUES, 2964*
        THERAPY, 7618
    INTESTINES
        COMPLICATIONS, 421
        ENZYMES, 3590
        METABOLISM, 4117
        REVIEW, 796
        SURGERY, 8211
        THERAPY, 8211
    JEJUNUM, 7584
        SURGERY, 7627
        TECHNIQUES, 2964*
    PANCREAS, 7828
        DIAGNOSIS, 3334
        ENDOSCOPY, 6376
        INFLAMMATION, 7729
        PANCREATOGRAPHY, 3334
        SECRETION, 5392
        SURGERY, 6376, 7729
        WOUNDS AND INJURIES, 7729
    PANCREATITIS
        COLON, 5791*
        COMPLICATIONS, 7728
    PROSTAGLANDINS
        ACID SECRETION, 951*
        SECRETION, 951*
    RECTUM
        COLITIS, 490
        IATROGENESIS, 7713
    RESPIRATORY SYSTEM
        DISEASES ASSOCIATED WITH, 5837
        GENETIC FACTORS, 4798

FISTULA (continued)
  RESPIRATORY SYSTEM (continued)
    LIVER, 5837
    NEOPLASMS, MALIGNANT, 2243
  SIGMOID
    IATROGENESIS, 7713
    UROGENITAL SYSTEM, 7705
  STOMACH, 7584
    ACID SECRETION, 1901, 5501, 6040*, 6058
    DUODENUM, 351
    GALLBLADDER, 1628
    GASTRIN, 1901, 6040*
    PROSTAGLANDINS, 951*
    SEROTONIN, 6728*
    ULCER, 5608
  THERAPY
    REVIEW, 796
  UROGENITAL SYSTEM
    COLITIS, 490
    RECTUM, 5730

FLUID BALANCE
  SEE WATER, ELECTROLYTE BALANCE

FLUORIDES
  ABSORPTION
    DIETARY FACTORS, 902
    LIPIDS, 902
  LIVER FUNCTION TESTS
    SULFOBROMOPHTHALEIN, 2956

FOLIC ACID
  ABSORPTION
    CELIAC DISEASE, 1383
    REVIEW, 6987
  AMINO ACIDS
    DEFICIENCY, 7473
  ANEMIA
    DEFICIENCY, 8482
    INTESTINE, SMALL, 4413
  DEFICIENCY
    MALABSORPTION SYNDROMES, 4923
  DIGESTION
    CELIAC DISEASE, 1383
  GLYCOPROTEINS
    BINDING, 1810
    CIRCULATION, 1810
  INTESTINAL ABSORPTION
    ANTICONVULSANTS, 7923
    DRUG EFFECTS ON, 7923
    METABOLISM, 7923
  INTESTINE, SMALL
    ABSORPTION, 1809
  JEJUNUM
    DEFICIENCY, 4923
  LIVER
    BINDING, 1810
    METABOLISM, 7473
    TRANSPORT, 1810
  MALABSORPTION SYNDROMES
    AGE FACTORS, 2361
    REVIEW, 6987
  MENETRIER'S DISEASE
    MALABSORPTION SYNDROMES, 6902
  METABOLISM
    ANTICONVULSANTS, 7923
    DRUG EFFECTS ON, 7923

FOLIC ACID (continued)
  SPRUE, TROPICAL
    ETIOLOGY, 443
    METABOLISM, 443
  VITAMIN B12
    DEFICIENCY, 7473

FOOD
  ABSORPTION
    ANTIBIOTICS, 6687*
  ACID SECRETION
    NERVOUS CONTROL, 960
  BILE
    DIGESTION, 2967
  BILIARY TRACT
    SCANNING, SCINTILLATION, 7844
  DIARRHEA, 8458
  DISEASE
    DIAGNOSIS, 6618
    TRANSMISSION, 6618
  EPIDEMIOLOGY
    DISEASE, 6601
  ESOPHAGUS
    OBSTRUCTION, 6199*
  FOOD POISONING
    ENTEROTOXINS, 804
  GASTROENTERITIS
    ETIOLOGY, 5204
  INTESTINAL OBSTRUCTION, 5660
  INTESTINE, SMALL
    MORPHOLOGY, 3585*
  INTESTINES
    DIGESTION, 2967
    HORMONES, 6838
  LIVER CIRRHOSIS
    ETIOLOGY, 1567
  LIVER DISEASES, ALCOHOLIC
    STATISTICAL STUDY, 1548
  PANCREAS
    BICARBONATE SECRETION, 1939
    DIGESTION, 2967
  PLASMA
    SECRETIN, 1939
  STAPHYLOCOCCUS
    ENTEROTOXINS, 804
  STOMACH
    ACID SECRETION, 7968*
    ELECTROPHYSIOLOGY, 3636*
    MOTILITY, 7330
    NEOPLASMS, 6881
    VAGOTOMY, 3636*

FOOD POISONING
  BACTERIA
    DIAGNOSIS, 1677
  BACTERIAL INFECTIONS
    CLOSTRIDIUM, 3524
  CLOSTRIDIUM
    DIAGNOSIS, 3524
  DIAGNOSIS, 4447
  ENTEROTOXINS
    FOOD, 804
  INTESTINE, SMALL
    ABSORPTION, 3244
  JAUNDICE
    ETIOLOGY, 3414*

- FOREIGN BODIES
  - GASTROINTESTINAL SYSTEM
    - SURGERY, 1399
  - INTESTINES
    - NEOPLASMS, 4880*
    - PERFORATION, 7621
  - PERITONITIS
    - IATROGENESIS, 4880*
  - STOMACH
    - PERFORATION, 7621

- FRUCTOSE
  - ALCOHOLS, 6515
  - GLYCOGEN
    - METABOLISM, 169
  - GLYCOGENOSIS
    - METABOLISM, 170
  - HEPATITIS, INFECTIOUS
    - THERAPY, 2522
  - INTESTINE, SMALL
    - ABSORPTION, 2725, 4508*
  - INTOLERANCE
    - BIOCHEMISTRY, 8232
    - CHILD, 8229
    - GENETIC FACTORS, 4142
    - GENETICS, 8232
    - PATHOLOGY, 8232
  - JEJUNUM
    - ABSORPTION, 4508*, 6010
  - LIVER
    - ENZYMES, 2000, 2934

- FUNGI
  - BILE ACIDS AND SALTS
    - FIBERS, 143
  - FATTY LIVER
    - ANDROGENS, 6787
    - HORMONE EFFECTS ON, 6787
  - GASTROENTERITIS
    - LACTASE, 7511*
  - LIVER INJURY
    - TOXICITY, 7143

- FUNGICIDES
  - LIVER
    - DRUG METABOLISM, 1034

- FUNGUS DISEASES
  - SEE MYCOSES

- GALACTOSAMINE
  - ALPHA FETOPROTEIN
    - LIVER INJURY, 3030
  - FATTY LIVER
    - ETIOLOGY, 579
  - GANGLIOSIDES
    - SYNTHESIS, 1014*
  - HEPATITIS, 4280
    - DRUG-INDUCED, 3929, 7419*, 8028*
    - LIPOPROTEINS, 1042, 4669
    - SIMULATION, 1042
  - HEPATITIS, INFECTIOUS
    - IMMUNOSUPPRESSION, 1041
    - OROTIC ACID, 1041
    - PHENOBARBITAL, 1041
    - SIMULATION, 1041
  - HEPATITIS, TOXIC, 8341*
    - ALBUMINS, 7431*
    - DRUG-INDUCED, 7431*
    - FIBRINOGEN, 7431*

- GALACTOSAMINE (continued)
  - LIVER
    - BIOCHEMISTRY, 1998
    - GLUCURONYLTRANSFERASE, 3813
    - METABOLISM, 5403*
    - PATHOLOGY, 1040
    - ULTRASTRUCTURE, 1040, 1998
  - LIVER INJURY, 4280
    - DRUG-INDUCED, 8028*
    - PREVENTION, 3027, 3028, 3029

- GALACTOSE
  - DUMPING SYNDROME
    - ABSORPTION, 4058
  - EXCRETION
    - OROTIC ACID, 2034
  - GLYCOPROTEINS
    - METABOLISM, 1100
  - INTESTINE, SMALL
    - ABSORPTION, 2725
    - VILLI, 1852
  - LIVER
    - ALCOHOLS, 2034
    - EXCRETION, 2034
    - GLYCOGEN, 2939
    - METABOLISM, 1038, 1997
    - OROTIC ACID, 2034
    - OXYGEN, 3782
    - REGENERATION, 1997
  - LIVER FUNCTION TESTS
    - CLEARANCE STUDY, 3365*
  - METABOLISM
    - DISEASE, 7855
  - TRANSPORT
    - HYPOGLYCEMIC AGENTS, 27
    - INTESTINES, 27

- GALLBLADDER
  - ABSORPTION
    - REVIEW, 2020
  - ADRENAL GLANDS
    - SCANNING, SCINTILLATION, 3101
  - AGE FACTORS
    - SURGERY, 5141*
  - ANOMALY, 562
    - CHOLANGIOGRAPHY, 7852
    - DUPLICATION, 1641, 1642
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - ANOMALY, CONGENITAL
    - ANGIOGRAPHY, 1640
    - FAMILIAL FACTORS, 6559*
    - RADIOLOGY, 1640
  - ANTIGENS
    - BILE, 4357*
  - APLASIA, 8438
  - BILE
    - ACIDITY, 3493*
    - CHEMICAL COMPOSITION, 7388*
  - BILE ACIDS AND SALTS
    - FETUS, 7396*
    - KINETICS, 1637
    - METABOLISM, 7396*
    - NEONATE, 7396*
    - STARVATION, 7394*
  - BILE DUCTS
    - NEOPLASMS, 1624

- GALLBLADDER (continued)
  - CALCULI
    - CHILD, 744
    - CYSTIC DUCT, 1596
    - EVOLUTION, 1596
    - INFUNDIBULUM, 1596
    - STATISTICAL STUDY, 1596
  - CELLS
    - KINETICS, 3515
  - CHOLAGOGUES AND CHOLERETICS
    - MUSCLES, 1008*
  - CHOLANGIOGRAPHY, 2206, 5163
  - CHOLECYSTITIS
    - CONTRAST MEDIA, 269
    - ULTRASTRUCTURE, 4368*
  - CHOLECYSTOGRAPHY
    - CERULEIN, 4752*
  - CHOLELITHIASIS
    - CELLS, 3515
    - DYSPLASIA, 1977*
  - CHOLESTEROL
    - CALCULI, 5152*
  - CONTRAST MEDIA
    - BILE DUCTS, 748
    - BIOCHEMISTRY, 5522
    - TECHNIQUES, 3092
  - CYSTS
    - SCANNING, SCINTILLATION, 7235
  - DRUG EFFECTS ON
    - ADRENERGIC RECEPTOR AGONISTS, 3791
    - ADRENERGIC RECEPTOR BLOCKADERS, 3791
  - DUODENITIS
    - CALCIFICATION, 3507*
  - DUODENUM
    - FISTULA, 766
  - DYES
    - CHOLECYSTOKININ, 1965*
    - EXCRETION, 1965*
  - ELECTRICAL CONTROL
    - CALCIUM, 912*
  - ELECTROPHYSIOLOGY
    - ABSORPTION, 905
    - ELECTROLYTES, 905
  - EMPHYSEMA
    - CHOLECYSTITIS, 1590, 1591
  - EPITHELIUM
    - TRANSPORT, 1767*
    - ULTRASTRUCTURE, 2676, 6682
  - FATTY ACIDS
    - TRANSPORT, 2930
  - FIBRINOLYSIS, 4372
  - FISTULA
    - RADIOLOGY, 1627
  - GASES
    - GANGRENE, 8445
  - GLYCOGENOSIS
    - CALCULI, 5162*
  - HEPATECTOMY
    - BILE ACIDS AND SALTS, 7448*
  - HERNIA
    - PERITONEUM, 1615
  - HORMONE EFFECTS ON
    - CHOLECYSTOKININ, 3650
    - GASTRIN, 3650
    - GLUCAGON, 3650
    - SECRETIN, 3650
    - SERUM, 3650

- GALLBLADDER (continued)
  - HORMONES
    - SECRETION, 6061
  - HORMONES, GASTROINTESTINAL
    - CHOLECYSTOKININ, 3650
    - GASTRIN, 3650
    - GLUCAGON, 3650
    - SECRETIN, 3650
    - SERUM, 3650
  - HYPERTENSION
    - INFARCTION, 7192
  - HYPOPLASIA, 8438
  - ILEUM
    - MORPHOLOGY, 2851
  - INFLAMMATION
    - ANGIOGRAPHY, 1621
    - ENZYMES, 1578*
    - LYSOSOMES, 1578*
    - PHOSPHOLIPASE, 1578*
  - INTESTINE, SMALL
    - ATROPHY, 6061
    - SECRETION, 2851
  - ION TRANSPORT
    - SODIUM, 1769*
  - JEJUNUM
    - MORPHOLOGY, 2851
  - LIPASE
    - EXTRACTS, TISSUE, 1079
    - NECROSIS, 2432*
  - LIVER
    - SCANNING, SCINTILLATION, 4771
  - MOTILITY
    - ANTRUM, 3729
    - CERULEIN, 69
    - CHILD, 3510
    - CHOLANGIOGRAPHY, 3640
    - CHOLECYSTOKININ, 1083
    - DRUGS, 3510
    - ETHNIC FACTORS, 5912*
    - HORMONE EFFECTS ON, 7375*
    - PATHOLOGY, 731
    - PEPTIDES, 1083
    - REVIEW, 2020
    - SOMATOSTATIN, 7375*
  - NEOPLASM METASTASIS
    - ANGIOGRAPHY, 5052
    - SURGERY, 5052
  - NEOPLASMS
    - CHOLELITHIASIS, 7203*
    - DIAGNOSIS, 7203*
    - LAPAROSCOPY, 262
    - SURGERY, 7203*
    - THERAPY, 6560*
  - NEOPLASMS, BENIGN
    - ANGIOGRAPHY, 1571*
    - DIAGNOSIS, 1571*
    - RADIOLOGY, 737
    - SURGERY, 737
  - NEOPLASMS, MALIGNANT
    - ANGIOGRAPHY, 1571*, 5052
    - CHOLECYSTECTOMY, 7850
    - DIAGNOSIS, 1571*
    - EPIDEMIOLOGY, 1643
    - PERFORATION, 738
    - RADIOLOGY, 1623
    - SURGERY, 5052
    - THERAPY, 7850
  - NERVOUS CONTROL, 3791
    - CHOLECYSTOKININ, 1970*

GALLBLADDER (continued)
    NERVOUS CONTROL (continued)
        CONNECTIVE TISSUE, 5991*
        GASTRIN, 1970*
        HORMONE EFFECTS ON, 1970*
    PANCREAS
        ANOMALY, 2432*
    PANCREATITIS
        HETEROTOPIA, 2432*
    PERFORATION
        HEMORRHAGE, 7230
        SURVIVAL, 5212
    PERMEABILITY
        DRUGS, 1820
        PRESSURE STUDY, 1820
    PHOSPHOLIPASE
        LYSOLECITHIN, 3757
    PHOSPHOLIPIDS
        EPITHELIUM, 3491*
        METABOLISM, 3491*
    POLYPS
        CHILD, 1593
        RADIOLOGY, 1593
    PORTACAVAL SHUNT
        MORPHOLOGY, 2537*
    RADIOLOGY
        CHOLECYSTOKININ, 131, 1965*
        COMPLICATIONS, 1631, 2566*
        ENZYMES, 268
        TECHNIQUES, 1216
        TOMOGRAPHY, 1216, 1631
    SECRETION
        CERULEIN, 69
    SPHINCTER
        PRESSURE STUDY, 1866
    STASIS
        ETIOLOGY, 4651
        GALLSTONES, 1620
    STOMACH
        FISTULA, 1628
    SURGERY
        AGE FACTORS, 7232
        COMPLICATIONS, 7231
        REVIEW, 7830
    TOMOGRAPHY, 6550*
    TRANSPORT
        ELECTROPHYSIOLOGY, 1767*
        WATER, ELECTROLYTE BALANCE, 1767*
    ULTRASONOGRAPHY, 6193, 7842
        CHOLELITHIASIS, 7845
        MORPHOMETRY, 1574*
        TECHNIQUES, 7543
    ULTRASTRUCTURE
        ELECTROPHYSIOLOGY, 5997
    WATER
        ABSORPTION, 1769*
    WATER, ELECTROLYTE BALANCE, 44
        ION TRANSPORT, 1769*

GALLBLADDER DISEASES
    AMYLASES
        THERAPY, 747
    BILE
        BIOCHEMISTRY, 8420*
        CALCULI, 1612
        IMMUNOGLOBULINS, 5047
    CHOLECYSTECTOMY
        SEQUELAE, 8444

GALLBLADDER DISEASES (continued)
    CHOLECYSTOGRAPHY
        DIAGNOSIS, 2567*
    CONTRAST MEDIA
        DIAGNOSIS, 1585
        TECHNIQUES, 1585
    CYSTIC FIBROSIS
        CHOLECYSTOGRAPHY, 7236
    DIAGNOSIS, 5917*
        CHOLECYSTOGRAPHY, 5913*
        DRAINAGE, 6152*
        TECHNIQUES, 6550*
        TOMOGRAPHY, 6550*
        ULTRASONOGRAPHY, 6575*
    DRAINAGE
        DIAGNOSIS, 1185*
    ILEUM
        SURGERY, 4385
    IMMUNOGLOBULINS, 6430
    INTESTINES
        CONTRAST MEDIA, 5913*
    JAUNDICE
        THERAPY, 747
    LIPIDS
        DRUG EFFECTS ON, 5138*
    LIPOPROTEINS
        DIAGNOSIS, 275
    LIVER
        ENZYMES, 1575*
    OBESITY
        STATISTICAL STUDY, 1633
    OBSTRUCTION
        ETIOLOGY, 1602
        INFANT, 1602
    SERUM
        ENZYMES, 1575*
        IMMUNOGLOBULINS, 5047
    THERAPY, 5917*
    ULTRASONOGRAPHY
        DIAGNOSIS, 1245
        TECHNIQUES, 5535

GALLSTONES
    SEE ALSO CHOLELITHIASIS
    BILE
        CALCIUM, 8420*
    BILE ACIDS AND SALTS, 1976*, 4651
    CALCIUM
        CHEMICAL COMPOSITION, 8427*
    CHEMICAL COMPOSITION
        GASES, 6570*
        ULTRASTRUCTURE, 4362
    CHOLESTEROL, 4363*, 4651
        BILIRUBIN, 5143*
        DRUG THERAPY, 1609
        SOLUBILITY, 8001*
    DIET
        SYNTHESIS, 6084*
    DRUG EFFECTS ON
        LIVER, 5921*
    DRUG THERAPY
        CHEMICAL PROPERTIES, 8002*
        CHOLIC ACID, 5145*
        SOLVENTS, 5144*, 5145*
    EPIDEMIOLOGY
        STATISTICAL STUDY, 2576*
    ETIOLOGY
        STATISTICAL STUDY, 2576*

- GALLSTONES (continued)
  - GALLBLADDER
    - STASIS, 1620
  - GASES
    - ETIOLOGY, 6570*
  - LIVER
    - CHENODEOXYCHOLIC ACID, 5921*
  - PANCREATITIS
    - COMPLICATIONS, 2444
    - ETIOLOGY, 2438
    - RADIOLOGY, 2445
  - PIGMENTS
    - BILIRUBIN, 5143*
    - CHEMICAL COMPOSITION, 2575*, 7826*
    - CHEMICAL PROPERTIES, 7826*, 8426*
    - CHOLESTEROL, 2575*
    - CHROMATOGRAPHY, 7826*
    - REVIEW, 2575*
    - SYNTHESIS, 8426*
  - PREVENTION, 6085*
  - SOLUBILITY
    - DRUG EFFECTS ON, 5921*
    - KINETICS, 1609
  - SOLVENTS
    - TECHNIQUES, 5920*
  - TECHNIQUES, 1617
  - THERAPY
    - SOLVENTS, 5920*
  - ULTRASTRUCTURE, 4620*, 5265

- GAMMA GLUTAMYLCYCLOTRANSFERASE
  - SEE ACYLTRANSFERASES

- GANGLIOSIDES
  - SYNTHESIS
    - GALACTOSAMINE, 1014*

- GANGRENE
  - CECUM
    - PSEUDO-OBSTRUCTION, 8236*
  - CHOLECYSTITIS
    - CHILD, 6584
    - COMPLICATIONS, 6584
  - CLOSTRIDIUM
    - THERAPY, 4115
  - COLITIS
    - AMEBIASIS, 5248
  - COLON
    - PSEUDO-OBSTRUCTION, 8236*
  - ENTEROCOLITIS, NECROTIZING
    - INTESTINES, 4185
  - GALLBLADDER
    - GASES, 8445
  - INTESTINE, SMALL
    - CHILD, 5957*
    - PARASITES AND PARASITIC DISEASES, 5957*
    - SURGERY, 407
  - INTESTINES, 7680
  - NEONATE
    - ENTEROCOLITIS, NECROTIZING, 4185

- GARDNER'S SYNDROME
  - ABDOMEN
    - NEOPLASMS, 1422
  - COLON
    - AMINES, 6999*
    - RECTUM, 6999*

- GARDNER'S SYNDROME (continued)
  - DIAGNOSIS
    - SURGERY, 7012
  - DISEASES ASSOCIATED WITH
    - NEOPLASMS, MALIGNANT, 3315
  - DUODENUM
    - NEOPLASMS, 5654*
    - POLYPS, 5654*
  - FAMILIAL FACTORS
    - CELL CULTURE, 5172*
  - GENETICS, 7053
  - NEOPLASMS
    - VATER'S AMPULLA, 5654*
  - POLYPS
    - REVIEW, 7013
  - RECTUM
    - AMINES, 6999*

- GASES
  - APPENDIX
    - APPENDICITIS, 7036
  - ARTERIES
    - CHEMICAL COMPOSITION, 6418*
  - BLOOD
    - CHEMICAL COMPOSITION, 6418*
  - CHROMATOGRAPHY
    - INTESTINES, 1179*
  - COLON
    - CYSTS, 2338
    - PATHOLOGY, 2338
    - RADIOLOGY, 2338
  - DIGESTION
    - GASTROINTESTINAL SYSTEM, 2635
    - REVIEW, 2635
  - ENDOSCOPY
    - ARTERIES, 4758
  - ENTEROCOLITIS, NECROTIZING
    - VEINS, 1689
  - GALLBLADDER
    - GANGRENE, 8445
  - GASTROINTESTINAL SYSTEM
    - DISTENTION, 1688
    - PHYSICAL FACTORS, 1688
  - INTESTINAL OBSTRUCTION
    - DISTENTION, 6292*
  - INTESTINE, LARGE
    - RADIOLOGY, 4745*
    - ULTRASONOGRAPHY, 7684
  - INTESTINE, SMALL, 6973
    - CYSTS, 2338
    - INTESTINAL OBSTRUCTION, 6292*
    - PATHOLOGY, 2338
    - RADIOLOGY, 2338
  - INTESTINES
    - DIAGNOSIS, 3933
    - NECROSIS, 3933
    - SURGERY, 1179*
  - LIVER
    - DISEASES ASSOCIATED WITH, 2477
  - LIVER DISEASES
    - ARTERIES, 6418*
    - VEINS, 6418*
  - OBESITY
    - INTESTINE, SMALL, 2337
    - SURGERY, 2337
  - PANCREATIC DUCT
    - BILIARY TRACT, 522
    - RADIOLOGY, 522

GASES (continued)
- PERITONEUM
  - DIAGNOSIS, 8466
  - INTESTINE, SMALL, 6968
- STASIS
  - VAGOTOMY, 6933
- STOMACH
  - ANALYSIS, 1290
  - DISTENTION, 6933
  - HEMORRHAGE, 3895
  - SHOCK, 3895
- VEINS
  - CHEMICAL COMPOSITION, 6418*

GASTRECTOMY
- AFFERENT LOOP SYNDROME
  - OSMOSIS, 5465*
- BLOOD
  - PROTEINS, 3151
- COMPLICATIONS, 6907, 6908, 6937
  - DUMPING SYNDROME, 5598*
  - HYPOGLYCEMIA, 5598*
  - INTUSSUSCEPTION, 2258
  - OBSTRUCTION, 1288*
  - PANCREATITIS, 7571
  - REVIEW, 1288*
  - SEQUELAE, 319
  - THERAPY, 4819
- DIARRHEA
  - ETIOLOGY, 4743*
- DUMPING SYNDROME, 4044*, 6255
  - HORMONES, ADRENAL CORTEX, 7592
  - SURGERY, 2766
  - THERAPY, 2766
- DUODENUM
  - ELECTROPHYSIOLOGY, 2763
  - ULCER, PEPTIC, 6934
- ESOPHAGITIS
  - ETIOLOGY, 3134
- ESOPHAGUS
  - MOTILITY, 4539
- GASTRIN, 3674*
- GASTRITIS
  - AGE FACTORS, 4045*
  - ETIOLOGY, 3134
  - SEX FACTORS, 4045*
- GASTRITIS, ATROPHIC
  - AGE FACTORS, 4045*
  - SEX FACTORS, 4045*
- HYPOGLYCEMIA
  - PREVENTION, 5598*
- INTESTINE, SMALL
  - BACTERIA, 1117
  - INTUSSUSCEPTION, 2258
  - MOTILITY, 4743*
- JEJUNUM
  - TECHNIQUES, 5597*
  - ULCER, 1355
- LIVER
  - FEEDING, 620
- LIVER INJURY, 3152
- METABOLISM, 3153
  - ALBUMINS, 6910
  - NITROGEN, 6910
  - PROTEINS, 6910
- MORPHOLOGY, 3153
- NEOPLASMS, MALIGNANT, 4857
  - BIOPSY, 6226*
  - DIAGNOSIS, 4820, 6226*

GASTRECTOMY (continued)
- NEOPLASMS, MALIGNANT (continued)
  - ENDOSCOPY, 6226*
  - JEJUNUM, 336
  - SURVIVAL, 331
- PANCREAS
  - ATROPHY, 2288*
  - SECRETION, 7571
- PANCREAS FUNCTION TESTS
  - BICARBONATE SECRETION, 2288*
- PLASMA
  - VITAMIN C, 5615
- SECRETION
  - GASTRIN, 4560*
- SERUM
  - GASTRIN, 3532
- STEATORRHEA
  - PANCREAS FUNCTION TESTS, 2288*
- STOMACH
  - ELECTROPHYSIOLOGY, 2763
  - ENDOSCOPY, 5601
  - MOTILITY, 6908, 7593, 7601
  - NEOPLASMS, 5597*
  - NEOPLASMS, BENIGN, 5606
  - NEOPLASMS, MALIGNANT, 3168
  - ULCER, PEPTIC, 6938
- TECHNIQUES, 4049, 4050, 4819, 6906
- ULCER, PEPTIC, 3211
  - COMPLICATIONS, 6934, 7571, 7584, 7589, 7593, 7601
  - ETIOLOGY, 4078
- URINE
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 5615
- VAGOTOMY
  - HEMORRHAGE, 392
  - SURGERY, 392
- VATER'S AMPULLA
  - ENDOSCOPY, 2317*
- VITAMIN B12
  - MALABSORPTION SYNDROMES, 3270
- VITAMIN D
  - BONES, 6254
  - MINERALS, 6254
- ZOLLINGER-ELLISON SYNDROME
  - GASTRIN, 5940*
  - SURVIVAL, 5225

GASTRIC INHIBITORY POLYPEPTIDE
- SEE HORMONES, GASTROINTESTINAL

GASTRIN
- ACHLORHYDRIA
  - ANEMIA, PERNICIOUS, 4805*
  - CELLS, 4804*
  - ETIOLOGY, 2594*
  - SERUM, 4804*
- ACID SECRETION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1889
  - AMINO ACIDS, 1867, 2779
  - FEEDING, 961
  - HISTAMINE, 1889
  - INSULIN, 345
  - NERVOUS CONTROL, 4716*
  - PARASYMPATHOMIMETICS, 5365*
  - POUCH STUDY, 961
  - PREGNANCY, 1906
  - STOMACH DISEASES, 345

GASTRIN (continued)
  ADRENERGIC RECEPTOR BLOCKADERS
    DYSPEPSIA, 2271
    ULCER, 2271
  AMINO ACIDS, 3691
  ANEMIA, 3541
  ANTIDEPRESSIVE AGENTS
    ADOLESCENCE, 5383
  ANTRECTOMY, 4856
  ANTRUM, 3697
    ACID SECRETION, 1232
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 4556*
    ANALYSIS, 1754*
    CELL CULTURE, 1891
    CELLS, 2681*, 3139*, 3593, 4496
    DISTENTION, 7971
    ELECTRICAL CONTROL, 1863
    ESOPHAGITIS, 5177*
    GASTRITIS, 5177*
    GASTROINTESTINAL DISEASES, 5177*
    GUANOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 4556*
    HYPERCHLORHYDRIA, 2257
    HYPERPLASIA, 2257
    LIVER EXTRACTS, 2780
    ORGAN CULTURE, 2803
    POLYPS, 3541
    RADIOIMMUNOASSAY, 3592
    SECRETION, 1334*, 3668*, 4554*,
      4556*, 6261*, 7349*, 7350*
    SERUM, 3139*
    SURGERY, 2353, 3670*, 3674*
    SYNTHESIS, 2803, 4554*
    ULCER, 4834*, 8181*
    ULCER, PEPTIC, 6261*
    ZOLLINGER-ELLISON SYNDROME, 5177*
  ASSAY
    METABOLISM, 5384
  ATROPINE
    SERUM, 2307
  BILE ACIDS AND SALTS, 2826
  CELLS
    ACIDITY, 2681*
    FETUS, 4489*
    HYPERPLASIA, 2693
    MARKER STUDY, 1753*
    MITOSIS, 1753*
    ULTRASTRUCTURE, 2681*
  CHENODEOXYCHOLIC ACID, 2826
  CHILD
    SERUM, 1890, 5372
  CIRCADIAN RHYTHM, 3692
  CIRCULATION, 3668*
    REVIEW, 204
  COLECTOMY
    SERUM, 3690
  DIET
    SERUM, 1902
  DRUG EFFECTS ON, 2802
    ALCOHOLS, 4683*
  DUODENECTOMY
    SOMATOSTATIN, 3225
  DUODENUM
    ANALYSIS, 1754*
    GLUCAGON, 953*
    PATHOLOGY, 323
    RADIOIMMUNOASSAY, 3592
    SECRETIN, 953*

GASTRIN (continued)
  DUODENUM (continued)
    SECRETION, 189
    SURGERY, 2353
    ULCER, 372, 1334*, 1340*, 2271,
      2602, 2804, 3197*, 3532, 3667*,
      4580
    ULCER, PEPTIC, 4560*, 4835*, 5593*,
      7575, 7598
    VAGOTOMY, 4074*
  ENTERECTOMY
    SERUM, 3690, 3718
  ESOPHAGUS
    ANOMALY, 4799
    ATROPINE, 4540
    HORMONE EFFECTS ON, 7936*
    MOTILITY, 4031, 6709, 7936*
    PARASYMPATHOMIMETICS, 4789*
    PRESSURE STUDY, 915*, 4521*
    REFLUX, 3532
    SPASM, 4031
    SPHINCTER, 915*, 1832*, 1841,
      2734*, 4396*, 4540, 5559*, 6709,
      7936*
  FEEDING
    SECRETION, 1334*
  GALLBLADDER
    HORMONE EFFECTS ON, 3650
    HORMONES, GASTROINTESTINAL, 3650
    NERVOUS CONTROL, 1970*
  GASTRECTOMY, 3674*
    SECRETION, 4560*
    SERUM, 3532
  GASTRITIS, 6896
    FEEDING, 6177
    SERUM, 3532
  GASTRITIS, ATROPHIC
    SERUM, 3143*
  GASTROINTESTINAL DISEASES
    DIAGNOSIS, 3059
    DUODENUM, 2306
    SERUM, 3532
    SURGERY, 2183
  GASTROINTESTINAL SYSTEM, 322, 3697
    ANALYSIS, 1754*
    CELLS, 6679*
    MOTILITY, 819
  H2 RECEPTOR ANTAGONISTS
    PLASMA, 2784*
  HEIDENHAIN POUCH
    ACID SECRETION, 6040*
    DIET, 6040*
    PROTEINS, 6040*
  HIATAL HERNIA
    SERUM, 3532
  HORMONE EFFECTS ON, 2802
  HORMONES, GASTROINTESTINAL
    GLUCAGON, 806
  HYPOGLYCEMIA
    INSULIN, 1340*
    VAGOTOMY, 6285
  IMMUNOCHEMISTRY, 5518
  IMMUNOGLOBULINS, 6845
    BINDING, 320
  INFANT
    SERUM, 1890, 5372
  INTESTINE, LARGE
    REGENERATION, 2801

GASTRIN (continued)
- INTESTINE, SMALL
  - ATROPHY, 4685*
  - HYPERPLASIA, 4685*
  - LIVER EXTRACTS, 2780
  - REGENERATION, 2801
  - SURGERY, 2069
- INTESTINES, 3688
  - REGENERATION, 2801
- JEJUNUM
  - ATROPHY, 4685*
  - HYPERPLASIA, 4685*
  - RADIOIMMUNOASSAY, 3592
- KIDNEY DISEASES
  - SERUM, 8499
- KIDNEYS, 2783*
- LIVER
  - PEPTIDES, 2936
- LIVER CIRRHOSIS, 5128*
  - CELLS, 8418
  - CIRCADIAN RHYTHM, 7178*
  - SERUM, 8418
- MALABSORPTION SYNDROMES
  - CELLS, 4912
- MENETRIER'S DISEASE
  - SERUM, 3532
- NEONATE, 2825
  - SERUM, 1890
- NEOPLASMS, BENIGN
  - DUODENUM, 4102*
  - STOMACH, 4102*
- NERVOUS CONTROL, 3680
  - SECRETION, 3668*
- PANCREAS
  - BICARBONATE SECRETION, 1922
  - NEOPLASMS, 2625
  - SECRETION, 4591*
  - SURGERY, 2625
- PANCREATECTOMY
  - SOMATOSTATIN, 3225
- PANCREATITIS
  - ALCOHOLISM, 2602
- PANCREATITIS, CHRONIC
  - ALCOHOLISM, 3356
  - SERUM, 3532
- PARASITES AND PARASITIC DISEASES
  - SERUM, 2829
  - STOMACH, 2829
- PARATHYROID GLANDS
  - CALCIUM, 4443
- PATHOLOGY, 4827
- PEPTIDES
  - CHEMICAL COMPOSITION, 5380
- PLASMA, 3593
  - VAGOTOMY, 3717
- PROTEINS, 6845
  - ATROPINE, 5634
  - DRUG EFFECTS ON, 5634
  - SECRETION, 1334*
- PYLOROPLASTY, 4835*, 4856
  - ANTRUM, 2238*
  - SEQUELAE, 2238*
  - SERUM, 3718
  - ULTRASTRUCTURE, 8181*
- PYLORUS
  - STENOSIS, 5593*
- RADIOIMMUNOASSAY
  - METABOLISM, 5384

GASTRIN (continued)
- REVIEW, 77
- SECRETION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4555*, 7350*
  - ATROPINE, 7967*
  - DRUG EFFECTS ON, 4068*
  - ENTERECTOMY, 4573*
  - FATS, 5358*
  - FEEDING, 959, 7364
  - GASTRODUODENOSTOMY, 3638*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 4555*
  - NERVOUS CONTROL, 7967*
  - PANCREAS, 959
  - STOMACH, 959
  - ULCER, 385
  - VAGOTOMY, 3638*, 4573*, 7364
- SERUM, 2693, 2783*, 3679
  - ACID SECRETION, 7970
  - ACIDITY, 5387*
  - ANTACIDS, 1876*
  - ATROPINE, 5623*
  - CALCIUM, 3669*, 5357*
  - CIRCADIAN RHYTHM, 7178*, 7575
  - DIETARY FACTORS, 5387*
  - DRUG EFFECTS ON, 3197*
  - DRUG THERAPY, 2294
  - ENTERECTOMY, 5370*
  - FATS, 3696
  - FEEDING, 6177
  - H2 RECEPTOR ANTAGONISTS, 1882*, 2294, 3197*
  - HORMONE EFFECTS ON, 2788*, 4581, 7347*
  - HORMONES, ADRENAL CORTEX, 4581
  - HYPERCALCEMIA, 6591*
  - INFANT, 6038*
  - MOTILIN, 1898, 7347*
  - NEONATE, 4553*
  - NERVOUS CONTROL, 4551*, 7970
  - PARENTERAL ALIMENTATION, 3854, 4551*
  - RADIOIMMUNOASSAY, 3592
  - SMOKING, 2308
  - SURGERY, 3670*
  - TECHNIQUES, 4762
  - THYROCALCITONIN, 2788*
  - VAGOTOMY, 5623*, 7603
- STOMACH
  - ACID SECRETION, 1232, 1906, 1922, 4580, 5366*
  - ACIDS, 3140*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4556*
  - AMINO ACIDS, 1901
  - ANTRUM, 3139*
  - ATROPINE, 7967*
  - CELLS, 3593, 3687, 3720, 4496
  - DISTENTION, 7971
  - EPINEPHRINE, 7972
  - ESOPHAGITIS, 5177*
  - FEEDING, 7364
  - FISTULA, 1901, 6040*
  - GASTRITIS, 5177*
  - GASTROINTESTINAL DISEASES, 5177*
  - GROWTH FACTORS, 2115
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 4556*

- GASTRIN (continued)
  - STOMACH (continued)
    - HEMODIALYSIS, 4047*
    - HYPERPLASIA, 1236
    - INSULIN, 4862
    - MOTILITY, 3645
    - NEOPLASMS, 1236
    - NEOPLASMS, MALIGNANT, 2602
    - NERVOUS CONTROL, 1897, 3660*, 7967*
    - PATHOLOGY, 323
    - PEPSIN, 1922
    - POLYPS, 3541
    - PYLOROPLASTY, 7364
    - RADIOIMMUNOASSAY, 3592
    - REGENERATION, 2801
    - SECRETION, 95, 103, 971, 1236, 3693, 4556*, 4579, 6261*, 7349*, 7350*, 7364, 7972
    - SYNTHESIS, 7972
    - THYROCALCITONIN, 4559*
    - ULCER, 2602, 3532
    - ULCER, PEPTIC, 6261*
    - VAGOTOMY, 3594, 4074*, 7364
    - ZOLLINGER-ELLISON SYNDROME, 5177*
  - STOMACH DISEASES
    - DIAGNOSIS, 3060
  - SYNTHESIS
    - INFANT, 6038*
  - THYROCALCITONIN
    - SERUM, 3001
  - TRACER STUDY, 1146
  - TRANSPORT
    - HORMONE EFFECTS ON, 4500*
  - ULCER
    - ANTRECTOMY, 6278
    - BIOCHEMISTRY, 2305
    - CELLS, 2804
    - DUODENUM, 5634
    - REVIEW, 2305
    - SECRETION, 2305
    - STRESS, 3706
    - SYNTHESIS, 2305
    - ULTRASTRUCTURE, 8181*
    - VAGOTOMY, 6278
  - ULCER, PEPTIC
    - CELLS, 1338*
    - CIRCADIAN RHYTHM, 7575
    - DIAGNOSIS, 3060
    - DIETARY FACTORS, 373
    - DISTENTION, 2285*
    - DRUG EFFECTS ON, 387
    - DRUG THERAPY, 2294
    - ETIOLOGY, 3142*
    - FEEDING, 372
    - H2 RECEPTOR ANTAGONISTS, 2294
    - HYPERPLASIA, 1876*
    - PLASMA, 2285*
    - REVIEW, 371
    - SERUM, 4861, 5221, 7575, 7598
    - SMOKING, 2308
    - SURGERY, 4856
    - ULTRASTRUCTURE, 1338*
    - VAGOTOMY, 1335*, 7600
  - VAGOTOMY, 4835*, 4856
    - ANTRUM, 2238*, 3719
    - CELLS, 3719, 3720
    - SECRETION, 1335*
    - SEQUELAE, 2238*

- GASTRIN (continued)
  - VAGOTOMY (continued)
    - SERUM, 3718, 3719
    - ULTRASTRUCTURE, 8181*
  - ZOLLINGER-ELLISON SYNDROME, 4396*
    - CALCIUM, 1192
    - DIAGNOSIS, 4395*, 6591*
    - GASTRECTOMY, 5940*
    - NEOPLASMS, 2625
    - RADIOIMMUNOASSAY, 5225
    - REVIEW, 5940*
    - SECRETION, 5175*, 5940*
    - SERUM, 2624, 3532
    - THERAPY, 5940*

- GASTRITIS
  - ACHLORHYDRIA
    - ANEMIA, PERNICIOUS, 4805*
    - DISEASES ASSOCIATED WITH, 4822
  - ACID SECRETION, 3206, 3212, 6722*, 8169
    - ETHNIC FACTORS, 338
  - ACIDS
    - CIRCULATION, 1920
    - PERMEABILITY, 1920
    - SIMULATION, 1920
  - AGE FACTORS, 6891
  - ALBUMINS
    - EXCRETION, 1282*
  - ANTIBODIES, 2244
  - ANTIHORMONES, 380
  - ANTRUM
    - BIOPSY, 247
    - DRUG THERAPY, 3178
    - ENDOSCOPY, 3178
    - GASTRIN, 5177*
    - HEARTBURN, 4061
    - HISTOCHEMISTRY, 3178
    - IMMUNOLOGY, 3178
    - MORPHOLOGY, 3178
  - ASPIRIN, 5488
    - WOUNDS AND INJURIES, 5610
  - BILE
    - REFLUX, 3134
  - CELLS
    - ACID SECRETION, 6896
    - MITOSIS, 6722*
  - CHOLECYSTITIS
    - DISEASES ASSOCIATED WITH, 4380
  - COMPLICATIONS
    - ULCER, PEPTIC, 1350
  - CYTOLOGY
    - IMMUNOLOGY, 6894
  - DIAGNOSIS
    - BIOPSY, 3993, 4060
    - ENDOSCOPY, 3993, 4060
    - RADIOLOGY, 3993
    - TECHNIQUES, 3994
  - DISEASES ASSOCIATED WITH
    - ULCER, PEPTIC, 6878*, 6893
  - DRUG-INDUCED
    - ASPIRIN, 3179
    - H2 RECEPTOR ANTAGONISTS, 5488
    - HEMORRHAGE, 3179
    - PREVENTION, 977, 5488
  - DRUG THERAPY, 3173
    - VITAMIN E, 6228
  - DUODENOSTOMY, 3716

GASTRITIS (continued)
- DUODENUM
  - ULCER, PEPTIC, 4835*
- DYSPEPSIA, 2248
- ELECTROLYTES, 3206
- ELECTROPHYSIOLOGY, 3138*
- ENDOSCOPY
  - BIOPSY, 6253
  - DIAGNOSIS, 6253
  - MORPHOLOGY, 3173
- EPIDEMIOLOGY, 3177
  - STATISTICAL STUDY, 5620
- ETIOLOGY
  - ANTRECTOMY, 3176
  - BILE, 3176
  - ENDOTOXINS, 4809*
  - GASTRECTOMY, 3134
- FAMILIAL FACTORS
  - NEOPLASMS, 1284*
  - STATISTICAL STUDY, 1284*
- GASTRECTOMY
  - AGE FACTORS, 4045*
  - SEX FACTORS, 4045*
- GASTRIN, 6896
  - FEEDING, 6177
- GASTRITIS, ATROPHIC, 2244
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 4436
- GASTROSTOMY, 3716
- H2 RECEPTOR ANTAGONISTS
  - PREVENTION, 5488
- HEMORRHAGE
  - DIAGNOSIS, 340
  - DRUG THERAPY, 339, 1285*
  - PATHOLOGY, 341
  - SURGERY, 342, 6898
  - THERAPY, 5609, 6898
- HIATAL HERNIA
  - HEMORRHAGE, 5571
- HYPERSENSITIVITY
  - TECHNIQUES, 3172
- IMMUNODEFICIENCY DISEASES
  - IRON, 2245
  - MALABSORPTION SYNDROMES, 2245
- IMMUNOLOGY, 1327
- LIVER CIRRHOSIS
  - COMPLICATIONS, 4809*
  - ENDOTOXINS, 4809*
- MITOSIS, 4576
- MORPHOLOGY, 3994, 6895
- PATHOLOGY, 6895
- PROSTAGLANDINS, 4067*
- PROTEINS
  - EXCRETION, 1282*
  - SERUM, 755
- PYLOROPLASTY, 4835*
- RADIOLOGY
  - MORPHOLOGY, 3173
- RADIOTHERAPY
  - COMPLICATIONS, 6225*
- REFLUX
  - ALKALINE, 2246
  - DIAGNOSIS, 2247
  - EPIDEMIOLOGY, 2247
  - PYLOROPLASTY, 3175
  - SURGERY, 5607, 6250
  - THERAPY, 2247, 3175, 4810*
  - ULCER, PEPTIC, 2246

GASTRITIS (continued)
- SECRETION
  - DEFICIENCY, 6228
  - DRUG THERAPY, 6228
  - GLYCOPROTEINS, 4576
- SERUM
  - GASTRIN, 3532
- STOMACH
  - EMPHYSEMA, 1257
  - GASTRIN, 5177*
  - SURGERY, 1326, 2247, 4810*
- STRESS
  - DIAGNOSIS, 4066
  - ETIOLOGY, 4066
  - PATHOLOGY, 4066
  - THERAPY, 4066
- SURGERY
  - REFLUX, 1294
- THERAPY, 4082
  - REVIEW, 4079
- ULCER
  - SURGERY, 6250
- ULCER, PEPTIC
  - IMMUNOLOGY, 6893
  - SURGERY, 391
- ULTRASTRUCTURE, 6894
- VAGOTOMY, 4835*
- VITAMIN B12
  - MALABSORPTION SYNDROMES, 2245

GASTRITIS, ATROPHIC
- ACID SECRETION
  - ETHNIC FACTORS, 338
- ALBUMINS
  - EXCRETION, 1282*
- AMINO ACIDS
  - METABOLISM, 4821
- ANEMIA, PERNICIOUS, 3144*
- CELLS
  - HYPERPLASIA, 2693
- CLASSIFICATION, 3143*
- DISEASES ASSOCIATED WITH
  - ANEMIA, PERNICIOUS, 3143*
- DRUG THERAPY, 3173
- ENDOSCOPY
  - MORPHOLOGY, 3173
- FERRITIN
  - DEFICIENCY, 3174
  - DIET, 3174
- GASTRECTOMY
  - AGE FACTORS, 4045*
  - SEX FACTORS, 4045*
- GASTRITIS, 2244
- HYPERCHLORHYDRIA, 3143*
- MITOSIS, 4495
- POLYPS, 3144*
- PROSTAGLANDINS, 4067*
- PROTEINS
  - EXCRETION, 1282*
- RADIOLOGY
  - MORPHOLOGY, 3173
- SERUM
  - GASTRIN, 3143*
- SIMULATION, 1147

GASTRODUODENAL ULCER
- SEE ULCER, PEPTIC

GASTRODUODENITIS
    ULCER, PEPTIC
        DRUG THERAPY, 6930

GASTRODUODENOSTOMY
    GASTRIN
        SECRETION, 3638*

GASTROENTERITIS
    CHILD
        BREAST FEEDING, 5202
        COMPLICATIONS, 8483
        DEHYDRATION, 5202
        ETIOLOGY, 5205, 5206, 6637
        REVIEW, 6637
        SODIUM, 5202
        THERAPY, 4431, 8483
    CHOLERA
        ANURIA, 6592
        SERUM, 7243
    COLLAGEN
        METABOLISM, 7870
    DIAGNOSIS
        INFANT, 7870
    DISEASES ASSOCIATED WITH, 5203
    ELECTROLYTES
        GLUCOSE, 4431
        SUCROSE, 4431
    ENDOCRINE DISEASES, 6966
    ENVIRONMENTAL FACTORS, 2249
    EOSINOPHILS
        DRUG THERAPY, 788
    EPIDEMIOLOGY, 2249, 5170*, 5226, 7889,
      8456*
        SEASONAL FACTORS, 5200
        VIRUSES, 5200
    ESOPHAGUS
        EOSINOPHILS, 4871*
    ETHNIC FACTORS
        INFANT, 7875
    ETIOLOGY
        BACTERIA, 5170*, 5206
        CHILD, 7871
        ETHNIC FACTORS, 7875
        INFANT, 7871, 7875
        VIRUSES, 4429, 5205
        YERSINIA, 8203
    FOOD
        ETIOLOGY, 5204
    FUNGI
        LACTASE, 7511*
    IMMUNITY, 5173*
    IMMUNOGLOBULINS
        VIRUSES, 1110
    INFANT, 4430
        BACTERIA, 6612
        BACTERIAL INFECTIONS, 3538
        COMPLICATIONS, 8483
        DIAGNOSIS, 7863
        ETIOLOGY, 4429, 5205, 6612
        REVIEW, 8460
        THERAPY, 8483
    INTESTINE, SMALL
        EPITHELIUM, 2962*
    JEJUNUM
        EPITHELIUM, 2962*
    MAGNESIUM
        SERUM, 7243
    MALABSORPTION SYNDROMES
        DISEASES ASSOCIATED WITH, 7644

GASTROENTERITIS (continued)
    MILK, 6317
    NUTRITION DISORDERS
        DIARRHEA, 7244
        EPIDEMIOLOGY, 7244
    PATHOLOGY, 5226
        REVIEW, 2612
    SALMONELLOSIS, 5217
    SODIUM
        TRANSPORT, 2962*
    STEROIDS
        CHILD, 669
    TRANSMISSION
        WATER, 5170*
    VIRUS DISEASES
        CHILD, 4392*, 7251, 8455*
        DISEASES ASSOCIATED WITH, 8481
        EPIDEMIOLOGY, 7251
        INFANT, 7251, 8460
        INTESTINE, SMALL, 2962*
        JEJUNUM, 2962*
        SEASONAL FACTORS, 8455*
        TRANSMISSION, 4392*
    VIRUSES, 8456*
        AGE FACTORS, 5935*
        CHILD, 790, 791, 5935*, 7872
        DEHYDRATION, 5935*
        DIAGNOSIS, 5935*, 7863
        EPIDEMIOLOGY, 5935*
        IMMUNOGLOBULINS, 1111, 1703
        INFANT, 791, 5935*
        INTERFERON, 420
        SEASONAL FACTORS, 5935*
        VOMITING, 5935*
    WATER
        TRANSMISSION, 789
    WATER, ELECTROLYTE BALANCE
        THERAPY, 2612

GASTROENTEROGRAPHY
    CONTRAST MEDIA, 2997

GASTROENTEROSTOMY
    COMPLICATIONS
        THERAPY, 4048, 4818
    DUODENUM
        ULCER, 4834*
    OBSTRUCTION
        LAPAROSCOPY, 6295
    STOMACH
        ULCER, PEPTIC, 6938

GASTROINTESTINAL DISEASES
    ABSORPTION
        AMINO ACIDS, 2617
        DRUGS, 2600
        REVIEW, 1661
    ACID SECRETION
        SURGERY, 2183
    AMYLASES
        REVIEW, 2182
    ANTRUM
        GASTRIN, 5177*
    BARIUM
        DIAGNOSIS, 1241
        ENDOSCOPY, 1241
        TECHNIQUES, 1241

GASTROINTESTINAL DISEASES (continued)
- BILE ACIDS AND SALTS
  - CHILD, 7756
  - METABOLISM, 6947, 7756
- BURNS
  - ACID SECRETION, 818
- CARCINOEMBRYONIC ANTIGEN
  - ANTIGENS, 5006*
  - DIAGNOSIS, 1238
- CHILD
  - REVIEW, 5191
- CIRCULATION
  - DIAGNOSIS, 8489, 8490
  - ETIOLOGY, 8489
  - PROGNOSIS, 8491
  - SURGERY, 8491
  - THERAPY, 8489
- CYTOLOGY
  - REVIEW, 7537
- DIAGNOSIS, 8494
  - BILE ACIDS AND SALTS, 7756
  - BIOPSY, 7537
  - BREATH TEST, 5649*
  - CYTOLOGY, 7537
  - ENDOSCOPY, 2596, 7537, 7538, 7541
  - FECES, 6168
  - IMMUNOLOGY, 6160
  - RADIOLOGY, 7538
  - REVIEW, 1649, 3987, 7537
  - TECHNIQUES, 1649, 3987
- DIET
  - CHILD, 7883
  - EPIDEMIOLOGY, 2636
  - ETIOLOGY, 2636
  - INFANT, 7883
  - REVIEW, 2636
  - THERAPY, 1650, 3527
- DIETARY FACTORS, 8495
- DISEASES ASSOCIATED WITH
  - HYPERPARATHYROIDISM, 7838
- DRUGS
  - ABSORPTION, 4138
- DUODENUM
  - GASTRIN, 2306
- ENDOSCOPY
  - BIOPSY, 7537
  - CYTOLOGY, 7537
  - RADIOLOGY, 7538
  - REVIEW, 3039*, 7537, 7538, 7541
- EPIDEMIOLOGY, 8495
  - WATER, 1673
- FECES
  - BIOCHEMISTRY, 6168
- FIBERS
  - DIET, 457, 4400
  - REVIEW, 2636, 2637, 2638, 4400
- GASTRIN
  - DIAGNOSIS, 3059
  - SURGERY, 2183
- GENETIC FACTORS, 3534
- HORMONES
  - REVIEW, 4399
- HORMONES, GASTROINTESTINAL, 8497
- HYPERSENSITIVITY
  - IMMUNOLOGY, 8231
- IMMUNITY, 8167
- INFLAMMATION, 6321
- INTESTINE, SMALL
  - ULTRASTRUCTURE, 4899

GASTROINTESTINAL DISEASES (continued)
- ISCHEMIA
  - REVIEW, 4119
- LACTOSE INTOLERANCE, 6318
- MAGNESIUM
  - DEFICIENCY, 8498
- MALABSORPTION SYNDROMES
  - LACTOSE, 6318
- MOTILITY, 4533
  - ELECTROPHYSIOLOGY, 1187
  - RADIOLOGY, 1187
- NEOPLASMS
  - DRUG THERAPY, 1323
- NUTRITION
  - CHILD, 7883
  - INFANT, 7883
- OCCUPATIONAL FACTORS
  - ENVIRONMENTAL FACTORS, 6616
- PARENTERAL ALIMENTATION
  - THERAPY, 3527
- PATHOLOGY
  - DIAGNOSIS, 1649
  - REVIEW, 1649
- PEPTIDES, 4578
- POTASSIUM
  - TRACER STUDY, 324
- PSYCHOLOGICAL FACTORS
  - CHILD, 7881
  - DIAGNOSIS, 3529
  - SOCIOECONOMIC FACTORS, 2595
  - THERAPY, 3529
- PSYCHOSOMATIC FACTORS
  - EVOLUTION, 1655
  - REVIEW, 1655
  - THERAPY, 1655
- RADIOLOGY
  - DIAGNOSIS, 3052
  - DRUG EFFECTS ON, 3986
  - REVIEW, 3039*, 7538
  - TECHNIQUES, 2618
- RADIONUCLIDES
  - DIAGNOSIS, 4753
- SECRETION
  - REVIEW, 1661
- SERUM
  - GASTRIN, 3532
  - PROTEINS, 8170
- STOMACH
  - ENDOSCOPY, 244
  - GASTRIN, 5177*
  - HORMONES, GASTROINTESTINAL, 6685
- SURGERY
  - JAUNDICE, 5161*
  - REVIEW, 4397
- THERAPY
  - REVIEW, 1649
- TRANSPLANTATION
  - KIDNEYS, 5233
- ULCER, PEPTIC
  - SURVIVAL, 360
- VIBRIO
  - SERODIAGNOSIS, 805
- VOMITING
  - INFANT, 7878
- WATER
  - TRANSMISSION, 6619

GASTROINTESTINAL SYSTEM
- ABSORPTION
  - ALCOHOLS, 3927

GASTROINTESTINAL SYSTEM (continued)
- ABSORPTION (continued)
  - AMINO ACIDS, 1792
  - ANEMIA, 5220
  - CHILD, 8109
  - L-DOPA, 889
  - DRUGS, 19, 2600
  - INFANT, 8109
  - IRON, 3618
  - LEAD, 879
  - METALS, 879
  - RADIOISOTOPES, 2705*
  - SELENIUM, 1806
  - VITAMIN B1, 2706*
- ALCOHOLISM, 8068
- ALCOHOLS, 3531
- ANGIOGRAPHY
  - REVIEW, 7549
- ANISAKIASIS
  - ETIOLOGY, 6657
- ANOMALY
  - DIAGNOSIS, 4885
  - DUPLICATION, 4415
  - RADIOLOGY, 4885
- ANTINEOPLASTIC AGENTS
  - NEOPLASMS, MALIGNANT, 3164
- BACTERIA, 4434, 5466*
  - ANTIBODIES, 4702*
- BACTERIAL INFECTIONS
  - YERSINIA, 8203
- BARIUM
  - RADIOLOGY, 49
  - TECHNIQUES, 49
- BILIARY TRACT
  - SHUNT, 5955
  - SURGERY, 5955
- BIOPSY
  - COMPLICATIONS, 6157
- BLEEDING
  - ANGIOGRAPHY, 2180, 4038*, 4435
  - ANTI-INFLAMMATORY AGENTS, 4440, 6593
  - ASPIRIN, 4440
  - CHILD, 1669, 4441
  - CLOTTING, 2280*
  - DIAGNOSIS, 1390*, 2185, 2253, 3985, 4435, 5230, 6159, 6198*
  - DRUG EFFECTS ON, 801
  - DRUG-INDUCED, 6593
  - DRUG THERAPY, 2253
  - ENDOSCOPY, 233, 1191, 1213, 2180, 2280*, 2614, 3056, 3985, 4437, 4438, 4439, 4756, 6159, 6198*, 6212, 6734, 6899
  - HYPERTENSION, PORTAL, 1213
  - INFANT, 1669
  - LIVER CIRRHOSIS, 5902*
  - RADIOLOGY, 232, 2614, 3056, 6198*, 6899
  - REVIEW, 4441
  - RISK FACTORS, 6212
  - SURGERY, 343
  - THERAPY, 2280*, 4438, 4439, 5230, 5902*, 6734
  - TISSUE ADHESIVES, 6734
  - VASOPRESSIN, 5902*
  - WOUNDS AND INJURIES, 343
- CARCINOID TUMOR
  - ABSORPTION, 4100*

GASTROINTESTINAL SYSTEM (continued)
- CARCINOID TUMOR (continued)
  - ETIOLOGY, 4389*
  - REVIEW, 4389*
- CELLS
  - REVIEW, 8111
  - SOMATOSTATIN, 3744
- CHILD
  - EOSINOPHILS, 2613
- CHOLECYSTOKININ
  - PANCREOZYMIN, 4548
- CIRCULATION
  - ANESTHESIA, 3862*
  - DRUG EFFECTS ON, 3862*
  - HEMORRHAGE, 4704*
  - REVIEW, 2994
  - SHOCK, 2119
- CYTOMEGALOVIRUSES
  - HEMORRHAGE, 1328
- DIAGNOSIS
  - ENDOSCOPY, 3180
- DIGESTION
  - ANEMIA, 5220
- DISEASE
  - EMBOLIZATION, 2255
- DRUG EFFECTS ON, 5185
- DRUG METABOLISM
  - DRUG EFFECTS ON, 3615
- DRUG THERAPY
  - REVIEW, 7858
- DYSENTERY
  - DRUG EFFECTS ON, 2996
- ECHINOCOCCOSIS
  - NEOPLASMS, 6628
- EDEMA
  - LIVER CIRRHOSIS, 1556*
- ELECTROPHYSIOLOGY
  - CALCIUM, 5306*
  - CHOLECYSTECTOMY, 1835
  - SURGERY, 5190
  - TECHNIQUES, 916, 3641, 5334, 7320*
  - VAGOTOMY, 363
- ENDOCRINE SYSTEM
  - MORPHOLOGY, 3*
- ENDOSCOPY, 1190, 6155, 6156
  - AGE FACTORS, 4754
  - ARTERIES, 4758
  - BACTERIAL INFECTIONS, 4388*
  - BIOPSY, 6157
  - BLEEDING, 2589*
  - CHILD, 2169*, 4755
  - COMPLICATIONS, 1646, 3984, 4388*, 6157, 7536
  - INFANT, 2169*
  - REVIEW, 1223, 1242, 7532, 7533, 7534, 7540, 8144
  - SEPSIS, 4388*
  - SURGERY, 3055
  - TECHNIQUES, 7533, 7534, 7540
- ENZYMES
  - DIAGNOSIS, 7085
- ESCHERICHIA COLI
  - MORPHOLOGY, 2685*
  - ULTRASTRUCTURE, 2685*
- FEEDING
  - HORMONES, 72
- FIBERS
  - REVIEW, 2638

GASTROINTESTINAL SYSTEM (continued)
  FISTULA
    COMPLICATIONS, 5207
    DISEASES ASSOCIATED WITH, 5207
    ETIOLOGY, 5207
    NEOPLASMS, MALIGNANT, 2243
    PROGNOSIS, 5207
    THERAPY, 5207
  FLUOROCARBONS
    REVIEW, 3097
  FOREIGN BODIES
    SURGERY, 1399
  GASES
    DIGESTION, 2635
    DISTENTION, 1688
    PHYSICAL FACTORS, 1688
  GASTRIN, 322, 3697
    ANALYSIS, 1754*
    CELLS, 6679*
  GIARDIASIS
    SIMULATION, 226
  GLYCOPROTEINS
    SYNTHESIS, 3662*
  GRANULOMA
    DIAGNOSIS, 6585*
  GROWTH SUBSTANCES
    HORMONES, GASTROINTESTINAL, 4493
  HEMANGIOMA
    SURGERY, 8235*
  HEMATOMA
    ANTICOAGULANTS, 4103*
  HEMORRHAGE
    ANGIOGRAPHY, 7549
    ANTICOAGULANTS, 2237*
    ANTIFIBRINOLYTIC AGENTS, 1286*
    BURNS, 5229
    CLOTTING, 2280*
    DIAGNOSIS, 1182*, 5530, 7549
    DRUG-INDUCED, 2254
    DRUG THERAPY, 1286*, 7186*
    DUODENITIS, 4436
    ENDOSCOPY, 2280*, 4757, 5530, 6212
    ETIOLOGY, 3213, 3546, 4436
    FISTULA, 1628, 2328
    GASTRITIS, 4436
    H2 RECEPTOR ANTAGONISTS, 3367*
    LIVER CIRRHOSIS, 7186*
    PREVENTION, 3367*
    PROGNOSIS, 4436
    RADIOLOGY, 2237*, 4757
    RADIONUCLIDES, 1182*
    REVIEW, 800, 7186*
    RISK FACTORS, 6212
    SALICYLATES, 3180
    STRESS, 2237*
    SURGERY, 799, 3213
    THERAPY, 2280*, 5228
    ULCER, 4436
    VASOPRESSIN, 7186*
  HEPATITIS, CHRONIC
    HEMODIALYSIS, 4266
  HORMONE EFFECTS ON
    HYPOTENSION, 1836
  HORMONES
    REVIEW, 4398, 4399
  HYPERSENSITIVITY
    REVIEW, 3528
  HYPOXIA
    MORPHOLOGY, 5464*

GASTROINTESTINAL SYSTEM (continued)
  IMMUNITY
    HOST FACTORS, 811
    REVIEW, 811
  IMMUNOGLOBULINS
    REVIEW, 3528
  INFECTION
    ELECTROLYTES, 6629
    TOXICITY, 6629
  IRRADIATION
    SEQUELAE, 6614
  JAUNDICE, OBSTRUCTIVE
    NEOPLASMS, 636
    NEOPLASMS, MALIGNANT, 2898
  LIVER CIRRHOSIS
    HEMORRHAGE, 3488
  LIVER INJURY
    HEMORRHAGE, 3367*
  LYMPHATIC SYSTEM
    NEOPLASMS, 1278, 1665
    NEOPLASMS, MALIGNANT, 1667
  LYMPHOCYTES
    REVIEW, 1658
  LYMPHOMA
    REVIEW, 7869
    SEZARY SYNDROME, 6606
  MALLORY-WEISS SYNDROME
    DISEASES ASSOCIATED WITH, 8149
  MORPHOLOGY
    ANEMIA, 5220
  MOTILITY
    ACIDS, 5333
    AGE FACTORS, 1834
    ANEMIA, 5220
    ASPIRIN, 2730*
    BREATH TEST, 7326
    CALCIUM, 5306*
    CHILD, 8109
    DIARRHEA, 5196
    DRUG EFFECTS ON, 2730*, 3646, 5323*
    ELECTROPHYSIOLOGY, 3641, 5190, 5334, 6700
    GASTRIN, 819
    HORMONES, 819
    INFANT, 8109
    LIVER DISEASES, 2645
    MARKER STUDY, 917, 1834
    NERVOUS CONTROL, 6700, 7942
    PEPTIDES, 4534
    RADIOLOGY, 1177*
    RADIOTELEMETRY, 7935*
    SECRETIN, 819
    SURGERY, 2764
    TECHNIQUES, 5334, 7935*
    WOUNDS AND INJURIES, 2645
  MUCUS
    CHEMICAL COMPOSITION, 210
  MUSCLES
    CALCIUM, 5306*
    HISTOCHEMISTRY, 3584*
    NEOPLASMS, 4416
  NEOPLASMS, 4409, 7890
    BIOCHEMISTRY, 775
    CHILD, 7569
    DIAGNOSIS, 7569
    DIET, 1663
    ENVIRONMENTAL FACTORS, 772
    GENETIC FACTORS, 772

GASTROINTESTINAL SYSTEM (continued)
  NEOPLASMS (continued)
    IMMUNITY, 5949
    IMMUNOTHERAPY, 5949
    LAPAROSCOPY, 7569
    REVIEW, 8111
    SURGERY, 6595, 6596
  NEOPLASMS, MALIGNANT, 5048
    AGE FACTORS, 3552
    ALPHA FETOPROTEIN, 3057
    ANTIGENS, 3057, 7862
    ANTINEOPLASTIC AGENTS, 771, 1393*
    CARCINOEMBRYONIC ANTIGEN, 8126
    COMPLEMENT, 8462
    CYTOLOGY, 8137
    DIAGNOSIS, 8137, 8493
    DISEASES ASSOCIATED WITH, 7884
    DRUG THERAPY, 771, 7858, 7876
    ENZYMES, 7861
    EPINEPHRINE, 234
    FAMILIAL FACTORS, 2627
    GENETICS, 6623
    HORMONES, 7861
    IMMUNOLOGY, 3057
    PROGNOSIS, 3552
    RADIOLOGY, 4151*
    RADIOTHERAPY, 7859
    REVIEW, 7859, 7860
    SURGERY, 4151*, 7860
    THERAPY, 3552
  NERVOUS SYSTEM
    REVIEW, 5227
  NUCLEIC ACIDS
    OCCUPATIONAL FACTORS, 1108
    SYNTHESIS, 1108
  ORGAN CULTURE, 2109
  PANCREATITIS
    SURGERY, 535
  PARENTERAL ALIMENTATION
    AMINO ACIDS, 7361
  PEPTIDES, 2858
    ENKEPHALINS, 4701*
  PERFORATION
    FOREIGN BODIES, 7621
    NEONATE, 5211
    SURVIVAL, 5212
  POLYPS
    INFANT, 4124
    PROGNOSIS, 4124
    PROTEIN-LOSING ENTEROPATHIES, 4124
  PRECANCEROUS CONDITIONS
    REVIEW, 8111
    THERAPY, 5950
  PROTEINS, 2858
    ABSORPTION, 20
    DIGESTION, 20
  PSEUDOTUMORS
    CHILD, 7569
    DIAGNOSIS, 7569
    LAPAROSCOPY, 7569
  RADIATION
    SEQUELAE, 6614
  RADIATION EFFECTS ON
    SEQUELAE, 6614
  RADIOLOGY
    CHILD, 2169*
    INFANT, 2169*
    TECHNIQUES, 1189, 8118
  RADIONUCLIDES, 6852*

GASTROINTESTINAL SYSTEM (continued)
  RADIOTELEMETRY
    TECHNIQUES, 7935*
  RADIOTHERAPY
    REVIEW, 7859
  RECTUM
    SURGERY, 8247
  REVIEW, 1635
  SARCOIDOSIS
    REVIEW, 2656
  SCANNING, SCINTILLATION
    COMPLICATIONS, 1101
  SCHISTOSOMIASIS
    EPIDEMIOLOGY, 2669
    GRANULOMA, 2669
  SCLERODERMA
    BARIUM, 4417
  SECRETION
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 7957
    CONTRAST MEDIA, 1101
  SHUNT
    TECHNIQUES, 5955
  SIGMOID
    SURGERY, 8247
  SODIUM
    EXCRETION, 2095
  SOMATOSTATIN
    FETUS, 814
  STRESS
    ULCER, 2645
  SURGERY, 6156
    COMPLICATIONS, 5943
    DIETARY FACTORS, 5186
    FOLATE, 3268
    GEOGRAPHICAL FACTORS, 5186
    INFANT, 7880
    MAGNESIUM, 8496
    REVIEW, 2597, 7860
  TRANSPORT
    VITAMIN B1, 2706*
  TRYPSIN
    CHILD, 6621
  TUBERCULOSIS
    PROGNOSIS, 5182
    SURGERY, 5182
    THERAPY, 5182
  VARICES
    LIVER CIRRHOSIS, 5902*
    THERAPY, 5902*
    VASOPRESSIN, 5902*
  VITAMIN A
    ABSORPTION, 1657
    METABOLISM, 1657
  WOUNDS AND INJURIES
    PERFORATION, 7621

GASTRONE
  SEE ALSO MUCOPOLYSACCHARIDES
  ACID SECRETION
    BIOASSAY, 93

GASTROSCOPY
  HEPATITIS, INFECTIOUS
    TRANSMISSION, 4282*
  MALLORY-WEISS SYNDROME
    DIAGNOSIS, 5580

GASTROSTOMY
    ACID SECRETION, 3150
    GASTRITIS, 3716
    STOMACH
        REFLUX, 3716
        SECRETION, 6037*

GAUCHER'S DISEASE
    THERAPY
        ENZYMES, 5817

GENETICS
    ALPHA 1 ANTITRYPSIN
        LIVER DISEASES, 8287*
    CELIAC DISEASE
        GLUTEN, 2356
        LACTOSE INTOLERANCE, 4905*
    COLITIS, ULCERATIVE
        ANTIGENS, 8263*
    CRIGLER-NAJJAR SYNDROME
        REVIEW, 543*
    CROHN'S DISEASE, 842
        ANTIGENS, 8263*
    FRUCTOSE
        INTOLERANCE, 8232
    GARDNER'S SYNDROME, 7053
    GASTROINTESTINAL SYSTEM
        NEOPLASMS, MALIGNANT, 6623
    GILBERT'S DISEASE
        REVIEW, 543*
    HEMOCHROMATOSIS
        CARBOHYDRATES, 7815*
        IRON, 7815*
    HEPATITIS, CHRONIC, 8381*
    INFLAMMATORY BOWEL DISEASES
        ANTIGENS, 8263*
    INTESTINAL OBSTRUCTION
        ANOMALY, 4109*
        SHORT BOWEL SYNDROME, 4109*
    LIPODYSTROPHY, INTESTINAL
        ULTRASTRUCTURE, 1463*
    LIVER
        REGENERATION, 6810
    LIVER DISEASES
        REVIEW, 543*
    NEOPLASMS
        REVIEW, 7239
    NIEMANN-PICK'S DISEASE
        REVIEW, 543*
    NUTRITION DISORDERS
        METALS, 7252
        MINERALS, 7252
    PANCREATITIS, CHRONIC
        ALCOHOLS, 4988*
    PORPHYRIA
        EPIDEMIOLOGY, 5821*
    ULCER, PEPTIC
        PEPSINOGEN, 2301, 4085
    WILSON'S DISEASE
        REVIEW, 543*

GIARDIASIS
    CHILD
        DIARRHEA, 1645*
        DRUG THERAPY, 3569
        EPIDEMIOLOGY, 3569
        LYMPHOCYTES, 2166*
    CHOLECYSTITIS
        DIAGNOSIS, 3570
        DUODENITIS, 5963

GIARDIASIS (continued)
    COLITIS
        COMPLICATIONS, 8506
    COMPLICATIONS
        MEGACOLON, 8506
    DIAGNOSIS, 5249
        ENDOSCOPY, 4463
        REVIEW, 2664, 3575
    DIARRHEA
        DRUG THERAPY, 2665
        ETIOLOGY, 2640
    DRUG THERAPY, 5966, 7892*
        TOLERANCE, 3569
    DUODENUM
        INTUBATION, 6658
        ULTRASTRUCTURE, 2660*
    ELECTRON MICROSCOPY
        DIAGNOSIS, 2659*
    ENDOSCOPY
        DUODENUM, 4463
    EPIDEMIOLOGY, 3558*, 5226, 5961, 5976
    GASTROINTESTINAL SYSTEM
        SIMULATION, 226
    IMMUNITY, 4737
    IMMUNOGLOBULINS
        DEFICIENCY, 2664
    INTESTINE, SMALL
        DIAGNOSIS, 2659*
        DIARRHEA, 3559
        MALABSORPTION SYNDROMES, 2659*
        MORPHOLOGY, 7892*
        STEATORRHEA, 3559
    INTESTINES
        DRUG THERAPY, 3572
        MALABSORPTION SYNDROMES, 1718
    JEJUNUM
        MALABSORPTION SYNDROMES, 4113
    LYMPHOCYTES
        CHILD, 1645*
    MALABSORPTION SYNDROMES
        ETIOLOGY, 3256*
        FATS, 5242*
        INTESTINES, 438
        ULTRASTRUCTURE, 2660*
        VITAMIN B12, 7892*
    PARASITES AND PARASITIC DISEASES,
      3558*
    PATHOLOGY
        REVIEW, 3575
    REVIEW, 5961
        DIAGNOSIS, 6664
        EPIDEMIOLOGY, 6664
        PATHOLOGY, 6664
        PREVENTION, 6664
        THERAPY, 6664
    SECRETIN
        DIAGNOSIS, 6658
    SIMULATION
        IMMUNITY, 4462
    STEATORRHEA
        BACTERIA, 5242*
        ETIOLOGY, 5242*
    STOMACH
        SURGERY, 2250
    THERAPY
        REVIEW, 2664, 3575
    TRANSMISSION, 7073, 8473
        REVIEW, 8472
        WATER, 3558*

GIARDIASIS (continued)
- TRICHINOSIS
  - IMMUNOLOGY, 2988*
  - INTESTINE, SMALL, 2988*

GILBERT'S DISEASE
- ANTIBIOTICS
  - DIAGNOSIS, 3411
  - METABOLISM, 3411
- BILIRUBIN
  - CLEARANCE STUDY, 3412
- CHOLELITHIASIS
  - DISEASES ASSOCIATED WITH, 5845
- CLASSIFICATION, 3410
- DIAGNOSIS
  - TECHNIQUES, 3411
- DRUG THERAPY, 1506*
- FAMILIAL FACTORS
  - DRUG METABOLISM, 2478
- GENETICS
  - REVIEW, 543*
- HEMOLYSIS
  - BILIRUBIN, 1218
  - DIAGNOSIS, 1218
- HYPERBILIRUBINEMIA
  - DIETARY FACTORS, 3412
- INDOCYANINE GREEN
  - EXCRETION, 4246*
- LIVER
  - DRUG EFFECTS ON, 3410
  - ENZYMES, 3410
- PATHOLOGY, 3410
- PHENOBARBITAL
  - DRUG METABOLISM, 7775
- SULFOBROMOPHTHALEIN
  - EXCRETION, 4246*
- THERAPY, 3410

GLOBULINS
- AMYLASES
  - ASSAY, 6065
  - CHEMICAL COMPOSITION, 6063
- ENTERITIS, REGIONAL, 7281
- HEPATITIS
  - PREVENTION, 6479*, 7146*
  - THERAPY, 2514
  - TRANSFUSION, 2514
- HEPATITIS, CHRONIC
  - PREVENTION, 3434*
- HEPATITIS, INFECTIOUS, 8350*
  - PREVENTION, 6479*, 7146*
  - REVIEW, 1515*
  - THERAPY, 1529
- HEPATITIS, SERUM
  - IMMUNITY, 5855*
- LIVER
  - SYNTHESIS, 2004
- LIVER CIRRHOSIS
  - IMMUNOLOGY, 3484

GLUCAGON
- ACHLORHYDRIA
  - ETIOLOGY, 2594*
- ACID SECRETION, 1842
- CHOLANGIOGRAPHY, 3102
- CHROMATOGRAPHY
  - TECHNIQUES, 6032
- COLON
  - MUSCLES, 6026*
  - RADIOLOGY, 3063

GLUCAGON (continued)
- DUODENUM, 4690
  - ACIDS, 953*
  - GASTRIN, 953*
  - HORMONE EFFECTS ON, 953*
  - HORMONES, GASTROINTESTINAL, 953*
  - RADIOLOGY, 1200
  - ULCER, 2309
- ELECTROPHYSIOLOGY
  - STOMACH, 4536
- ESOPHAGUS
  - OBSTRUCTION, 6199*
  - SPHINCTER, 1842
- GALLBLADDER
  - HORMONE EFFECTS ON, 3650
  - HORMONES, GASTROINTESTINAL, 3650
- GLUCONEOGENESIS
  - ADENOSINE TRIPHOSPHATE, 6804
- HEPATITIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 5927*
- HEPATITIS, INFECTIOUS
  - LIVER INJURY, 2883*
- HORMONES, GASTROINTESTINAL
  - GASTRIN, 806
- IMMUNOLOGY
  - SOMATOSTATIN, 3832*
- INTESTINE, SMALL, 4690
- JAUNDICE, OBSTRUCTIVE
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 5927*
- JEJUNUM, 4690
- KERNICTERUS
  - DIURESIS, 2473
- LIVER
  - ADENOSINE TRIPHOSPHATE, 2937
  - ESTROGENS, 8008*
  - GLUCONEOGENESIS, 6804
  - METABOLISM, 5404*, 8008*
  - REGENERATION, 2883*
  - SURGERY, 4735
- LIVER CIRRHOSIS
  - DIAGNOSIS, 6508*
- LIVER DISEASES
  - DIAGNOSIS, 6508*
- LIVER INJURY
  - HORMONE EFFECTS ON, 2883*
- MOTILITY, 4535
- PANCREAS
  - BICARBONATE SECRETION, 2855
  - SECRETION, 2855
- PANCREATITIS, 4987*
  - HYPOCALCEMIA, 4233
  - SIMULATION, 2106*
  - SURVIVAL, 2106*
- PYLORUS
  - MOTILITY, 67
- RADIOIMMUNOASSAY
  - TECHNIQUES, 6032
- REVIEW, 207
- STOMACH
  - ACID SECRETION, 1899, 2794*
  - ASPIRIN, 2269
  - CELLS, 2684*
  - ELECTRICAL CONTROL, 1864
  - ELECTROPHYSIOLOGY, 3636*
  - MOTILITY, 67, 3648
  - SECRETION, 2794*
  - SURGERY, 190

- GLUCAGON (continued)
  - STOMACH (continued)
    - ULTRASTRUCTURE, 4536
    - VAGOTOMY, 3636*
    - WOUNDS AND INJURIES, 2269
  - ULCER
    - SECRETION, 2309
  - VILLI
    - DRUG EFFECTS ON, 2738*

- GLUCONEOGENESIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    - ADENOSINE TRIPHOSPHATE, 6804
  - FEEDING
    - DRUG EFFECTS ON, 1999
  - GLUCAGON
    - ADENOSINE TRIPHOSPHATE, 6804
  - HEPATOCYTES
    - ENZYMES, 3781
  - JEJUNUM, 1095
    - FEEDING, 191
  - LIVER, 7387*
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6804
    - AMINO ACIDS, 157
    - ENZYMES, 2000
    - GLUCAGON, 6804
    - LEAD, 6770*
    - NEOPLASMS, 2938
    - UREMIA, 6795
  - LIVER FUNCTION TESTS
    - HEPATITIS, CHRONIC, 6466*
    - HEPATITIS, INFECTIOUS, 6466*
    - LIVER CIRRHOSIS, 6466*
    - LIVER DISEASES, 6466*

- GLUCOSAMINE
  - COLITIS
    - ENZYMES, 5717*
    - SYNTHESIS, 5717*

- GLUCOSE
  - ABSORPTION
    - BILE ACIDS AND SALTS, 28
    - DRUG EFFECTS ON, 6825
    - FATTY ACIDS, 28
    - JEJUNUM, 28, 4132*
  - ACID SECRETION
    - CHOLESTASIS, 6057
    - INSULIN, 962
  - ALCOHOLS
    - TRANSPORT, 30
  - ANEMIA
    - INTESTINE, SMALL, 4413
  - COLON
    - SECRETION, 6132
  - DUMPING SYNDROME
    - ABSORPTION, 4058
  - DUODENUM
    - ELECTROPHYSIOLOGY, 2694*
    - INSECTICIDES, 5299
    - TRANSPORT, 5299
  - GASTROENTERITIS
    - ELECTROLYTES, 4431
  - GLYCOGEN
    - METABOLISM, 169
  - GLYCOGENOSIS
    - METABOLISM, 3396

- GLUCOSE (continued)
  - HEPATITIS, INFECTIOUS
    - LIVER FUNCTION TESTS, 4294*
  - ILEUM
    - ELECTROPHYSIOLOGY, 2694*
    - ISCHEMIA, 3866*
    - SECRETION, 6132
    - TRANSPORT, 6011
  - INTESTINAL ABSORPTION
    - DRUG EFFECTS ON, 2968
    - MOTILITY, 6694*
  - INTESTINE, SMALL, 3849
    - ABSORPTION, 1777*, 2725, 2961*, 4500*, 4508*, 6825
    - DIGESTION, 2725
    - ELECTROPHYSIOLOGY, 2695*
    - ENZYMES, 1096, 2089
    - ION TRANSPORT, 2694*, 6009
    - ISCHEMIA, 3866*
    - METABOLISM, 7300*
    - ORGAN CULTURE, 7300*
    - OSMOTIC PRESSURE, 8095
    - PARENTERAL ALIMENTATION, 3854
    - PERFUSION, 1096, 2089
    - PERMEABILITY, 5446
    - TRANSPORT, 1812, 3854, 4500*, 6011, 6823
  - INTESTINES
    - ABSORPTION, 3832*
  - JEJUNUM
    - ABSORPTION, 2961*, 4508*, 6010
    - ELECTROPHYSIOLOGY, 2694*
    - ENZYMES, 8084*
    - KINETICS, 1819
    - OSMOTIC PRESSURE, 8095
    - PERFUSION, 8084*
    - SECRETION, 6132
    - TRANSPORT, 30, 1819, 4497*, 6011
  - KWASHIORKOR
    - INFANT, 4146
  - LIVER, 8061
    - EXCRETION, 2552
    - GLYCOGEN, 2939
    - TRIGLYCERIDES, 2005
  - LIVER CIRRHOSIS
    - DIAGNOSIS, 6508*
  - LIVER DISEASES
    - DIAGNOSIS, 6508*
  - MARASMUS
    - METABOLISM, 4146
  - OXIDATION
    - DIETARY FACTORS, 176
    - INTESTINES, 176
  - PANCREAS
    - ENZYMES, 3742
    - HYPERGLYCEMIA, 2856
    - HYPERPHAGIA, 2856
    - NERVOUS CONTROL, 2856
    - SECRETION, 2856
  - PARASITES AND PARASITIC DISEASES
    - DIETARY FACTORS, 4738
  - PYLOROPLASTY
    - ANALYSIS, 5635
  - SERUM
    - STRESS, 1919
  - SHUNT, INTESTINAL
    - ABSORPTION, 2315*
  - SODIUM
    - ELECTRICAL CONTROL, 1812

- GLUCOSE (continued)
  - STOMACH
    - ABSORPTION, 3148
    - ACID SECRETION, 3702, 6055, 6057
    - ELECTROPHYSIOLOGY, 7940*
    - MOTILITY, 940, 7940*
    - OSMOTIC PRESSURE, 4568*
    - OXIDATION, 4568*
    - SECRETION, 6053
    - VAGOTOMY, 2805
  - TRANSPORT
    - AGE FACTORS, 1818
    - HYPOGLYCEMIC AGENTS, 27
    - INTESTINES, 27
    - SODIUM, 1812
  - VAGOTOMY
    - ANALYSIS, 5635

- GLUCOSE INTOLERANCE
  - DUODENUM
    - ULCER, 2309
  - ULCER
    - SECRETION, 2309

- GLUCOSE PHOSPHATE DEHYDROGENASE
  - DEFICIENCY
    - DIAGNOSIS, 6467*
    - DISEASES ASSOCIATED WITH, 6467*
    - HYPERBILIRUBINEMIA, 6467*
  - GLYCOGENOSIS, 3396
  - LIVER
    - DIET, 6120
  - LIVER INJURY, 6120
    - HISTOCHEMISTRY, 640

- GLUCOSE PHOSPHATES
  - ENZYMES
    - DEFICIENCY, 6415*

- GLUCOSE TOLERANCE TEST
  - LIVER CIRRHOSIS, 2552

- GLUCURONIDASE
  - BILE ACIDS AND SALTS
    - EXCRETION, 2046
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 2046
  - HEPATITIS, INFECTIOUS
    - AMINO TRANSFERASES, 663
  - LIVER
    - BILIRUBIN, 3776
    - NEOPLASMS, 166
  - LIVER DISEASES
    - LIVER FUNCTION TESTS, 6395*
  - PANCREAS
    - NEOPLASMS, MALIGNANT, 527
  - PANCREATIC DISEASES
    - SERUM, 527
  - PANCREATITIS
    - SERUM, 527
  - PANCREATITIS, CHRONIC
    - SERUM, 527

- GLUTAMYLTRANSPEPTIDASE
  - CELIAC DISEASE
    - ETIOLOGY, 6978*
  - HEPATITIS, CHRONIC, 271
  - JAUNDICE, OBSTRUCTIVE
    - SIMULATION, 225

- GLUTAMYLTRANSPEPTIDASE (continued)
  - LIVER
    - DRUG EFFECTS ON, 4638
    - MARKER STUDY, 4638
  - LIVER CIRRHOSIS, 271
  - LIVER DISEASES, ALCOHOLIC, 271

- GLUTATHIONE
  - AMINO ACIDS
    - METABOLISM, 7993*
  - BILE DUCTS
    - SURGERY, 6555*
  - LIVER, 7993*
    - DRUG METABOLISM, 4658
  - WILSON'S DISEASE
    - HEMOLYSIS, 8304*

- GLUTEN
  - CELIAC DISEASE
    - ANTIBODIES, 2355
    - CHROMATOGRAPHY, 4917
    - DIAGNOSIS, 2191
    - DRUG THERAPY, 4141
    - ETIOLOGY, 445
    - FAMILIAL FACTORS, 2356
    - GENETICS, 2356
    - IMMUNOLOGY, 4918
    - INTEGUMENTARY SYSTEM, 4744*
    - THERAPY, 445
  - DERMATITIS HERPETIFORMIS
    - ANTIBODIES, 2355
    - DIETARY FACTORS, 4869*
  - DIARRHEA
    - THERAPY, 2362
  - HYPERSENSITIVITY
    - GENETIC FACTORS, 4144
    - IMMUNOLOGY, 4144
  - MALABSORPTION SYNDROMES
    - INTEGUMENTARY SYSTEM, 1386

- GLYCERIN
  - ALCOHOLS
    - ENZYMES, 2035
    - LIVER, 2035
  - LIVER
    - LIPOPROTEINS, 1060, 2945

- GLYCEROPHOSPHATES
  - FATTY ACIDS
    - LIVER, 3780
    - SYNTHESIS, 3780
  - LIVER
    - ALCOHOLS, 165
    - COENZYMES, 146
    - LIPIDS, 146
    - METABOLISM, 146

- GLYCOGEN
  - AMYLASES
    - HYDROLYSIS, 6064
  - COLON
    - CIRCADIAN RHYTHM, 2960*
    - MUSCLES, 2960*
  - ENZYMES
    - DEFICIENCY, 7108*
  - FRUCTOSE
    - METABOLISM, 169
  - GLUCOSE
    - METABOLISM, 169

- GLYCOGEN (continued)
  - HEPATOCYTES, 8063
  - LIVER
    - ALCOHOLISM, 8067
    - ENZYMES, 4667, 7108*
    - GALACTOSE, 2939
    - GLUCOSE, 2939
    - HORMONE CONTROL, 8005*
    - HYPOTHERMIA, 7457
    - LIPIDS, 2001
    - METABOLISM, 169, 7416*, 8005*
    - STRESS, 1919, 7457
  - METABOLISM
    - AGE FACTORS, 7416*
    - ALCOHOLISM, 8067

- GLYCOGEN PHOSPHORYLASE
  - CIRCADIAN RHYTHM
    - FEEDING, 2039
    - LIVER, 2039
  - GLYCOGENOSIS, 3396

- GLYCOGEN STORAGE DISEASE
  - SEE GLYCOGENOSIS

- GLYCOGENOLYSIS
  - LIVER
    - CALCIUM, 2940
    - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 2940

- GLYCOGENOSIS
  - BIOCHEMISTRY
    - LIVER, 580
  - CALCULI
    - SURVIVAL, 5162*
  - CHILD
    - DIAGNOSIS, 8290*
  - DISEASES ASSOCIATED WITH, 6415*
  - ETIOLOGY
    - MEMBRANES, 3396
    - TRANSPORT, 3396
  - FRUCTOSE
    - METABOLISM, 170
  - GALLBLADDER
    - CALCULI, 5162*
  - GLUCOSE
    - METABOLISM, 3396
  - GLUCOSE PHOSPHATE DEHYDROGENASE, 3396
  - GLYCOGEN PHOSPHORYLASE, 3396
  - HYPOGLYCEMIA, 3396, 3397
  - MEMBRANES
    - TRANSPORT, 3396
  - METABOLISM
    - LIVER, 580
  - SURGERY, 5818*
  - THERAPY, 5818*
    - DIET, 3396, 3397
    - LIPIDS, 3397
    - TRIGLYCERIDES, 3397

- GLYCOLIPIDS
  - INTESTINE, SMALL
    - CHEMICAL COMPOSITION, 7496*
    - FATTY ACIDS, 7496*
  - STOMACH, 6725*
    - CHEMICAL COMPOSITION, 7351*
    - CHROMATOGRAPHY, 1887, 3661*
    - HAPTENS, 7356
    - ISOLATION, 7351*

- GLYCOLYSIS
  - LIVER
    - NEOPLASMS, 2938

- GLYCOPROTEINS
  - ACID SECRETION
    - URINE, 214
  - COLITIS, ULCERATIVE
    - MORPHOLOGY, 5758*
  - COLON
    - FETUS, 3853
    - NEOPLASMS, MALIGNANT, 3852
    - SYNTHESIS, 3853
  - DIGESTION
    - PEPSIN, 107
    - PEPTIDE HYDROLASES, 107
  - FOLIC ACID
    - BINDING, 1810
    - CIRCULATION, 1810
  - GALACTOSE
    - METABOLISM, 1100
  - GASTRITIS
    - SECRETION, 4576
  - GASTROINTESTINAL SYSTEM
    - SYNTHESIS, 3662*
  - HEPATITIS
    - SERUM, 7263, 7790*
  - HEPATITIS, CHRONIC, 6525*
    - DIAGNOSIS, 6502
    - SERUM, 6468*
  - HEPATITIS, INFECTIOUS
    - SERUM, 6468*
  - ILEUM
    - METABOLISM, 1100
  - INTESTINE, SMALL
    - CHOLERA, 3850
    - SECRETION, 3850
    - TOXINS, 3850
  - INTESTINES
    - ENZYMES, 3851
    - FETUS, 3852
  - LIVER CIRRHOSIS, 6525*
    - DIAGNOSIS, 6502
    - SERUM, 7263
  - LIVER DISEASES, 6525*
    - SERUM, 2941
  - NEOPLASMS
    - SERUM, 7263
  - ORGAN CULTURE
    - MARKER STUDY, 2061*
  - PANCREAS
    - SECRETION, 2835*
    - TRANSPORT, 2835*
  - RECTUM
    - CELLS, 8090*
    - COLITIS, ULCERATIVE, 4971
    - CYSTIC FIBROSIS, 8090*
    - SECRETION, 8090*
    - SYNTHESIS, 8090*
    - TRANSPORT, 8090*
  - SECRETION
    - CYSTIC FIBROSIS, 8090*
  - STOMACH
    - DRUG EFFECTS ON, 2792*
    - DRUGS, 89
    - RADIOIMMUNOASSAY, 3935*
    - SECRETION, 1752*, 2792*, 4576, 7969*
    - SYNTHESIS, 89
    - TRANSPORT, 7352*

GLYCOPROTEINS (continued)
- SYNTHESIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2061*
  - COLON, 2061*
  - CYSTIC FIBROSIS, 8090*
  - MARKER STUDY, 2061*
  - ORGAN CULTURE, 2061*
- TRANSPORT
  - CYSTIC FIBROSIS, 8090*
- ULCER, PEPTIC
  - SECRETION, 4576

GLYCOSIDES
- ANTIBACTERIALS, 6625
- ILEUM
  - CALCIUM, 5315*
  - NERVOUS CONTROL, 5315*
- INTESTINES
  - MUSCLES, 4712*
- ISCHEMIA
  - INTESTINES, 4712*
- LIVER
  - ADENOSINE TRIPHOSPHATASE, 4635
  - METABOLISM, 4635
  - NEOPLASMS, 7100*
- LIVER INJURY
  - DRUG-INDUCED, 1504
- METABOLISM
  - DUODENUM, 3599*
  - STOMACH, 3599*

GNOTOBIOTICS
- CECUM
  - SALMONELLOSIS, 2132
- INTESTINES
  - BACTERIA, 1671
  - MOTILITY, 1848
- PROTOZOA
  - DIAGNOSIS, 1719

GRANULOMA
- CROHN'S DISEASE
  - BONES, 1741
- GASTROINTESTINAL SYSTEM
  - DIAGNOSIS, 6585*
- HEPATITIS
  - EOSINOPHILS, 4459*
  - PARASITES AND PARASITIC DISEASES, 4459*
- ILEUM
  - DIAGNOSIS, 6585*
  - OBSTRUCTION, 3242
- INTESTINAL OBSTRUCTION, 3242
- INTESTINE, SMALL
  - DIAGNOSIS, 6585*
  - OBSTRUCTION, 3242
- LIVER
  - ANTI-INFLAMMATORY AGENTS, 7142*
  - DRUG-INDUCED, 7142*
  - TUBERCULOSIS, 589
- SCHISTOSOMIASIS
  - GASTROINTESTINAL SYSTEM, 2669
- SPLEEN
  - TUBERCULOSIS, 589
- STOMACH
  - DIAGNOSIS, 6585*

GROWTH DISORDERS
- INFECTION
  - KWASHIORKOR, 5951
  - MARASMUS, 5951
- KWASHIORKOR
  - ALBUMINS, 5951
- MARASMUS
  - ALBUMINS, 5951

GROWTH SUBSTANCES
- GASTROINTESTINAL SYSTEM
  - HORMONES, GASTROINTESTINAL, 4493
- ILEUM
  - BILE, 5443*
  - ENTERECTOMY, 5443*
  - PANCREAS, 5443*
- LIVER
  - PITUITARY GLAND, 2942
  - SERUM, 1169
- LIVER INJURY
  - DRUG-INDUCED, 1169
- UROGASTRONE
  - CELLS, 2117

GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
- ADENOSINE TRIPHOSPHATE
  - CALCIUM, 6059*
  - PANCREAS, 6059*
  - PROTEINS, 6059*
- ANTRUM
  - GASTRIN, 4556*
- LIVER
  - GLYCOGENOLYSIS, 2940
- PANCREAS
  - HORMONES, GASTROINTESTINAL, 996
- SECRETION
  - AMYLASES, 7985*
  - GASTRIN, 4555*
- STOMACH
  - ADRENERGIC RECEPTOR AGONISTS, 6723*
  - ADRENERGIC RECEPTOR BLOCKADERS, 6723*
  - GASTRIN, 4556*
  - PROSTAGLANDINS, 2743*

GUANYL CYCLASE
- ILEUM
  - ALCOHOLS, 7338*
- INTESTINE, SMALL
  - CIRCADIAN RHYTHM, 2090
  - FEEDING, 2090
- LIVER
  - ALCOHOLS, 7338*
- PANCREAS
  - ALCOHOLS, 7338*
- STOMACH
  - ALCOHOLS, 7338*

H1 RECEPTOR ANTAGONISTS
- ESOPHAGUS
  - SPHINCTER, 1843, 2750
- STOMACH
  - WOUNDS AND INJURIES, 6834*

H2 RECEPTOR ANTAGONISTS
- ABSORPTION
  - ANTACIDS, 7359
  - FEEDING, 4405

H2 RECEPTOR ANTAGONISTS (continued)
- ACID SECRETION
  - ADENYL CYCLASE, 1908
  - DRUG EFFECTS ON, 2806, 6915*
  - HISTAMINE, 7964*
  - HORMONES, GASTROINTESTINAL, 5378
- CAFFEINE
  - ACID SECRETION, 357*
- DRUG THERAPY
  - COMPLICATIONS, 6916*
- DUODENUM
  - ULCER, 97, 3195*, 3197*, 3198*, 4073*
  - ULCER, PEPTIC, 4833*, 6917*, 7572*
- ESOPHAGUS
  - MOTILITY, 928, 2733*, 3625*
  - SPHINCTER, 929, 1829*, 2732*, 2750
- GASTRIN
  - SERUM, 2294
- GASTRITIS
  - DRUG-INDUCED, 5488
  - PREVENTION, 5488
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 3367*
- HISTAMINE
  - ACID SECRETION, 2293
  - BINDING, 7289*
- LIVER DISEASES
  - BLEEDING, 2471
- MOTILITY
  - SPHINCTER, 929
- PANCREATIC DISEASES
  - DRUG THERAPY, 2415*
- PLASMA
  - GASTRIN, 2784*
- SERUM
  - GASTRIN, 1882*, 3197*
- STOMACH
  - ABSORPTION, 7357
  - ACID SECRETION, 1881*, 1893, 1899, 2778, 2789*, 6048, 6283, 6915*, 7357, 7963*
  - ADENYL CYCLASE, 1883*, 2790*
  - CARBOXYLASES, 1881*
  - DRUG EFFECTS ON, 2806, 7360
  - ELECTROPHYSIOLOGY, 91, 7334
  - HISTAMINE, 1881*, 2790*
  - ION TRANSPORT, 974
  - PATHOLOGY, 975
  - REVIEW, 7357
  - SECRETION, 1882*, 2415*, 2784*, 2789*, 2799, 6046
  - ULCER, 980
  - ULCER, PEPTIC, 5595*, 6915*
  - WOUNDS AND INJURIES, 6834*
- ULCER
  - ACID SECRETION, 4832*
  - BICARBONATE SECRETION, 4832*
  - DRUG THERAPY, 5626*
  - DUODENUM, 5626*
  - LIVER FUNCTION TESTS, 4832*
  - STRESS, 1154, 1312
- ULCER, PEPTIC
  - ACID SECRETION, 381, 4833*
  - BLEEDING, 5638
  - CHOLECYSTOKININ, 1339*
  - COMPLICATIONS, 6916*
  - DRUG THERAPY, 2295, 5595*, 6904, 6916*, 6917*, 7357, 8188

H2 RECEPTOR ANTAGONISTS (continued)
- ULCER, PEPTIC (continued)
  - GASTRIN, 2294
  - HEMODIALYSIS, 5638
  - PEPSIN, 381
  - RECURRENCE, 382
  - REVIEW, 7357
- URTICARIA PIGMENTOSA
  - THERAPY, 1693
- ZOLLINGER-ELLISON SYNDROME
  - DRUG THERAPY, 5224

HALLUCINOGENS
- LIVER
  - DRUG EFFECTS ON, 6127
- SYNTHESIS, 810

HAMARTOMA
- BILE DUCTS
  - JAUNDICE, 1622
- DUODENUM
  - INTUSSUSCEPTION, 5659
- LIVER
  - ANGIOGRAPHY, 3108
  - CHILD, 5029*
  - MORPHOLOGY, 5029*
  - SCANNING, SCINTILLATION, 3108
- STOMACH
  - CHILD, 1301
  - REVIEW, 1301

HAPTOGLOBINS
- LIVER
  - PROSTAGLANDINS, 2114
- SERUM
  - PROSTAGLANDINS, 2114
- ULCER
  - DUODENUM, 6284

HARTNUP'S SYNDROME
- CHILD, 5208
- URINE
  - DIAGNOSIS, 5208

HEARTBURN
- ANTRUM
  - GASTRITIS, 4061
- DUODENITIS
  - ETIOLOGY, 4061
- PREGNANCY
  - ETIOLOGY, 5563*
  - MANOMETRY, 5563*
  - PRESSURE STUDY, 5563*

HEIDENHAIN POUCH
- ACID SECRETION
  - ANTRECTOMY, 1885*
  - DIET, 6040*
  - ENTERECTOMY, 5370*
  - GASTRIN, 6040*
  - PENTAGASTRIN, 1885*
  - PROTEINS, 6040*
- GASTRIN
  - DIET, 6040*
  - PROTEINS, 6040*
- PENTAGASTRIN
  - ACID SECRETION, 7965*
  - TEMPERATURE, 7965*
- PROSTAGLANDINS
  - ACID SECRETION, 951*
  - SECRETION, 951*

- HEIDENHAIN POUCH (continued)
    - TEMPERATURE
        - ACID SECRETION, 7965*

- HELMINTHIASIS
    - ANEMIA
        - ACID SECRETION, 2649
    - BILIARY TRACT
        - PATHOLOGY, 5487
    - CECUM
        - MOTILITY, 1827*
    - COLON
        - PATHOLOGY, 1722
    - DIAGNOSIS
        - IMMUNOLOGY, 829
    - DRUG THERAPY, 831, 833, 834, 835, 836, 837, 8503
        - CHILD, 838
        - IMMUNOLOGY, 832
        - INTESTINES, 1720
        - METABOLISM, 832
        - NERVOUS CONTROL, 832
    - EPIDEMIOLOGY, 5250, 8502
        - GEOGRAPHICAL FACTORS, 828
        - INTESTINES, 828
    - HISTAMINE
        - ACID SECRETION, 2649
    - INTESTINE, SMALL
        - ABSORPTION, 5485
        - IRON, 5508
        - PROTEINS, 5508
        - REVIEW, 826
        - TRACER STUDY, 1827*
    - INTESTINES
        - DIAGNOSIS, 821
        - DRUG THERAPY, 830
        - ELECTROPHYSIOLOGY, 5251
        - FEEDING, 1712
        - IMMUNOLOGY, 227
        - LEAD, 5971
        - MOTILITY, 5251
        - PARENTERAL ALIMENTATION, 1712
        - PATHOLOGY, 5487
    - IRON
        - DEFICIENCY, 5508
    - LIPOGENESIS, 5436
    - LIVER DISEASES
        - SCHISTOSOMIASIS, 820
    - MALABSORPTION SYNDROMES
        - ANEMIA, 827
        - INTESTINES, 827
    - MOTILITY
        - INTESTINE, SMALL, 1827*
    - PREVENTION, 8503
    - PROTEINS
        - DEFICIENCY, 5508
    - THERAPY, 5250
    - TRANSMISSION
        - IMMUNITY, 5509

- HEMANGIOMA
    - ANGIOGRAPHY
        - DIAGNOSIS, 5030*
    - CECUM
        - BLEEDING, 2195
    - COLON
        - BLEEDING, 3073
        - ENDOSCOPY, 3073

- HEMANGIOMA (continued)
    - GASTROINTESTINAL SYSTEM
        - SURGERY, 8235*
    - ILEUM
        - RUPTURE, 430
    - INTESTINE, SMALL
        - INFANT, 5683
        - INTUSSUSCEPTION, 5683
    - LIVER, 2458*
        - ANEMIA, 2457*
        - ANGIOGRAPHY, 1249
        - CHILD, 5010*
        - COMPLICATIONS, 2457*
        - JAUNDICE, OBSTRUCTIVE, 2457*
        - NEONATE, 2457*
    - MESENTERY
        - RUPTURE, 430
    - ULTRASONOGRAPHY
        - DIAGNOSIS, 5030*

- HEMATEMESIS
    - DISEASES ASSOCIATED WITH
        - CARDIOVASCULAR SYSTEM, 4452
    - REYE'S SYNDROME
        - THERAPY, 2462*

- HEMATIN
    - SEE HEME

- HEMATOBILIA
    - ANEURYSM
        - BLEEDING, 7129
    - ANGIOGRAPHY
        - DIAGNOSIS, 7120
        - THERAPY, 7120
    - BILIARY TRACT
        - SURGERY, 6582
    - CALCULI
        - ETIOLOGY, 8446
    - ETIOLOGY, 4268
    - LIVER
        - ANEURYSM, 1487
        - BIOPSY, 2459*
        - EMBOLIZATION, 1455*
        - THERAPY, 1455*
        - WOUNDS AND INJURIES, 4268
    - LIVER INJURY
        - DIAGNOSIS, 7132
        - THERAPY, 7132
    - PANCREAS
        - PSEUDOCYSTS, 1444
    - THERAPY, 4268

- HEMATOMA
    - DUODENUM
        - OBSTRUCTION, 426
        - THERAPY, 4872*
    - ESOPHAGUS
        - OBSTRUCTION, 310
    - GASTROINTESTINAL SYSTEM
        - ANTICOAGULANTS, 4103*
    - INTESTINES
        - ANTICOAGULANTS, 4103*
    - LIVER
        - ANGIOGRAPHY, 3109
        - BIOPSY, 3110
        - DIAGNOSIS, 3109
        - ETIOLOGY, 3110
        - SCANNING, SCINTILLATION, 3110

- HEMATOPOIESIS
    - HEPATITIS, TOXIC
        - CARBON TETRACHLORIDE, 7480
    - LIVER
        - AGE FACTORS, 6073*
        - FETUS, 1155
        - NEONATE, 1155
    - LIVER INJURY
        - CARBON TETRACHLORIDE, 7480
    - STOMACH
        - DIAGNOSIS, 2251

- HEME
    - ALBUMINS
        - SYNTHESIS, 2012
    - HYPERTENSION, PORTAL
        - METABOLISM, 8400*
        - SHUNT, 8400*
        - SPLENECTOMY, 8400*
    - INSULIN
        - SYNTHESIS, 2012
    - LIVER
        - ALCOHOLS, 2868
        - CONTRACEPTIVES, ORAL, 1071
        - DRUG EFFECTS ON, 2868, 2904
        - METABOLISM, 2904
        - PHENOBARBITAL, 2868
        - SECRETION, 3796
        - SYNTHESIS, 2012, 2868
    - LIVER CIRRHOSIS
        - HYPERTENSION, PORTAL, 8400*
        - METABOLISM, 8400*
    - SPLENECTOMY
        - METABOLISM, 8400*

- HEMOBILIA
    - SEE HEMATOBILIA

- HEMOCHROMATOSIS
    - ANTIGENS
        - GENETIC FACTORS, 3398
    - DIAGNOSIS
        - BIOPSY, 4269
    - FAMILIAL FACTORS, 5056
        - LIVER CIRRHOSIS, 7815*
    - GENETIC FACTORS, 5056
    - GENETICS
        - CARBOHYDRATES, 7815*
        - IRON, 7815*
    - HEPATOCYTES
        - FERRITIN, 5906*
        - IRON, 5906*
    - LIVER
        - IRON, 3377, 5907*
    - LIVER CIRRHOSIS
        - HEPATOCYTES, 5906*
        - PATHOLOGY, 5906*
        - REVIEW, 8397*
    - MARKER STUDY, 5907*
    - PATHOLOGY, 4269
    - REVIEW, 720, 4270
    - VITAMIN C
        - DEFICIENCY, 3399

- HEMODIALYSIS
    - ANTIGENS, 3438
    - AUSTRALIA ANTIGEN
        - OCCUPATIONAL FACTORS, 8363

- HEMODIALYSIS (continued)
    - COLON
        - PERFORATION, 5727
    - COMPLICATIONS
        - HEPATITIS, INFECTIOUS, 3421*
    - HEPATITIS, 5066*
    - HEPATITIS, CHRONIC
        - ANTIGENS, 5868*
        - AUSTRALIA ANTIGEN, 5868*
        - GASTROINTESTINAL SYSTEM, 4266
    - HEPATITIS, INFECTIOUS
        - DIAGNOSIS, 8365
        - EPIDEMIOLOGY, 5872*, 6485*
        - IMMUNITY, 3440
        - OCCUPATIONAL FACTORS, 8363
        - TRANSMISSION, 4304, 5872*, 6485*, 8353*
    - INTESTINAL ABSORPTION
        - ANTACIDS, 8230
        - IRON, 8230
    - INTESTINE, SMALL
        - MORPHOLOGY, 6587*
        - PATHOLOGY, 5938*
    - LIVER COMA, 4665
        - REVIEW, 1048
        - TECHNIQUES, 1048
        - THERAPY, 5028*, 5816*
    - LIVER DISEASES
        - HEPATITIS, SERUM, 666
    - LIVER INJURY
        - THERAPY, 5028*, 5816*
    - STOMACH
        - ACID SECRETION, 4047*
        - GASTRIN, 4047*
        - MORPHOLOGY, 8172
    - ULCER, PEPTIC
        - BLEEDING, 5638
        - H2 RECEPTOR ANTAGONISTS, 5638

- HEMOGLOBINS
    - STOMACH
        - TECHNIQUES, 3995
    - XYLOSE
        - ABSORPTION, 901

- HEMOLYSIS
    - BILE ACIDS AND SALTS
        - METABOLISM, 6090*
    - GILBERT'S DISEASE
        - BILIRUBIN, 1218
        - DIAGNOSIS, 1218
    - HEPATITIS
        - BILIRUBIN, 545*
        - ELECTROLYTES, 545*
        - MEMBRANES, 545*
    - LIVER CIRRHOSIS
        - BILIRUBIN, 545*
        - ELECTROLYTES, 545*
        - MEMBRANES, 545*
    - SHUNT, INTESTINAL
        - COMPLICATIONS, 4875*
    - WILSON'S DISEASE, 2465*
        - GLUTATHIONE, 8304*

- HEMORRHAGE
    - SEE ALSO BLEEDING
    - ANGIOGRAPHY
        - DIAGNOSIS, 2252
        - DUODENUM, 2252

HEMORRHAGE (continued)

- ANGIOGRAPHY (continued)
  - REVIEW, 2252
  - STOMACH, 2252
  - THERAPY, 2252
- ANTRUM
  - CIRCULATION, 4703*
- ANUS, 4166
- CECUM
  - DYSPLASIA, 2371*, 7657*
- CHOLECYSTITIS, 7857
- COLITIS, ULCERATIVE
  - IMMUNOLOGY, 3324
  - SURVIVAL, 5769
- COLON, 7045
  - DIAGNOSIS, 1182*
  - NEOPLASMS, 7040
  - RADIONUCLIDES, 1182*
  - THERAPY, 6874*
- COLONOSCOPY
  - COMPLICATIONS, 7010
- DIAGNOSIS
  - ENDOSCOPY, 5583
  - RADIOLOGY, 5583
- DIVERTICULUM
  - EMBOLIZATION, 3278*
  - THERAPY, 3278*
- DRUG-INDUCED
  - ANALGESICS AND ANTIPYRETICS, 3547
  - ASPIRIN, 2254, 3547
  - CHILD, 2254
  - DUODENUM, 3547
  - ESOPHAGUS, 3547
  - GASTROINTESTINAL SYSTEM, 2254
  - STOMACH, 3547
- DUODENUM, 4831
  - ANTICOAGULANTS, 2237*
  - CIRCULATION, 4704*
  - EMBOLIZATION, 315*
  - ENDOSCOPY, 4757
  - ETIOLOGY, 3213
  - FISTULA, 2328
  - RADIOLOGY, 4757
  - STRESS, 2237*
  - SURGERY, 3213
  - THERAPY, 5228, 5942
- DYSPLASIA
  - COLONOSCOPY, 2371*
- ENDOSCOPY
  - CLOTTING, 2280*
  - DIAGNOSIS, 5530
- ENTERITIS, 7857
- ESOPHAGUS
  - BURNS, 5229
  - CIRCULATION, 4704*
  - ENDOSCOPY, 4757
  - ETIOLOGY, 3213
  - HYPERTENSION, PORTAL, 6200*
  - PROGNOSIS, 6200*
  - RADIOLOGY, 4757
  - THERAPY, 8156, 8157
  - TUBERCULOSIS, 4023*
  - VARICES, 3137, 6200*, 6897, 8156, 8157
- GALLBLADDER
  - PERFORATION, 7230
- GASTRECTOMY
  - VAGOTOMY, 392

HEMORRHAGE (continued)

- GASTRITIS
  - DIAGNOSIS, 340
  - DRUG-INDUCED, 3179
  - DRUG THERAPY, 339, 1285*
  - PATHOLOGY, 341
  - SURGERY, 342, 6898
  - THERAPY, 6898
- GASTROINTESTINAL SYSTEM
  - ANGIOGRAPHY, 7549
  - ANTICOAGULANTS, 2237*
  - ANTIFIBRINOLYTIC AGENTS, 1286*
  - BURNS, 5229
  - CIRCULATION, 4704*
  - CLOTTING, 2280*
  - CYTOMEGALOVIRUSES, 1328
  - DIAGNOSIS, 1182*, 5530, 7549
  - DRUG THERAPY, 1286*, 7186*
  - DUODENITIS, 4436
  - ENDOSCOPY, 2280*, 4757, 5530, 6212
  - ETIOLOGY, 3213, 3546, 4436
  - FISTULA, 1628, 2328
  - GASTRITIS, 4436
  - H2 RECEPTOR ANTAGONISTS, 3367*
  - LIVER CIRRHOSIS, 7186*
  - PREVENTION, 3367*
  - PROGNOSIS, 4436
  - RADIOLOGY, 2237*, 4757
  - RADIONUCLIDES, 1182*
  - REVIEW, 800, 7186*
  - RISK FACTORS, 6212
  - SALICYLATES, 3180
  - STRESS, 2237*
  - SURGERY, 799, 3213
  - THERAPY, 2280*, 5228
  - ULCER, 4436
  - VASOPRESSIN, 7186*
- HIATAL HERNIA
  - DIAGNOSIS, 5571
  - ESOPHAGITIS, 5571
  - ETIOLOGY, 5571
  - GASTRITIS, 5571
  - SURGERY, 5571
  - ULCER, PEPTIC, 5571
- HYPERTENSION, PORTAL
  - ESOPHAGUS, 6533*
  - FAMILIAL FACTORS, 6533*
- ILEUM
  - DYSPLASIA, 7657*
- INTESTINE, LARGE
  - ANGIOGRAPHY, 1255
  - DYSPLASIA, 2371*
- INTESTINE, SMALL
  - ANTICOAGULANTS, 2237*
  - BURNS, 5229
  - REVIEW, 422
  - STRESS, 2237*
- INTESTINES
  - ETIOLOGY, 3546
- JEJUNUM
  - DYSPLASIA, 7657*
  - ULCER, 4128
- KIDNEYS
  - TRANSPLANTATION, 1328
- LIVER
  - ANGIOGRAPHY, 5819*
  - DIAGNOSIS, 5819*
  - NEOPLASMS, BENIGN, 6409*
  - SURGERY, 6454*, 8321

- EMORRHAGE (continued)
  - LIVER (continued)
    - THERAPY, 5819*, 6454*
    - WOUNDS AND INJURIES, 5819*, 6454*
  - LIVER CIRRHOSIS
    - ALCOHOLS, 5117
    - BLOOD PLATELETS, 719
    - ENDOSCOPY, 2562
    - ESOPHAGUS, 3483*
    - GASTROINTESTINAL SYSTEM, 3488
    - KERNICTERUS, 717
    - SURVIVAL, 8394
    - THERAPY, 717
  - LIVER COMA
    - PREVENTION, 8417
  - LIVER DISEASES
    - BLOOD PLATELETS, 3395
  - LIVER INJURY
    - ANGIOGRAPHY, 5819*
    - COMPLICATIONS, 3367*
    - DIAGNOSIS, 5819*
    - GASTROINTESTINAL SYSTEM, 3367*
    - HEPATOCYTES, 4632*
    - SHOCK, 4632*
    - THERAPY, 5819*
  - MALLORY-WEISS SYNDROME, 7563
  - MECKEL'S DIVERTICULUM
    - SURGERY, 8221
  - MESENTERY
    - ANGIOGRAPHY, 7657*
    - DYSPLASIA, 7657*
  - NECROSIS, 7857
  - NERVOUS SYSTEM
    - DIAGNOSIS, 4447
  - PANCREAS
    - PSEUDOCYSTS, 6365*
  - PANCREATITIS
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2838*
    - ADENYL CYCLASE, 2838*
    - ALBUMINS, 4231
    - DRUG-INDUCED, 5787*
    - SIMULATION, 4231
    - SURGERY, 7077*
  - PANCREATITIS, CHRONIC
    - ETIOLOGY, 7079*
    - HYPERTENSION, PORTAL, 7079*
  - PROCTOCOLITIS, 4956
    - ETIOLOGY, 4206
    - REVIEW, 3316
    - THERAPY, 4206
  - PSEUDOCYSTS
    - SURGERY, 6365*
  - PYLORUS
    - EMBOLIZATION, 315*
  - RECTUM
    - NEOPLASMS, 7040
    - THERAPY, 6874*
  - STOMACH
    - ACID SECRETION, 5368*
    - ANOMALY, 344
    - BURNS, 5229
    - CIRCULATION, 4703*, 4704*, 5368*
    - CONTRAST MEDIA, 1295
    - DIAGNOSIS, 6897
    - DISEASES ASSOCIATED WITH, 4453
    - ENDOSCOPY, 4757, 6897
    - ETIOLOGY, 3213, 3546
    - GASES, 3895

- HEMORRHAGE (continued)
  - STOMACH (continued)
    - RADIOLOGY, 4757
    - SURGERY, 3213
    - THERAPY, 5228, 5942
    - ULCER, 4831
    - ULCER, PEPTIC, 6897
  - ULCER
    - ETIOLOGY, 4128
    - POTASSIUM, 4128
    - STRESS, 7857
    - THERAPY, 6874*
  - ULCER, PEPTIC
    - COMPLICATIONS, 7596
    - ETIOLOGY, 7596
    - PROGNOSIS, 7596
    - THERAPY, 5228, 7596
  - VARICES
    - HYPERTENSION, PORTAL, 6200*
    - PROGNOSIS, 6200*
  - VASOPRESSIN
    - ANESTHESIA, 6874*
    - TECHNIQUES, 5579
  - WATER, ELECTROLYTE BALANCE
    - THERAPY, 6874*

- HEMORRHOIDS
  - ANGIOGRAPHY, 4189
  - ARTERIES
    - MORPHOLOGY, 3587*
  - CIRCULATION
    - MORPHOLOGY, 3587*
  - COLITIS, ULCERATIVE
    - DISEASES ASSOCIATED WITH, 4204
  - CROHN'S DISEASE
    - DISEASES ASSOCIATED WITH, 4204
  - CRYOSURGERY
    - REVIEW, 2391
  - CRYOTHERAPY, 493
  - DISEASES ASSOCIATED WITH, 4186
  - ETIOLOGY, 3286, 4187, 4191
    - AGE FACTORS, 4186
    - CONSTIPATION, 4188
    - GENETIC FACTORS, 4186, 4188
    - OCCUPATIONAL FACTORS, 4186
    - PREGNANCY, 4188
    - REVIEW, 4165
    - SEX FACTORS, 4186
  - INFLAMMATORY BOWEL DISEASES
    - DISEASES ASSOCIATED WITH, 4204
  - MORPHOLOGY, 4189, 4192
  - PREGNANCY
    - COMPLICATIONS, 4165
  - RECTUM
    - CIRCULATION, 3587*
  - SURGERY
    - RECURRENCE, 7026
    - SEQUELAE, 7026
    - TECHNIQUES, 1435
  - THERAPY
    - COMPLICATIONS, 4204
    - TECHNIQUES, 4951
  - THROMBOSIS
    - ETIOLOGY, 4190
    - ULTRASTRUCTURE, 4190

- HEMOSIDEROSIS
  - LIVER CIRRHOSIS
    - INFANT, 5042*

- HEMOSTASIS
  - ANUS, 4166
  - LIVER
    - SURGERY, 6423, 6427
    - TECHNIQUES, 6427
  - LIVER CIRRHOSIS, 3471*
  - LIVER DISEASES
    - PROTHROMBIN, 7110*
  - MORPHOLOGY
    - HORMONE EFFECTS ON, 2995
  - SOMATOSTATIN
    - MORPHOLOGY, 2995
  - TECHNIQUES
    - REVIEW, 6423

- HEPARIN
  - BILE DUCTS
    - CALCULI, 8425*
  - CHOLESTASIS, 3516
    - LIPOPROTEINS, 566
    - SIMULATION, 763
  - COMMON BILE DUCT CALCULI
    - DRUG THERAPY, 8425*
    - THERAPY, 8425*
  - LIVER DISEASES, ALCOHOLIC
    - FIBRINOLYSIS, 3462*

- HEPATECTOMY
  - ALBUMINS
    - AMINO ACIDS, 151
    - STEROIDS, 151
  - AMMONIA
    - DIET, 2026
    - METABOLISM, 2026
  - BILE ACIDS AND SALTS
    - CECUM, 7448*
    - GALLBLADDER, 7448*
    - INTESTINE, SMALL, 7448*
    - LIVER, 7448*
  - CIRCULATION
    - CLEARANCE STUDY, 7475
  - ELECTROPHYSIOLOGY
    - MEMBRANES, 2016
  - FATS
    - METABOLISM, 7462
  - HEPATOCYTES
    - KINETICS, 4733
    - SECRETION, 2886*
  - HUMORAL FACTORS
    - SYNTHESIS, 8036
  - HYPERTENSION, PORTAL, 6398*
  - KIDNEYS, 5410*
  - LIVER
    - ALPHA FETOPROTEIN, 3751*
    - CLEARANCE STUDY, 7475
    - COMA, 3792
    - HYPERPLASIA, 8035*
    - OXIDATIVE PHOSPHORYLATION, 1021*
    - REGENERATION, 1021*, 1975*, 2895, 3804, 8035*
    - TISSUE CULTURE, 1975*
  - NERVOUS SYSTEM
    - ACID-BASE BALANCE, 3036
    - ELECTROPHYSIOLOGY, 3036
  - NITROSAMINES
    - CARCINOGENS, 152
  - REGENERATION, 2157
    - CIRCULATION, 7462
    - FATS, 7462

- HEPATECTOMY (continued)
  - REGENERATION (continued)
    - MORPHOLOGY, 8080
    - RETICULOENDOTHELIAL SYSTEM, 2895
  - SIMULATION
    - TECHNIQUES, 2896
  - TECHNIQUES
    - REGENERATION, 3903

- HEPATIC VEIN THROMBOSIS
  - SEE ALSO BUDD-CHIARI SYNDROME
  - CALCIFICATION
    - CONTRACEPTIVES, ORAL, 5039*
  - CONTRACEPTIVES, ORAL, 5807*
  - DIAGNOSIS
    - ANGIOGRAPHY, 3109
  - HEPATOMEGALY
    - SCANNING, SCINTILLATION, 593
  - HYPERTENSION, PORTAL, 1502
  - INFARCTION
    - LIVER, 2475

- HEPATITIS
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    - GLUCAGON, 5927*
  - ALCOHOLS
    - OXIDATION, 5430*
  - ALPHA 1 ANTITRYPSIN, 3361*
  - ALPHA FETOPROTEIN, 3449, 4280
  - ANESTHETICS
    - DIAGNOSIS, 6447*
    - HYPERSENSITIVITY, 6447*
  - ANEURYSM
    - DISEASES ASSOCIATED WITH, 7138*
  - ANGIOGRAPHY
    - CHILD, 7086*
  - ANTIBODIES, 4781, 8351*
    - CARRIER STATE, 8359*
    - EPIDEMIOLOGY, 6484*, 7792
    - ETHNIC FACTORS, 7157*
  - ANTIGENS, 1520*, 1521*, 3437, 3438, 4303 8358*
    - CARRIER STATE, 7788*
    - DIAGNOSIS, 5871*
    - ETHNIC FACTORS, 7157*
    - RADIOIMMUNOASSAY, 5871*
    - RADIOIMMUNOLOGY, 5871*
  - AUSTRALIA ANTIGEN, 3437, 3438
    - CARRIER STATE, 6475*, 7788*
    - CELLS, 3439
    - HEPATITIS, INFECTIOUS, 659
    - IMMUNITY, 3441
    - IMMUNOLOGY, 6474*
    - LIVER, 6470*
    - PLASMAPHERESIS, 643*
    - SERUM, 3439, 6470*
  - AUTOIMMUNE DISEASES, 3461*
  - BACTERIAL INFECTIONS
    - VENEREAL DISEASES, 8054
  - BILE ACIDS AND SALTS
    - BILE, 7105*
    - DIAGNOSIS, 3380, 4751*
    - INFANT, 7105*
    - SERUM, 7105*
    - TECHNIQUES, 3380
  - BILIRUBIN
    - ETIOLOGY, 3425*
  - BIOPSY
    - ENZYMES, 5798*

EPATITIS (continued)
- CARDIOVASCULAR SYSTEM
  - CHILD, 6488
- CARRIER STATE
  - INTERFERON, 2516
  - THERAPY, 2516
- CELLS
  - ANTIGENS, 3439
- CHILD
  - EPIDEMIOLOGY, 6484*
- CHOLESTASIS
  - DIAGNOSIS, 8369
  - ETIOLOGY, 8369
- CHOLESTEROL
  - METABOLISM, 6478*
- CIRCULATION
  - CHILD, 6488
- CLEARANCE STUDY
  - SULFOBROMOPHTHALEIN, 3094
- COMPLEMENT
  - IMMUNOLOGY, 5867*
- DANE PARTICLES
  - ANTIGENS, 6471*
- DENTISTRY
  - EPIDEMIOLOGY, 7782*
- DIAGNOSIS
  - ANTIBODIES, 7789*
  - AUSTRALIA ANTIGEN, 7789*
  - CHILD, 6489
  - CLEARANCE STUDY, 3094
  - HYPERBILIRUBINEMIA, 6467*
  - LIPOPROTEINS, 6438
  - REVIEW, 2488*
- DISEASES ASSOCIATED WITH, 6467*
  - ANTIGENS, 1520*
  - DIAGNOSIS, 1520*
  - IMMUNOLOGY, 5098
  - PATHOLOGY, 1520*
  - ULTRASTRUCTURE, 5098
- DRUG DEPENDENCE
  - NARCOTICS, 7764
- DRUG-INDUCED
  - ANESTHETICS, 6447*
  - ANTIBIOTICS, 8340*
  - DRUG EFFECTS ON, 3929
  - GALACTOSAMINE, 3929, 7419*, 8028*
  - PREVENTION, 8028*
  - SURVIVAL, 3803
- DRUG THERAPY
  - IMMUNOSUPPRESSION, 5091
- ENZYMES, 3456
- EPIDEMIOLOGY, 1521*, 3456, 7781*
  - CHILD, 6489
  - REVIEW, 2484*, 2488*
- ETIOLOGY, 5859
  - REVIEW, 2484*
  - YERSINIA, 8203
- GALACTOSAMINE, 4280
  - LIPOPROTEINS, 1042, 4669
  - SIMULATION, 1042
- GLOBULINS
  - THERAPY, 2514
- GLYCOPROTEINS
  - SERUM, 7263
- GRANULOMA
  - EOSINOPHILS, 4459*
  - PARASITES AND PARASITIC DISEASES, 4459*
- HEMODIALYSIS, 5066*

HEPATITIS (continued)
- HEMOLYSIS
  - BILIRUBIN, 545*
  - ELECTROLYTES, 545*
  - MEMBRANES, 545*
- HEPATITIS
  - ANTIGENS, 1520*
- HEPATITIS, CHRONIC
  - LIVER FUNCTION TESTS, 679
- HEPATITIS, TOXIC
  - DRUG THERAPY, 8027*
- HORMONES, ADRENAL CORTEX
  - THERAPY, 1543*
- HYPERSENSITIVITY
  - ANTIHYPERTENSIVE AGENTS, 2481*
- IMMUNITY, 7146*
  - CHILD, 6487
- IMMUNOGLOBULINS, 8351*
  - PREVENTION, 2515
- IMMUNOLOGY, 3051*, 3438, 3448, 3461*, 5860*, 6474*
- INDOCYANINE GREEN
  - EXCRETION, 4246*
- INFANT
  - BILE ACIDS AND SALTS, 3368*
  - DIAGNOSIS, 3368*
- JAUNDICE
  - NEOPLASMS, 3425*
- KERNICTERUS
  - REYE'S SYNDROME, 5026*
- LIPIDS, 7093*
- LIVER
  - ANEURYSM, 7138*
  - DRUG METABOLISM, 7477
  - KERNICTERUS, 1564
  - LIPASE, 7173*
- LIVER CIRRHOSIS, 3466
  - ANTIGENS, 1520*
  - DISEASES ASSOCIATED WITH, 7818
  - ETIOLOGY, 8408
- LIVER DISEASES, ALCOHOLIC, 6516, 7176
  - ALCOHOLISM, 2532*
  - DIAGNOSIS, 7804*
  - ETIOLOGY, 7807*
  - HORMONES, ADRENAL CORTEX, 7808*
  - HYALIN SUBSTANCE, 3463*
  - IMMUNOGLOBULINS, 7804*
  - IMMUNOLOGY, 6511*
  - NECROSIS, 3463*
  - REVIEW, 7807*
  - SEQUELAE, 2532*
  - SURVIVAL, 2532*
- LIVER INJURY
  - DRUG-INDUCED, 1511
  - DRUG THERAPY, 8374
  - IMMUNOLOGY, 1517*
- LYMPHOCYTES
  - TOXICITY, 1517*, 2520
- MICROORGANISMS
  - ENTEROCOLITIS, 3033
  - NECROSIS, 3033
- NECROSIS
  - ALPHA FETOPROTEIN, 3372*
  - SURVIVAL, 3372*
- NEONATE, 6424
  - DISEASES ASSOCIATED WITH, 6486*
  - ETIOLOGY, 6460*
  - PROGNOSIS, 3413*, 6486*
  - SURVIVAL, 6486*
  - TRANSMISSION, 5857*

- HEPATITIS (continued)
  - NUCLEIC ACIDS
    - BINDING, 3942*
  - OCCUPATIONAL FACTORS, 7782*
    - DIAGNOSIS, 8348*
    - THERAPY, 8348*
  - PAIN
    - DIAGNOSIS, 1546
  - PATHOLOGY
    - REVIEW, 1514*, 7796
  - PERFUSION, 5066*
  - PEROXIDES, 7093*
  - PREGNANCY, 7153*
    - DIETARY FACTORS, 2493*
    - EPIDEMIOLOGY, 2493*
    - SURVIVAL, 2493*
  - PREVENTION, 6480*
    - GLOBULINS, 6479*, 7146*
    - IMMUNOGLOBULINS, 5086*
    - REVIEW, 2488*
  - PROGNOSIS, 2504
    - ANTIGENS, 3436
  - REVIEW, 2510, 7794
  - REYE'S SYNDROME
    - REVIEW, 5026*
  - SEQUELAE, 2504
  - SERODIAGNOSIS
    - RADIOIMMUNOASSAY, 6482*
  - SERUM
    - ANTIGENS, 3439
    - GLYCOPROTEINS, 7790*
  - STEROIDS
    - CHILD, 669
  - STEROLS
    - METABOLISM, 6478*
  - SULFOBROMOPHTHALEIN
    - EXCRETION, 4246*
  - SURVIVAL
    - AGE FACTORS, 6458*
    - TRANSPLANTATION, 3803
  - THERAPY
    - OXYGEN, 8075
    - REVIEW, 2488*
    - SURVIVAL, 6458*
  - TOXICITY
    - LIVER INJURY, 1517*
    - TECHNIQUES, 2520
  - TRANSFUSION, 3434*
    - AGE FACTORS, 2525*
    - AUSTRALIA ANTIGEN, 2525*
    - BIOPSY, 2525*
    - GLOBULINS, 2514
    - IMMUNOGLOBULINS, 5086*
    - JAUNDICE, 2525*
    - LIVER DISEASES, 2514
    - PREVENTION, 5086*
    - REVIEW, 5067*
    - SEX FACTORS, 2525*
  - TRANSMISSION, 7781*, 7783*
    - FAMILIAL FACTORS, 7149*
    - REVIEW, 2484*, 2488*
  - TRANSPLANTATION
    - KIDNEYS, 5176*
  - TRIGLYCERIDES
    - DEFICIENCY, 4669
    - LIPOPROTEINS, 4669
  - URINE
    - ENZYMES, 6464*

- HEPATITIS (continued)
  - VACCINES
    - REVIEW, 6480*
  - VIROLOGY
    - REVIEW, 7795, 7797
  - VIRUSES, 5098
    - AGE FACTORS, 7469
    - REVIEW, 6456*
    - SIMULATION, 1166, 7472
  - VITAMIN B6
    - METABOLISM, 2448*
  - VITAMIN D
    - METABOLISM, 3363*
  - WILSON'S DISEASE
    - DISEASES ASSOCIATED WITH, 7145*

- HEPATITIS, CHRONIC
  - ACIDS
    - THERAPY, 4253*
  - ADENOSINE TRIPHOSPHATE, 2529
  - ADOLESCENCE
    - IMMUNOGLOBULINS, 3457
    - PROGNOSIS, 3457
  - ALPHA 1 ANTITRYPSIN, 3361*
  - AMINO ACIDS
    - ENZYMES, 682
    - METABOLISM, 8327
  - AMYLASES
    - SALIVARY GLANDS, 5107
  - ANTIBODIES, 5881*, 5884
    - ALBUMINS, 7090*
    - AUTOIMMUNE DISEASES, 4252*
    - DIAGNOSIS, 7165*
    - ETIOLOGY, 3451*
    - PATHOLOGY, 6500*
  - ANTIGENS, 3438, 4303, 4311*, 4312
    - ANTIBODIES, 5865*
    - EPIDEMIOLOGY, 2496*
    - GENETIC FACTORS, 3451*
    - HEMODIALYSIS, 5868*
    - IMMUNITY, 4314
    - VIROLOGY, 5864*
  - AUSTRALIA ANTIGEN, 3438
    - ANALYSIS, 1519*
    - ANTIGENS, 5864*
    - BIOPSY, 1519*, 7152*
    - CELLS, 3439
    - CHILD, 6499*
    - DANE PARTICLES, 5864*
    - EPIDEMIOLOGY, 2496*
    - ETIOLOGY, 2524*
    - HEMODIALYSIS, 5868*
    - IMMUNITY, 3441, 5868*, 7151*
    - IMMUNOGLOBULINS, 4309*
    - IMMUNOLOGY, 685, 4310*
    - LIVER, 6470*
    - LIVER CIRRHOSIS, 6499*
    - PATHOLOGY, 6500*
    - PROGNOSIS, 6501*
    - SERUM, 3439, 6470*
    - VIROLOGY, 5864*
  - AUTOIMMUNE DISEASES
    - TOXICITY, 2528
  - BILIRUBIN
    - METABOLISM, 7801, 8385*
  - BIOCHEMISTRY, 7169
    - REVIEW, 7168
  - BIOPSY
    - ENZYMES, 5798*
    - MORPHOLOGY, 6495

EPATITIS, CHRONIC (continued)
- BLOOD
  - COMPLEMENT, 8382*
- CARRIER STATE
  - AUSTRALIA ANTIGEN, 2523*
  - LIVER, 2526
- CELLS
  - ANTIGENS, 3439
- CHEMICAL COMPOSITION
  - SERUM, 4331*
- CHILD
  - AMINO ACIDS, 8327
  - DIAGNOSIS, 5883
  - DRUG THERAPY, 5883
  - HEPATOCYTES, 7166*
  - IMMUNOGLOBULINS, 3457
  - IMMUNOLOGY, 5099*
  - PROGNOSIS, 3457
  - THERAPY, 1545
  - ULTRASTRUCTURE, 7166*
  - VITAMIN B12, 5890
- CHOLESTASIS
  - ANTIBODIES, 4317
  - DIAGNOSIS, 4317
- CHOLINESTERASES
  - DIAGNOSIS, 278
- CIRCULATION
  - IMMUNOLOGY, 5108
- CLASSIFICATION, 5891
- COLLAGEN
  - ENZYMES, 8296*
  - SYNTHESIS, 7742*
- COMPLICATIONS, 3387
  - CRYOGLOBULINEMIA, 6497*
  - HYPOXIA, 5892
- COPPER
  - HEPATOCYTES, 2539*
  - MORPHOLOGY, 1488
- DANE PARTICLES
  - ANTIGENS, 5864*
  - VIROLOGY, 5864*
- DIAGNOSIS, 7800, 8139
  - AMINO TRANSFERASES, 5889
  - ANTIBODIES, 7798*
  - BIOPSY, 6184, 6457*
  - CLEARANCE STUDY, 3961
  - ENZYMES, 4316, 5889
  - GLYCOPROTEINS, 6502
  - MORPHOLOGY, 6184, 6457*
  - REVIEW, 3455, 7168, 7170
  - UREA, 4316
  - VITAMIN B12, 5890
- DISEASES ASSOCIATED WITH
  - ANEMIA, HEMOLYTIC, 5886
  - CRYOGLOBULINEMIA, 6461*
  - HEMOPHILIA, 7167
- DRUG-INDUCED, 5069*
  - ANALGESICS AND ANTIPYRETICS, 6440*
  - SIMULATION, 6781*
- DRUG THERAPY, 4308*, 5105*
  - ALKALINE PHOSPHATASE, 8387
  - ANTI-INFLAMMATORY AGENTS, 2556
  - BLOOD, 8387
  - ENZYMES, 651
  - HORMONES, ADRENAL CORTEX, 8384*, 8385*
  - PROGNOSIS, 2524*, 8388
  - TOXICITY, 2556

HEPATITIS, CHRONIC (continued)
- ENVIRONMENTAL FACTORS
  - ETIOLOGY, 3451*
- ETIOLOGY
  - ALCOHOLISM, 5106*
  - IMMUNOLOGY, 6498*
  - REVIEW, 3455, 7168
- FIBRINOGEN
  - KINETICS, 7813*
- FIBROSIS
  - LIVER CIRRHOSIS, 8288*
- GENETIC FACTORS
  - ANTIGENS, 3453*
  - ETIOLOGY, 3451*
- GENETICS, 8381*
- GLUCONEOGENESIS
  - LIVER FUNCTION TESTS, 6466*
- GLUTAMYLTRANSPEPTIDASE, 271
- GLYCOPROTEINS, 6525*
- HEMODIALYSIS
  - GASTROINTESTINAL SYSTEM, 4266
- HEPATITIS
  - LIVER FUNCTION TESTS, 679
- HEPATITIS, INFECTIOUS
  - ANTIGENS, 7156*
  - AUSTRALIA ANTIGEN, 7156*
  - COMPLICATIONS, 8376
  - EVOLUTION, 2512
- HEPATOCYTES
  - IMMUNITY, 5882*
  - MORPHOLOGY, 1513*, 5882*
  - ULTRASTRUCTURE, 1513*, 2469
- HISTOCHEMISTRY, 5075*
- HUMORAL FACTORS
  - DIAGNOSIS, 7087*
- HYPERTENSION, PORTAL
  - CHILD, 5893
  - PRESSURE STUDY, 4300
- IMMUNOGLOBULINS, 6401*, 6498*
  - PATHOLOGY, 6500*
- IMMUNOLOGY, 2524*, 2527, 3438, 5085*, 5887, 7169, 8383*
  - DIAGNOSIS, 5880*
  - PROGNOSIS, 5880*
  - REVIEW, 4299*, 7168, 7799
- IMMUNOSUPPRESSION
  - THERAPY, 6494*
- IMMUNOTHERAPY, 5885
- INFANT
  - TRANSMISSION, 5858*
- INTERFERON
  - ANTIGENS, 2516
  - THERAPY, 2516
- JAUNDICE
  - DRUG-INDUCED, 6443*
- KIDNEYS
  - ANTIBODIES, 5103*
- LIPIDS
  - PEROXIDATION, 8058
- LIVER
  - ANTIBODIES, 5103*
  - BIOPSY, 2523*
  - LYMPHOCYTES, 681
  - MORPHOLOGY, 2526
  - NEOPLASMS, 4331*, 8288*
  - ULTRASTRUCTURE, 681
- LIVER CIRRHOSIS
  - CHILD, 6499*
  - IMMUNOGLOBULINS, 711

HEPATITIS, CHRONIC (continued)
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - ANTIBODIES, 5101*
  - COPPER, 1489
  - DISEASES ASSOCIATED WITH, 677*
  - LYMPHOCYTES, 1569
- LIVER COMA
  - SURVIVAL, 8319
- LIVER DISEASES
  - TRANSFUSION, 1544*
- LIVER FUNCTION TESTS, 6501*
  - SCANNING, SCINTILLATION, 4245*
- LIVER INJURY
  - HYALURONIDASE, 684
  - IMMUNOLOGY, 1517*
- LYMPHOCYTES, 1542*
  - ENZYMES, 2529
  - IMMUNOLOGY, 688, 6496*
  - MARKER STUDY, 4315
  - MORPHOLOGY, 5882*
  - PHYTOHEMAGGLUTININ, 4292
  - SERUM, 4292
  - TECHNIQUES, 2520
  - TOXICITY, 1517*, 2520
- MITOCHONDRIA
  - ANTIBODIES, 4332*, 4333*
- MORPHOLOGY, 6501*
- MUSCLES
  - ANTIBODIES, 4332*
- NUCLEIC ACIDS
  - BINDING, 3942*
- OXYGEN
  - THERAPY, 692
- PANCREAS
  - AMYLASES, 3370*
- PATHOLOGY, 5887, 5894, 6459*, 6462
  - ANTIBODIES, 5100*
  - REVIEW, 1514*, 3455
- PIGMENTATION, 2545*
- PLASMA
  - CHEMICAL COMPOSITION, 4331*
- PRECANCEROUS CONDITIONS
  - FIBROSIS, 8288*
- PREGNANCY, 7153*
- PREVENTION
  - GLOBULINS, 3434*
- PROGNOSIS
  - GENETIC FACTORS, 3453*
  - IMMUNOGLOBULINS, 3457
  - MORPHOLOGY, 8386*
  - SEX FACTORS, 8386*
  - VITAMIN B12, 5890
- PROTEINS
  - ENZYMES, 6469*
  - IMMUNITY, 1024
- REVIEW, 680
- SALIVARY GLANDS
  - AMYLASES, 3370*
- SALMONELLOSIS, 5884
- SCLERODERMA
  - DISEASES ASSOCIATED WITH, 3556
- SEROTONIN
  - METABOLISM, 705
- SERUM
  - AMYLASES, 3370*
  - ANTIBODIES, 3430*
  - ANTIGENS, 3430*, 3439
  - AUSTRALIA ANTIGEN, 3430*
  - GLYCOPROTEINS, 6468*

HEPATITIS, CHRONIC (continued)
- SERUM (continued)
  - IMMUNOGLOBULINS, 5888
  - VITAMIN B12, 5890
- SULFOBROMOPHTHALEIN
  - BINDING, 4659
- THALASSEMIA
  - CHILD, 1544*
  - LIVER DISEASES, 1544*
  - LIVER FUNCTION TESTS, 1544*
- THERAPY, 690
  - REVIEW, 3455, 7168, 7170
- THYROID GLAND, 6503
- TOXICITY
  - EPIDEMIOLOGY, 2556
  - LIVER INJURY, 1517*
- TRANSFUSION
  - AGE FACTORS, 2525*
  - AUSTRALIA ANTIGEN, 2525*
  - BIOPSY, 2525*
  - JAUNDICE, 2525*
  - SEX FACTORS, 2525*
- TRANSPLANTATION
  - KIDNEYS, 5176*
- VEINS
  - NECROSIS, 689
- VIRUSES
  - PARTICLES, 1539
- WILSON'S DISEASE
  - DISEASES ASSOCIATED WITH, 7769

HEPATITIS, CHRONIC INTERSTITIAL
- SEE LIVER CIRRHOSIS

HEPATITIS, INFECTIOUS
- ACRODERMATITIS
  - CHILD, 3442
  - IMMUNITY, 3442
- ADOLESCENCE
  - TRANSMISSION, 8366
- AGE FACTORS, 8375
- ALPHA 1 ANTITRYPSIN
  - DEFICIENCY, 8286*
- ALPHA FETOPROTEIN, 5096
  - DIAGNOSIS, 4293*
  - PLASMA, 5879*
  - RADIOIMMUNOASSAY, 7089*
- AMINO ACIDS
  - KERNICTERUS, 4295*
- AMINO TRANSFERASES
  - GLUCURONIDASE, 663
- ANEMIA, 5878
- ANTIBODIES, 8351*
  - CARRIER STATE, 5856*
  - EPIDEMIOLOGY, 5080*, 6484*
  - ETHNIC FACTORS, 7157*
  - GENETIC FACTORS, 5856*
  - PATHOLOGY, 1518*
- ANTIGENS, 3429*, 3433*, 3437, 4303, 8358*
  - ANTIBODIES, 6472*
  - BLOOD, 7150*
  - DIAGNOSIS, 7150*
  - EPIDEMIOLOGY, 2496*
  - ETHNIC FACTORS, 7157*
  - FAMILIAL FACTORS, 6493
  - GEOGRAPHICAL FACTORS, 6493
  - IMMUNOLOGY, 5104*
  - LIVER, 7150*

HEPATITIS, INFECTIOUS (continued)
- ANTIGENS (continued)
  - PROGNOSIS, 7150*
  - VIROLOGY, 5863*
- AUSTRALIA ANTIGEN, 1535, 1536, 2506, 3429*, 3437, 3446, 5081*
  - ANTIBODIES, 5083*
  - ANTIGENS, 5863*
  - BIOCHEMISTRY, 2513
  - BIOPSY, 7152*
  - BLOOD, 7150*
  - BLOOD GROUPS, 8352*
  - CARRIER STATE, 652
  - CELLS, 3439
  - CEREBROSPINAL FLUID, 662
  - CHILD, 4283*, 8380
  - DANE PARTICLES, 5863*
  - DIAGNOSIS, 7150*, 8378
  - DIALYSIS, 2513
  - DRUG THERAPY, 2487*
  - EPIDEMIOLOGY, 647, 657, 2017, 2496*, 3445, 6491, 7162, 7163, 8352*, 8364
  - HEPATOCYTES, 4289*
  - IMMUNITY, 3427*, 8354*
  - IMMUNOGLOBULINS, 4309*
  - IMMUNOLOGY, 644, 645, 665, 5084*, 5104*, 7164
  - INFANT, 2492*, 2495*
  - LIVER, 6470*, 7150*
  - NEONATE, 2492*, 2495*
  - PREGNANCY, 2492*, 4283*
  - PROGNOSIS, 8378, 8380
  - RADIOIMMUNOASSAY, 5083*
  - REVIEW, 2495*, 2503, 6490, 7164
  - SALIVA, 660
  - SERUM, 3439, 6470*
  - SEX FACTORS, 3419*
  - STATISTICAL STUDY, 6492
  - TRANSMISSION, 652, 2490*, 2492*, 5077*, 7164
  - ULTRASTRUCTURE, 4289*, 5083*
  - VACCINES, 1537
  - VIROLOGY, 5863*
- BILIRUBIN
  - DIALYSIS, 4305
  - METABOLISM, 5089*
- BIOCHEMISTRY
  - REVIEW, 8367
- BIOPSY
  - ANTIGENS, 7156*
  - AUSTRALIA ANTIGEN, 7156*
- BLEEDING
  - CLOTTING, 1528
- BLOOD
  - TRANSMISSION, 8361
- CARBOHYDRATES, 5877
  - ENZYMES, 2603
- CARDIOVASCULAR SYSTEM
  - CHILD, 6488
- CARRIER STATE, 5874*
  - EPIDEMIOLOGY, 8364
  - GENETIC FACTORS, 5856*
- CELLS
  - ANTIGENS, 3439
- CHILD
  - AMINO ACIDS, 4780, 8370
  - AUSTRALIA ANTIGEN, 4779, 7161
  - DIAGNOSIS, 4779, 4780

HEPATITIS, INFECTIOUS (continued)
- CHILD (continued)
  - DRUG THERAPY, 668
  - ENZYMES, 4780
  - EPIDEMIOLOGY, 2511, 4779, 6484*, 7161, 8352*
  - HORMONES, ADRENAL CORTEX, 668
  - LIVER FUNCTION TESTS, 8370
  - PREGNANCY, 4283*
  - PREVENTION, 2491*
  - PROGNOSIS, 4287*
  - PROTEINS, 8373
  - SEASONAL FACTORS, 8352*
  - TRANSMISSION, 8366
- CHOLESTASIS
  - DIAGNOSIS, 8369
  - ETIOLOGY, 8369
  - PREGNANCY, 3424*
- CHOLINESTERASES
  - ANTI-INFLAMMATORY AGENTS, 8371
  - DRUG EFFECTS ON, 8371
- CIRCULATION
  - CHILD, 6488
- CLASSIFICATION
  - REVIEW, 6490
- COLLAGEN
  - ENZYMES, 8296*
- COMPLEMENT
  - PROGNOSIS, 2517
- COMPLICATIONS
  - HEPATITIS, CHRONIC, 8376
  - HYPERBILIRUBINEMIA, 8376
  - LIVER CIRRHOSIS, 8376
  - SEQUELAE, 1523
- CYTOMEGALOVIRUSES
  - DIAGNOSIS, 5876*
- DANE PARTICLES
  - ANTIGENS, 5863*, 6471*
  - NUCLEIC ACIDS, 5480*, 5863*
  - PROTEINS, 5862*
  - VIROLOGY, 5863*
- DENTISTRY
  - EPIDEMIOLOGY, 4285*, 7782*
- DIAGNOSIS, 4306
  - AMINO TRANSFERASES, 6465*
  - ANTIBODIES, 3432*, 7789*
  - AUSTRALIA ANTIGEN, 4779, 7789*
  - BILIRUBIN, 6465*
  - BIOPSY, 6184
  - CHILD, 6489
  - ETIOLOGY, 1526
  - HYPERBILIRUBINEMIA, 6467*
  - MORPHOLOGY, 6184
  - PROTEINS, 8373
  - REVIEW, 3444
  - TECHNIQUES, 2210, 6465*
  - ZINC, 6465*
- DIET
  - THERAPY, 7148*
- DIETARY FACTORS
  - EPIDEMIOLOGY, 8352*
- DISEASES ASSOCIATED WITH, 6467*
  - BILIARY TRACT DISEASES, 8376
  - CIRCULATION, 5870*
  - DIABETES, 8376
  - FATTY LIVER, 8376
  - LIVER CIRRHOSIS, POSTNECROTIC, 3444
  - NEOPLASMS, MALIGNANT, 3444

HEPATITIS, INFECTIOUS (continued)
- DISEASES ASSOCIATED WITH (continued)
    - PANCREATITIS, 8376
    - REVIEW, 3444
    - ULCER, 8376
- DOWN'S SYNDROME
    - ANTIGENS, 2486*
    - EPIDEMIOLOGY, 2486*
- DRUG DEPENDENCE
    - ANTIBODIES, 2518
    - IMMUNOGLOBULINS, 2518
- DRUG EFFECTS ON, 5431
- DRUG METABOLISM, 5088*
- DRUG THERAPY, 2521, 5087*, 5851*
    - COENZYMES, 664
    - COMA, 670
    - ENZYMES, 651
    - HORMONES, ADRENAL CORTEX, 667
    - IMMUNOGLOBULINS, 7786*
    - IMMUNOSUPPRESSION, 5091
    - REVIEW, 5853*
    - SIMULATION, 1176
- ENZYMES
    - OCCUPATIONAL FACTORS, 7791*
    - PEROXIDATION, 6469*
    - PHYSICAL ACTIVITY, 7791*
    - SERUM, 6469*
- EPIDEMIOLOGY, 2502, 3418*, 3431, 5078, 5079*, 7781*
    - CHILD, 653, 6489
    - HEMODIALYSIS, 5872*
    - OCCUPATIONAL FACTORS, 3420*
    - REVIEW, 1524, 2485*, 7160, 8367
- ETIOLOGY, 4306
    - REVIEW, 2485*
- FATTY LIVER
    - BIOPSY, 4267
- FECES
    - TRANSMISSION, 5873*
    - VIRUSES, 5873*
- FRUCTOSE
    - THERAPY, 2522
- GALACTOSAMINE
    - IMMUNOSUPPRESSION, 1041
    - OROTIC ACID, 1041
    - PHENOBARBITAL, 1041
    - SIMULATION, 1041
- GEOGRAPHICAL FACTORS
    - REVIEW, 3444
- GLOBULINS, 8350*
    - REVIEW, 1515*
    - THERAPY, 1529
- GLUCONEOGENESIS
    - LIVER FUNCTION TESTS, 6466*
- HEMODIALYSIS
    - COMPLICATIONS, 3421*
    - DIAGNOSIS, 8365
    - EPIDEMIOLOGY, 6485*
    - OCCUPATIONAL FACTORS, 8363
    - TRANSMISSION, 6485*, 8353*
- HEPATITIS
    - AUSTRALIA ANTIGEN, 659
- HEPATITIS, CHRONIC
    - ANTIGENS, 7156*
    - AUSTRALIA ANTIGEN, 7156*
    - EVOLUTION, 2512
- HEPATITIS, SERUM
    - REVIEW, 1530

HEPATITIS, INFECTIOUS (continued)
- HEPATITIS, TOXIC
    - ULTRASTRUCTURE, 3821
- HEPATOCYTES
    - MORPHOLOGY, 1513*
    - ULTRASTRUCTURE, 1513*
- HERPESVIRUSES
    - REVIEW, 2499*
- HORMONES
    - DIET, 7148*
    - THERAPY, 7148*
- HYPERBILIRUBINEMIA, 4305
    - NEONATE, 8286*
    - TRANSMISSION, 8286*
- IMMUNITY, 4297*, 4298*, 7146*
    - AUSTRALIA ANTIGEN, 3440
    - CHILD, 6487
    - HEMODIALYSIS, 3440
    - PATHOLOGY, 1518*
    - REVIEW, 1515*
- IMMUNOGLOBULINS, 8350*, 8351*, 8372
    - ANTIGENS, 8355*
    - HEPATOCYTES, 8356*
    - PREVENTION, 7147*
    - REVIEW, 7147*
    - TRANSMISSION, 7786*
- IMMUNOLOGY, 3448, 5860*, 8354*
    - PROGNOSIS, 7158
    - REVIEW, 4299*, 8367
- IMMUNOTHERAPY
    - ANTIBODIES, 3428*
    - REVIEW, 5853*
- INFANT, 3422*, 5092
    - NUCLEOTIDASE, 4750*
- ISOENZYMES
    - DIAGNOSIS, 5076*
- JAUNDICE, OBSTRUCTIVE
    - LIPOPROTEINS, 8368
- LIPIDS
    - HYPERLIPOPROTEINEMIA, 5869*
- LIPOPROTEINS
    - IMMUNITY, 8354*
- LIVER
    - AUSTRALIA ANTIGEN, 625
    - CLOTTING, 1527
    - IMMUNOLOGY, 625
    - LIPASE, 7173*
    - MORPHOLOGY, 2104*
    - PRIMATES, 2104*
- LIVER DISEASES
    - ANTIGENS, 656
    - EPIDEMIOLOGY, 656
- LIVER FUNCTION TESTS
    - GLUCOSE, 4294*
    - RADIONUCLIDES, 1512*
- LIVER INJURY
    - COMPLICATIONS, 3416*
    - GLUCAGON, 2883*
    - HORMONE EFFECTS ON, 2883*
    - IMMUNOLOGY, 5085*
    - INSULIN, 2883*
- LYMPHOCYTES
    - PHYTOHEMAGGLUTININ, 4292
    - SERUM, 4292
- MORPHOLOGY, 2882*
    - REVIEW, 8367
- MUSCLES
    - ANTIBODIES, 2519
    - BIOCHEMISTRY, 2519

HEPATITIS, INFECTIOUS (continued)
- MUSCLES (continued)
  - IMMUNOGLOBULINS, 2519
- NECROSIS
  - ALPHA FETOPROTEIN, 3372*
  - DIAGNOSIS, 3435
  - ENZYMES, 3435
  - ISOENZYMES, 3435
  - SURVIVAL, 3372*
- NEONATE, 5092
  - NUCLEOTIDASE, 4750*
  - SEQUELAE, 4284*
  - TRANSMISSION, 5077*
- NERVOUS SYSTEM
  - DISEASES ASSOCIATED WITH, 4329*
- NUCLEIC ACIDS
  - ENZYMES, 273, 1538
  - METABOLISM, 3450
- OCCUPATIONAL FACTORS, 7782*
  - IMMUNOGLOBULINS, 2489*
  - PLASMA, 2489*
- PANCREAS FUNCTION TESTS
  - AMYLASES, 6463*
- PATHOLOGY, 2882*, 6459*
  - REVIEW, 7796
- PLASMA
  - KALLIKREIN, 5097
  - LIPIDS, 5869*
  - LIPOPROTEINS, 8368
- PREGNANCY
  - AUSTRALIA ANTIGEN, 3423*
  - SEQUELAE, 4284*
  - THERAPY, 3423*
  - TRANSMISSION, 4283*
- PRESSURE STUDY
  - HYPERTENSION, PORTAL, 4300
- PREVENTION, 6480*
  - GLOBULINS, 6479*, 7146*
  - REVIEW, 646, 8367
- PRIMATES
  - EPIDEMIOLOGY, 2485*
  - ETIOLOGY, 2485*
  - SIMULATION, 2104*
- PROGNOSIS, 8376
  - ANTIGENS, 3436
- PROTEINS
  - ENZYMES, 6469*
  - IMMUNITY, 1024
  - SYNTHESIS, 6721
- REVIEW, 7794
- RIBOSOMES, 6721
- SEQUELAE
  - COMPLICATIONS, 671
- SERODIAGNOSIS
  - ANTIBODIES, 6472*
  - ANTIGENS, 6472*
  - EPIDEMIOLOGY, 648
  - RADIOIMMUNOASSAY, 6482*
- SERUM
  - ANTIGENS, 3439
  - CHOLINESTERASES, 8371
  - GLYCOPROTEINS, 6468*
- SIMULATION, 6117, 7472
  - PRIMATES, 672
- SOCIOECONOMIC FACTORS
  - REVIEW, 3444
- SURVIVAL
  - AGE FACTORS, 6458*

HEPATITIS, INFECTIOUS (continued)
- THERAPY, 8377
  - REVIEW, 1525, 5853*
  - SURVIVAL, 6458*
  - VITAMIN B12, 5852*
  - VITAMINS, 5852*
- TRANSFUSION
  - AUSTRALIA ANTIGEN, 2498*
  - CARDIOVASCULAR SYSTEM, 611
  - IMMUNOTHERAPY, 1516*
  - SOCIOECONOMIC FACTORS, 1522*
  - SURGERY, 611
  - TRANSMISSION, 5854*, 8362
- TRANSMISSION, 3446, 5874*, 7781*, 7783*
  - ANTIGENS, 646
  - CHILD, 2491*
  - DENTISTRY, 5079*
  - DIAGNOSIS, 1208
  - ENVIRONMENTAL FACTORS, 2507
  - FAMILIAL FACTORS, 7149*
  - GASTROSCOPY, 4282*
  - HEMODIALYSIS, 4304, 5872*
  - IMMUNOGLOBULINS, 2489*
  - OCCUPATIONAL FACTORS, 2489*, 3420*
  - PLASMA, 2489*
  - PREGNANCY, 2491*
  - PREVENTION, 5854*
  - PRIMATES, 673, 2508
  - REVIEW, 646, 6490, 7160
  - RISK FACTORS, 2489*, 8361
  - SALIVA, 8360*
  - SEX FACTORS, 3419*, 7159, 8353*
  - UROGENITAL SYSTEM, 8360*
- TRANSPLANTATION
  - COMPLICATIONS, 3421*
- URIC ACID, 3450
- URINE
  - ENZYMES, 6464*
- VACCINES, 7160
  - REVIEW, 6480*
- VIROLOGY, 4672
  - DANE PARTICLES, 5480*, 5862*
  - REVIEW, 7795, 7797
- VIRUS DISEASES
  - IMMUNOLOGY, 2494*
- VIRUSES
  - ANTIGENS, 8349*
  - CELL CULTURE, 1540
  - EPIDEMIOLOGY, 6481*
  - FECES, 5090*
  - IMMUNOLOGY, 8349*
  - PARTICLES, 1539

HEPATITIS, NONVIRAL
- ALCOHOLISM
  - LIVER INJURY, 4319*
- CATHARTICS, 7140*
- CHENODEOXYCHOLIC ACID, 6116
- CHOLESTASIS
  - THERAPY, 639*
- DRUG-INDUCED, 5069*
  - PREVENTION, 2482*
- LIVER DISEASES, ALCOHOLIC
  - ALCOHOLISM, 4325*
  - BIOPSY, 4325*
- PATHOLOGY, 6459*

- HEPATITIS, SERUM
  - AUSTRALIA ANTIGEN
    - CHILD, 8380
    - PROGNOSIS, 8380
  - CATECHOLAMINES
    - CARDIOVASCULAR SYSTEM, 4301
    - METABOLISM, 4301
  - DENTISTRY
    - EPIDEMIOLOGY, 7782*
  - DIAGNOSIS
    - ANTIGENS, 5093
    - AUSTRALIA ANTIGEN, 5093
    - HYPERSENSITIVITY, 5093
  - DIETARY FACTORS
    - TRANSMISSION, 674
  - EPIDEMIOLOGY, 5875
  - HEPATITIS, INFECTIOUS
    - REVIEW, 1530
  - IMMUNITY
    - GLOBULINS, 5855*
  - LIVER DISEASES
    - HEMODIALYSIS, 666
  - OCCUPATIONAL FACTORS, 7782*
  - PLASMA
    - ANTIBODIES, 6483*
  - PREVENTION
    - REVIEW, 5855*
  - SERODIAGNOSIS
    - RADIOIMMUNOASSAY, 6482*
  - TRANSFUSION, 3434*

- HEPATITIS, TOXIC
  - AMINO ACIDS
    - KERNICTERUS, 4295*
  - ANALGESICS AND ANTIPYRETICS, 6441*
  - ANESTHETICS, 5070*, 7778
  - ASPIRIN
    - DRUG-INDUCED, 5068*
  - BIOCHEMISTRY, 3417
  - BIOPSY
    - ENZYMES, 5798*
  - CARBON TETRACHLORIDE, 4671
    - HEMATOPOIESIS, 7480
  - COLLAGEN
    - SYNTHESIS, 7742*
  - DRUG EFFECTS ON
    - CARBON TETRACHLORIDE, 3763*
  - DRUG-INDUCED, 5069*, 7780
    - AGE FACTORS, 8375
    - GALACTOSAMINE, 7431*
  - EPIDEMIOLOGY, 3414*
  - ETIOLOGY
    - ENZYMES, 4281
  - GALACTOSAMINE, 8341*
    - ALBUMINS, 7431*
    - FIBRINOGEN, 7431*
  - HEPATITIS
    - DRUG THERAPY, 8027*
  - HEPATITIS, INFECTIOUS
    - ULTRASTRUCTURE, 3821
  - HEPATOCYTES
    - MORPHOLOGY, 4671
  - HYPNOTIC AGENTS
    - DRUG METABOLISM, 2047
    - EXCRETION, 2047
  - LIPOPROTEINS, 4671
  - LIVER, 4281
    - MORPHOLOGY, 7419*
    - NECROSIS, 6786

- HEPATITIS, TOXIC (continued)
  - LIVER FUNCTION TESTS
    - DIAGNOSIS, 6439*
  - LYSOSOMES
    - DETERGENTS, 3764*
    - TRANQUILIZING AGENTS, 7468
  - METABOLISM, 3417
  - PATHOLOGY, 3414*
  - PESTICIDES
    - DIAGNOSIS, 6439*
    - OCCUPATIONAL FACTORS, 6439*
  - PROTEINS
    - SYNTHESIS, 6721
  - RIBOSOMES, 6721
  - THERAPY, 3417
    - OXYGEN, 8075
  - THYROID GLAND
    - IODINE, 700
  - TOXICOLOGY
    - ALKALOIDS, 642
    - PYRROLIZIDINES, 642
  - VIRUSES
    - NECROSIS, 6786
    - SIMULATION, 6786

- HEPATITIS, VIRAL
  - SEE HEPATITIS, INFECTIOUS

- HEPATOCYTES
  - ACIDS
    - FATTY ACIDS, 4648
  - ALBUMINS, 7291*
  - ALCOHOLISM
    - OXIDATION, 5398*
  - AMINO ACIDS
    - TRANSPORT, 6760*
  - ANALGESICS AND ANTIPYRETICS
    - DRUG METABOLISM, 2105*
  - ANTIGENS
    - ULTRASTRUCTURE, 4288*, 4290*
  - AUSTRALIA ANTIGEN
    - HEPATITIS, INFECTIOUS, 4289*
    - IMMUNOGLOBULINS, 626
    - ULTRASTRUCTURE, 4288*, 4289*, 4290*
  - BILE
    - OBSTRUCTION, 2677*
    - SYNTHESIS, 1004*
  - BILE ACIDS AND SALTS
    - METABOLISM, 1007*
    - TRANSPORT, 1007*, 7443*
  - CARBON TETRACHLORIDE
    - MORPHOLOGY, 8021*
  - CELL CULTURE, 5400*
    - DRUG METABOLISM, 4611*
    - METABOLISM, 6101
    - MORPHOLOGY, 6101
    - TECHNIQUES, 2867*, 7992*
  - CHOLELITHIASIS
    - MITOCHONDRIA, 3514
    - ULTRASTRUCTURE, 3514, 5928
  - CHOLERESIS
    - BILE ACIDS AND SALTS, 570
  - CHOLESTASIS, 4255*
    - ALKALINE PHOSPHATASE, 7403*
    - BIOCHEMISTRY, 2880*
    - ENZYMES, 7403*
    - MORPHOMETRY, 2677*, 2880*
    - PATHOLOGY, 2880*
    - ULTRASTRUCTURE, 2880*

HEPATOCYTES (continued)
- CHOLESTEROL
  - LIPOPROTEINS, 8013*
- CIRCULATION
  - ULTRASTRUCTURE, 3032
- CLEARANCE STUDY, 7455
- COENZYMES, 2867*
- CYTOCHROMES, 7415*
- DRUG METABOLISM
  - ALCOHOLS, 5398*
- ELECTROPHYSIOLOGY
  - PRIMATES, 5992
- ENZYMES
  - ALCOHOLS, 4624*
  - DRUG EFFECTS ON, 4624*
- FATTY ACIDS
  - METABOLISM, 7444*
- FATTY LIVER
  - ULTRASTRUCTURE, 6504*
- FERRITIN
  - METABOLISM, 6772*
- FIBRIN
  - DIGESTION, 4717*
- GLUCONEOGENESIS
  - ENZYMES, 3781
- GLYCOGEN, 8063
- HEMOCHROMATOSIS
  - FERRITIN, 5906*
  - IRON, 5906*
  - LIVER CIRRHOSIS, 5906*
- HEPATECTOMY
  - KINETICS, 4733
- HEPATITIS, CHRONIC
  - CHILD, 7166*
  - COPPER, 2539*
  - IMMUNITY, 5882*
  - MORPHOLOGY, 1513*, 5882*
  - ULTRASTRUCTURE, 1513*, 2469
- HEPATITIS, INFECTIOUS
  - IMMUNOGLOBULINS, 8356*
  - MORPHOLOGY, 1513*
  - ULTRASTRUCTURE, 1513*
- HEPATITIS, TOXIC
  - MORPHOLOGY, 4671
- HORMONE EFFECTS ON
  - THYROID GLAND, 8053
- HORMONES
  - BINDING, 6796
- HYPERBILIRUBINEMIA, HEREDITARY
  - TRANSPLANTATION, 1974*
- IRON
  - METABOLISM, 6772*
- ISOLATION, 7415*
- LIPIDS
  - CARBON TETRACHLORIDE, 8021*
  - METABOLISM, 7444*
- LIPOPROTEINS, 2867*
  - SYNTHESIS, 4654
  - SYPHILIS, 8056
  - ULTRASTRUCTURE, 4654
- LIVER, 119*
  - CELLS, 2678*
  - NEOPLASMS, 7101*
  - PRECANCEROUS CONDITIONS, 2149
  - REGENERATION, 6110
- LIVER CIRRHOSIS
  - COPPER, 2539*
  - FERRITIN, 5906*
  - IMMUNITY, 5882*

HEPATOCYTES (continued)
- LIVER CIRRHOSIS (continued)
  - IRON, 5906*
  - MORPHOLOGY, 2538*, 5882*
  - ULTRASTRUCTURE, 2469, 7181*
- LIVER DISEASES
  - ANTIGENS, 5861*
  - AUSTRALIA ANTIGEN, 5861*
  - IMMUNITY, 5882*
  - MORPHOLOGY, 5882*
- LIVER DISEASES, ALCOHOLIC
  - COPPER, 2539*
  - PEROXISOMES, 4248*
- LIVER INJURY
  - BIOCHEMISTRY, 4632*
  - CIRCADIAN RHYTHM, 4610*
  - HEMORRHAGE, 4632*
  - TRANSPLANTATION, 5434*
  - ULTRASTRUCTURE, 4632*
- MEMBRANES
  - ANTIGENS, 6846
  - AUSTRALIA ANTIGEN, 5094
  - BILE ACIDS AND SALTS, 7392*
  - ENZYMES, 4315
  - LIPIDS, 6846
  - ULTRASTRUCTURE, 5400*
- METABOLISM, 4774
- MITOCHONDRIA
  - AGE FACTORS, 7418*
  - CHOLELITHIASIS, 7836
  - DIETARY FACTORS, 6789
  - DRUG-INDUCED, 6122
  - MORPHOLOGY, 6789
  - OXIDATIVE PHOSPHORYLATION, 4637
- MORPHOLOGY
  - ANTICONVULSANTS, 3378
- NARCOTICS
  - ULTRASTRUCTURE, 3815
- NEONATE
  - CELL CULTURE, 3802
- NUCLEIC ACIDS, 8063
- PERFUSION
  - PRESSURE STUDY, 4606*
  - TECHNIQUES, 4606*
- PHENOBARBITAL, 7415*
- PLASMA
  - SYNTHESIS, 2879*
- PROTEINS, 8063
  - SYNTHESIS, 2879*, 3382, 8011*
- SCLERODERMA
  - ULTRASTRUCTURE, 7115*
- SECRETION
  - HEPATECTOMY, 2886*
- SIDEROSIS
  - IRON, 8389*
- SULFOBROMOPHTHALEIN
  - ABSORPTION, 1774*
  - AGE FACTORS, 1774*
  - VIABILITY, 1774*
- TOXICITY
  - ACIDS, 4629*
  - BILE ACIDS AND SALTS, 4641
  - ULTRASTRUCTURE, 4629*
- TRANQUILIZING AGENTS
  - METABOLISM, 6769*
- TRANSPLANTATION, 2888*
  - SURVIVAL, 5434*
- TRANSPORT
  - AMINO ACIDS, 6024

HEPATOCYTES (continued)
  TRANSPORT (continued)
    INDOCYANINE GREEN, 4246*
    SULFOBROMOPHTHALEIN, 7930
  ULTRASTRUCTURE
    TECHNIQUES, 7294
  VEINS
    OBSTRUCTION, 3032

HEPATOLENTICULAR DEGENERATION
  SEE WILSON'S DISEASE

HEPATOMEGALY
  ANOXIA
    CYTOLOGY, 123*
  DRUG-INDUCED
    HYPOLIPEMIC AGENTS, 7454
    PHENOBARBITAL, 5417*
  HEPATIC VEIN THROMBOSIS
    SCANNING, SCINTILLATION, 593
  LIVER CIRRHOSIS
    AMINO TRANSFERASES, 3467*
    ENZYMES, 3467*
    IMMUNOGLOBULINS, 3467*
  NUCLEIC ACIDS, 5417*
  REYE'S SYNDROME
    THERAPY, 2462*
  ULTRASONOGRAPHY, 6394*
  URINARY SYSTEM
    DISEASES ASSOCIATED WITH, 2461*

HERBICIDES
  LIVER
    SULFOBROMOPHTHALEIN, 1986

HERNIA
  ABDOMEN
    MORPHOLOGY, 4442
  ANEMIA
    DISEASES ASSOCIATED WITH, 1262*
  APPENDECTOMY
    COMPLICATIONS, 7685
  DIAPHRAGM
    DIAGNOSIS, 1279
    STOMACH, 1304
    SURGERY, 6215
    WOUNDS AND INJURIES, 2616
  DUODENUM
    DIAGNOSIS, 4118
    INTESTINAL OBSTRUCTION, 423
  ESOPHAGUS
    DIAGNOSIS, 6161
    ENDOSCOPY, 6161
    OBSTRUCTION, 1306
    RADIOLOGY, 6161
  GALLBLADDER
    PERITONEUM, 1615
  ILEOSTOMY
    COMPLICATIONS, 5691
    DIAGNOSIS, 5691
    INTESTINAL OBSTRUCTION, 5691
    SURVIVAL, 5691
  INTESTINAL OBSTRUCTION, 5678
  INTESTINE, SMALL
    MORPHOLOGY, 8194*
  IRON
    DEFICIENCY, 1262*
  LIVER
    SCANNING, SCINTILLATION, 1491

HERNIA (continued)
  NEONATE
    SIMULATION, 5725
  PANCREATITIS
    DIAGNOSIS, 7081
  PNEUMATOSIS
    STOMACH, 8163*
  RECTUM
    ANOMALY, 5725
  STOMACH
    OBSTRUCTION, 1306
    RADIOLOGY, 3184
  SURGERY
    RESPIRATORY SYSTEM, 6215
  UROGENITAL SYSTEM
    STOMACH, 5611

HERNIA, HIATUS
  SEE HIATAL HERNIA

HERPESVIRUSES
  DUODENUM
    ULCER, 2815
  ESOPHAGITIS
    MYCOSES, 305
  HEPATITIS, INFECTIOUS
    REVIEW, 2499*
  ULCER, PEPTIC
    ETIOLOGY, 2815

HETEROTOPIA
  DUODENUM
    INTUSSUSCEPTION, 1375
    STOMACH, 1375
  ILEUM
    STOMACH, 424
  INTESTINES
    CHILAIDITI'S SYNDROME, 2395
    RADIOLOGY, 2395
  LIVER
    TRANSPLANTATION, 592
  PANCREAS
    DIAGNOSIS, 5784
  PANCREATIC DUCT
    DIAGNOSIS, 5784
  PANCREATITIS
    GALLBLADDER, 2432*

HIATAL HERNIA
  ACID SECRETION
    SURGERY, 8146*
  COMPLICATIONS, 6220
  DISEASES ASSOCIATED WITH
    REFLUX, 4034
  ESOPHAGEAL REFLUX
    BARIUM, 5577
    EPIDEMIOLOGY, 5577
    SURGERY, 6863*
  ESOPHAGITIS
    COMPLICATIONS, 5574
    IATROGENESIS, 6206
    PROGNOSIS, 6867
    REVIEW, 6867
    SURGERY, 5574, 6867
    THERAPY, 6867
  ESOPHAGUS
    ANOMALY, 2233
    NEOPLASMS, 5573

IATAL HERNIA (continued)
- HEMORRHAGE
  - DIAGNOSIS, 5571
  - ESOPHAGITIS, 5571
  - ETIOLOGY, 5571
  - GASTRITIS, 5571
  - SURGERY, 5571
  - ULCER, PEPTIC, 5571
- MANOMETRY
  - SURGERY, 5581
- NERVOUS SYSTEM
  - REVIEW, 5227
- PRESSURE STUDY
  - MANOMETRY, 5569
- SERUM
  - GASTRIN, 3532
- STENOSIS
  - SURGERY, 5584
- STOMACH
  - ACID SECRETION, 8146*
  - ANOMALY, 2233
  - INTESTINAL OBSTRUCTION, 5562*
  - NEOPLASMS, 5573
  - SECRETION, 7559
  - ULCER, 3190
- SURGERY, 1269
  - COMPLICATIONS, 5574, 6207, 6866
  - TECHNIQUES, 6866
- VAGOTOMY
  - COMPLICATIONS, 293*

HIRSCHSPRUNG'S DISEASE
- SEE ALSO MEGACOLON
- APPENDIX
  - ENZYMES, 454*
  - NERVOUS SYSTEM, 454*
- BIOPSY
  - DIAGNOSIS, 3934*
- CHILD
  - DIAGNOSIS, 3309
  - HISTOCHEMISTRY, 3309
  - SURGERY, 3536
- CHOLINESTERASES
  - DIAGNOSIS, 240
- COLON
  - DYSPLASIA, 5721*
  - SURGERY, 5742
- CONSTIPATION
  - CHILD, 3536
- DIAGNOSIS, 7061
  - INFANT, 1427
  - MANOMETRY, 7698
  - REVIEW, 1428
- ELECTROPHYSIOLOGY
  - DIAGNOSIS, 3934*
- ENTEROCOLITIS, 7061
- ENZYMES
  - DIAGNOSIS, 240
- ETIOLOGY, 7061
- HISTOCHEMISTRY
  - DIAGNOSIS, 3074
- INTESTINAL OBSTRUCTION
  - NEONATE, 7007
  - REVIEW, 7007
- MORPHOLOGY
  - COLON, 4711*
- NEONATE
  - DIAGNOSIS, 494
  - REVIEW, 7007

HIRSCHSPRUNG'S DISEASE (continued)
- NEONATE (continued)
  - THERAPY, 494
- NERVOUS SYSTEM
  - DISEASE, 5721*
- PATHOLOGY, 7061
- RECTUM
  - BIOPSY, 1427
- REVIEW, 7670
- SIMULATION, 3023
  - COLON, 4711*
  - INTESTINE, SMALL, 4711*
- SURGERY
  - COMPLICATIONS, 1429
  - TECHNIQUES, 4156, 5729, 5742
- THERAPY, 7061

HISTAMINE
- ABSORPTION
  - DRUG EFFECTS ON, 6825
- ACID SECRETION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1908
  - DRUG EFFECTS ON, 2795*
  - DRUG-INDUCED, 972
  - GASTRIN, 1889
  - H2 RECEPTOR ANTAGONISTS, 7964*
  - PENTAGASTRIN, 973
  - PREGNANCY, 1906
  - STOMACH, 973, 1908
  - TRACER STUDY, 7964*
  - VAGOTOMY, 973
- BINDING
  - DRUG EFFECTS ON, 7289*
- DUODENUM
  - ULCER, 3194*, 4069*, 4855
- ESOPHAGUS
  - SPHINCTER, 1843
- H2 RECEPTOR ANTAGONISTS
  - ACID SECRETION, 2293
  - BINDING, 7289*
- HELMINTHIASIS
  - ACID SECRETION, 2649
- INTESTINE, SMALL
  - DRUG EFFECTS ON, 7289*
  - METABOLISM, 180
  - MUSCLES, 7494*
- LIVER CIRRHOSIS
  - PLASMA, 5130*
  - ULCER, 5130*
- METABOLISM
  - ILEUM, 2091
  - MUSCLES, 2091
- PANCREATITIS, CHRONIC
  - SERUM, 4241
- PEPSIN
  - DRUG EFFECTS ON, 2795*
- PROTEINS
  - ENZYMES, 94
- STOMACH, 4855
  - ACID SECRETION, 106, 1906, 2778, 4567*, 5361*, 5366*, 6056, 7964*
  - ADENOSINE TRIPHOSPHATASE, 108
  - ADENYL CYCLASE, 1883*, 2790*, 5359*
  - AGE FACTORS, 3704
  - ALCOHOLS, 78*
  - CARBONIC ANHYDRASE, 108
  - DRUG EFFECTS ON, 5360*

HISTAMINE (continued)
  STOMACH (continued)
    H2 RECEPTOR ANTAGONISTS, 1881*, 2790*
    ION TRANSPORT, 974
    METABOLISM, 3704, 3707
    PATHOLOGY, 975
    SECRETION, 95, 96, 1907, 3703, 6053, 6735, 7969*
    ULCER, PEPTIC, 3193*
    WOUNDS AND INJURIES, 6834*
  ULCER
    CALCIUM, 230
    DRUG THERAPY, 1921
    STOMACH, 5130*
    STRESS, 6736
  ULCER, PEPTIC, 3194*
    PROGNOSIS, 6912*
  VAGOTOMY, 3194*

HODGKIN'S DISEASE
  RADIOTHERAPY
    COMPLICATIONS, 6225*
  STOMACH, 6236, 6889

HORMONE CONTROL
  CARBOHYDRATES
    METABOLISM, 8019*
    REVIEW, 8019*
  HORMONES, GASTROINTESTINAL
    DIGESTION, 5187
  ILEUM
    ION TRANSPORT, 7313
  INTESTINE, SMALL
    GROWTH FACTORS, 7502
    ION TRANSPORT, 7313
    NEONATE, 7502
  INTESTINES
    SECRETION, 5453
  JEJUNUM
    ION TRANSPORT, 7313
    SUCRASE, 3831*
  LIPIDS
    REVIEW, 8019*
  LIVER
    CARBOHYDRATES, 8019*
    ENZYMES, 6715*
    GLYCOGEN, 8005*
    LIPIDS, 8019*
    OXYGEN, 7995*
  MILK
    METABOLISM, 6714*
  PANCREAS
    AMYLASES, 7985*
    DUODENUM, 2969
    SECRETION, 2969, 7985*
  PROTEINS
    SYNTHESIS, 6768*
  SECRETION
    AMYLASES, 7985*
    PROTEINS, 7376
  STOMACH
    ACID SECRETION, 7342*
    CIRCULATION, 7342*
    ELECTROPHYSIOLOGY, 1895

HORMONES
  ANTRUM
    MORPHOLOGY, 2274
    SURGERY, 2274

HORMONES (continued)
  BURNS, CHEMICAL
    THERAPY, 4724
  CHOLECYSTITIS
    ADRENAL GLANDS, 753
    HYPOTHALAMUS, 753
    PITUITARY GLAND, 753
  CHOLELITHIASIS, 761
  COLON
    ADENYL CYCLASE, 178
    TRANSPORT, 178
  DIARRHEA
    NEOPLASMS, 782
    REVIEW, 782
  DUODENUM
    ACID SECRETION, 7344*
    GROWTH FACTORS, 8085*
    MOTILITY, 922
  GALLBLADDER
    SECRETION, 6061
  GASTROINTESTINAL DISEASES
    REVIEW, 4399
  GASTROINTESTINAL SYSTEM
    FEEDING, 72
    MOTILITY, 819
    NEOPLASMS, MALIGNANT, 7861
    REVIEW, 4398, 4399
  HEPATITIS, INFECTIOUS
    DIET, 7148*
    THERAPY, 7148*
  HEPATOCYTES
    BINDING, 6796
  ILEUM
    ION TRANSPORT, 34
  INSECTICIDES
    METABOLISM, 1113
  INTESTINE, SMALL
    ATROPHY, 6061
    ELECTROPHYSIOLOGY, 206
    GROWTH FACTORS, 8085*
    MORPHOLOGY, 1087
    SURGERY, 1087, 3886, 3887
  INTESTINES
    CELLS, 5273
    CHROMATIN, 2088
    CIRCULATION, 2128
    FOOD, 6838
    SECRETION, 2128
  JAUNDICE
    TOXICITY, 8344
  KWASHIORKOR
    INFANT, 4146
    NUTRITION DISORDERS, 7245
  LIVER
    HYPERPLASIA, 8297*
    METABOLISM, 128, 5409*
    NEOPLASMS, MALIGNANT, 5051, 5409*
    OXYGEN, 2042
  LIVER CIRRHOSIS
    SERUM, 3478*
    THYROID GLAND, 3478*
  LIVER DISEASES, ALCOHOLIC
    LIVER CIRRHOSIS, 6509*
  LIVER INJURY
    ANDROGENS, 6451*
    DIURETICS, 2869*
    ETIOLOGY, 6451*
    NARCOTICS, 2869*

ORMONES (continued)

- MARASMUS, 4146
  - NUTRITION DISORDERS, 7245
- MOTILITY
  - BRADYKININ, 2758
- PANCREAS, 7983*
  - ADENYL CYCLASE, 118, 990
  - BINDING, 116, 1002
  - ENZYMES, 111
  - NEOPLASMS, MALIGNANT, 7861
  - REVIEW, 8125
  - SECRETION, 117, 6061
- PANCREATITIS
  - HYPOCALCEMIA, 4233
  - SECRETION, 289
- PELIOSIS HEPATIS
  - ETIOLOGY, 6451*
- PEPTIDES
  - SYNTHESIS, 1143
- STOMACH
  - ELECTROPHYSIOLOGY, 206
  - ENZYMES, 205
  - MORPHOLOGY, 1888
  - MOTILITY, 922
  - PEPTIDES, 1144
  - PYROGENS, 205
  - REVIEW, 1144
  - SECRETIN, 3672*
- THYROID GLAND
  - BILE, 2111
  - LACTASE, 5444*
  - PANCREAS, 2111
  - SALIVARY GLANDS, 2111
  - SUCRASE, 5444*

HORMONES, ADRENAL CORTEX

- ABSORPTION
  - CALCIUM, 1362
  - PHOSPHORUS, 1362
- ALBUMINS
  - SYNTHESIS, 76
- BILE
  - SODIUM, 1070
- BILIRUBIN
  - METABOLISM, 8385*
- CHOLERESIS
  - CYTOCHROMES, 1070
- COLITIS, ULCERATIVE, 7066
- COLON
  - CROHN'S DISEASE, 8517
  - ION TRANSPORT, 7922
- CROHN'S DISEASE
  - DRUG THERAPY, 8517
- DUODENUM
  - GROWTH FACTORS, 8085*
- GASTRECTOMY
  - DUMPING SYNDROME, 7592
- HEPATITIS
  - THERAPY, 1543*
- HEPATITIS, CHRONIC
  - DRUG THERAPY, 8384*, 8385*
- HEPATITIS, INFECTIOUS
  - CHILD, 668
  - DRUG THERAPY, 667
- ILEUM
  - ION TRANSPORT, 7313
- INTESTINE, LARGE
  - ION TRANSPORT, 7922

HORMONES, ADRENAL CORTEX (continued)

- INTESTINE, SMALL
  - GROWTH FACTORS, 8085*
  - ION TRANSPORT, 7313
- JEJUNUM
  - ION TRANSPORT, 7313
- LIVER
  - AGE FACTORS, 7416*
  - CARBOHYDRATES, 3784
  - DRUG METABOLISM, 2951
  - NEOPLASMS, 8291*
- LIVER CIRRHOSIS
  - PLASMA, 2554
  - SECRETION, 2553
  - SODIUM, 715
- LIVER DISEASES, ALCOHOLIC
  - DRUG THERAPY, 1549
  - HEPATITIS, 7808*
- NEOPLASMS
  - SECRETION, 8291*
- PANCREAS
  - PARASYMPATHOMIMETICS, 1943
  - PATHOLOGY, 6752
  - SECRETION, 6752
- PANCREATITIS
  - THERAPY, 4229
- RECTUM
  - CROHN'S DISEASE, 8517
- SALIVARY GLANDS
  - HORMONE EFFECTS ON, 6719
- SERUM
  - GASTRIN, 4581
- STOMACH
  - CARCINOID TUMOR, 2239
  - MITOSIS, 3008
- THERAPY
  - CHILD, 6622
  - COMPLICATIONS, 6622
- ULCER
  - DRUG-INDUCED, 5373
- ULCER, PEPTIC, 7592

HORMONES, GASTROINTESTINAL

- ACHLORHYDRIA
  - ANALYSIS, 2594*
  - ETIOLOGY, 2594*, 5197
  - SERUM, 2594*
- ACID SECRETION
  - H2 RECEPTOR ANTAGONISTS, 5378
- ANTRUM
  - ELECTROPHYSIOLOGY, 945
- CHEMICAL PROPERTIES, 6033
- CHILD
  - REVIEW, 6953
- CHROMATOGRAPHY
  - TECHNIQUES, 6032
- COLON
  - MOTILITY, 938
- DIARRHEA
  - ETIOLOGY, 5197
  - WATER, ELECTROLYTE BALANCE, 4427
- DIGESTION
  - HORMONE CONTROL, 5187
- DRUG EFFECTS ON
  - ATROPINE, 3738
- DUMPING SYNDROME
  - THERAPY, 4057
- DUODENECTOMY, 202

HORMONES, GASTROINTESTINAL (continued)
    DUODENUM, 1872*
        CIRCULATION, 4700*
        ELECTROPHYSIOLOGY, 945
        GLUCAGON, 953*
        INSULIN, 7956*
        SECRETIN, 953*
    ENDOCRINE SYSTEM
        INTESTINES, 6036
        STOMACH, 6036
    ESOPHAGUS
        MOTILITY, 927, 4524*
    GALLBLADDER
        CHOLECYSTOKININ, 3650
        GASTRIN, 3650
        GLUCAGON, 3650
        SECRETIN, 3650
        SERUM, 3650
    GASTRIN
        GLUCAGON, 806
    GASTROINTESTINAL DISEASES, 8497
        STOMACH, 6685
    GASTROINTESTINAL SYSTEM
        GROWTH SUBSTANCES, 4493
    HORMONE EFFECTS ON
        REVIEW, 5352
    ILEUM, 1872*
        ASSAY, 6820*
        DIGESTION, 6820*
    IMMUNOLOGY, 4545*
    INTESTINE, SMALL, 1872*
        SECRETION, 2961*
    INTESTINES
        ELECTRICAL CONTROL, 1826*
        MOTILITY, 1826*
    ISOLATION, 201
    JEJUNUM, 1872*
        ASSAY, 6820*
        CIRCULATION, 4700*
        DIGESTION, 6820*
        MOTILITY, 1826*
    KIDNEYS, 7885
    LIVER CIRRHOSIS
        PEPTIDES, 713
    MILK
        METABOLISM, 6714*
    MORPHOLOGY, 200, 203, 398
    MUSCLES
        CIRCULATION, 4700*
    NEONATE
        MILK, 6714*
    NERVOUS SYSTEM
        IMMUNOLOGY, 209
    ODDI'S SPHINCTER, 3649
    PANCREAS
        ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 996
        AMYLASES, 1936, 2849
        BICARBONATE SECRETION, 4593*, 5388*
        CELLS, 5272
        CHYMOTRYPSIN, 1936
        ENZYMES, 996, 997
        GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 996
        LIPASE, 1936
        PSEUDOCYSTS, 4217
        SECRETION, 1950, 2849, 5388*

HORMONES, GASTROINTESTINAL (continued)
    PANCREATIC DUCT
        CELLS, 1757
    PANCREATITIS, 4217
    PANCREOZYMIN, 2748
    PEPTIDES, 398
    POTASSIUM
        DEFICIENCY, 5197
    RADIOIMMUNOASSAY
        ILEUM, 5468*
        INTESTINES, 5468*
        JEJUNUM, 5468*
        TECHNIQUES, 6032
    REVIEW, 207, 2598, 3659, 5353, 6837, 7874
    SECRETIN, 2748
    SECRETION
        FATS, 5358*
    SPLEEN
        CIRCULATION, 4700*
    STOMACH
        DRUG EFFECTS ON, 3738
        FATS, 3696
        MOTILITY, 3648
        NERVOUS CONTROL, 1897
        SECRETION, 971, 3738, 5262*
    ULCER
        SECRETION, 4836*
    VAGOTOMY
        SECRETION, 3738

HYALIN SUBSTANCE
    LIVER CIRRHOSIS
        ULTRASTRUCTURE, 2541*
    LIVER DISEASES, ALCOHOLIC
        HEPATITIS, 3463*
        ULTRASTRUCTURE, 6512*, 6513*

HYALURONIDASE
    LIVER
        ION TRANSPORT, 2718

HYDROCARBONS
    LIPIDS
        BINDING, 1033
    LIVER
        NEOPLASMS, 7100*
    LIVER INJURY
        MORPHOLOGY, 6811
        OCCUPATIONAL FACTORS, 8342
    PROTEINS
        BINDING, 1033

HYDROCARBONS, AROMATIC
    LIVER
        METABOLISM, 3809

HYDROCARBONS, CHLORINATED
    LIVER INJURY
        METABOLISM, 2922
        OXIDOREDUCTASES, 2922
    PORPHYRINS
        ENZYMES, 6785
        URINE, 6785

HYDROCARBONS, HALOGENATED
    LIVER INJURY, 2923

YDROGEN
- ACID SECRETION
  - PERMEABILITY, 2818
- ALCOHOLS
  - METABOLISM, 7429*
- BREATH TEST
  - SMOKING, 8136
- ESOPHAGUS
  - ABSORPTION, 7301*
  - ALCOHOLS, 7301*
  - BILE ACIDS AND SALTS, 7301*
- MOTILITY
  - BREATH TEST, 4743*, 7326

YPERALIMENTATION
- BILIARY TRACT
  - SECRETION, 989, 2844
- INFLAMMATORY BOWEL DISEASES
  - REVIEW, 1734
- PANCREAS
  - SECRETION, 989, 2844
- SHORT BOWEL SYNDROME
  - REVIEW, 1734
- STOMACH
  - BLEEDING, 5502
- ULCER
  - STRESS, 1151

HYPERBILIRUBINEMIA
- ALPHA 1 ANTITRYPSIN
  - DEFICIENCY, 8286*
- ANEMIA, SICKLE CELL
  - COMPLICATIONS, 7133*
  - PROGNOSIS, 7133*
- ANTIBIOTICS
  - BINDING, 8320
- BILIRUBIN
  - ETIOLOGY, 3425*
  - GLUCURONIDES, 3425*
- CHOLANGIOGRAPHY
  - TECHNIQUES, 267
- CHOLESTASIS
  - DRUG METABOLISM, 5023*
- DIAGNOSIS
  - COMPLICATIONS, 6436
  - LIPOPROTEINS, 6438
- DRUG-INDUCED
  - BILIRUBIN, 5072*
  - DRUG EFFECTS ON, 3812
- GILBERT'S DISEASE
  - DIETARY FACTORS, 3412
- GLUCOSE PHOSPHATE DEHYDROGENASE
  - DEFICIENCY, 6467*
- HEPATITIS
  - DIAGNOSIS, 6467*
- HEPATITIS, INFECTIOUS, 4305
  - COMPLICATIONS, 8376
  - DIAGNOSIS, 6467*
  - TRANSMISSION, 8286*
- INDOCYANINE GREEN
  - NEONATE, 5061*
- INFANT
  - DIAGNOSIS, 4277*
  - ENZYMES, 7999*
  - PHOTOTHERAPY, 5062*
- JAUNDICE, OBSTRUCTIVE, 4305
- LIVER CIRRHOSIS
  - CIRCULATION, 3470*

HYPERBILIRUBINEMIA (continued)
- LIVER DISEASES
  - DRUG METABOLISM, 5023*
  - STEROIDS, 5844
- LIVER FUNCTION TESTS
  - SCANNING, SCINTILLATION, 4245*
- NEONATE, 6437
  - ALPHA 1 ANTITRYPSIN, 8286*
  - ALPHA FETOPROTEIN, 3408*
  - DIAGNOSIS, 3408*, 4277*
  - DRUG-INDUCED, 7772*
  - ETIOLOGY, 7772*
  - HEPATITIS, INFECTIOUS, 8286*
  - HYPERTENSION, PORTAL, 8286*
  - OXYTOCIN, 5842*
  - PHOTOTHERAPY, 3405*, 5062*, 8337*
  - PROSTAGLANDINS, 5842*
  - REVIEW, 7776
  - REYE'S SYNDROME, 8286*
  - THERAPY, 7776, 8286*
- PARENTERAL ALIMENTATION
  - INFANT, 3407*
- PHOTOTHERAPY, 5843*
  - IMMUNOGLOBULINS, 8337*
  - IMMUNOLOGY, 8337*
- PREGNANCY
  - DRUG-INDUCED, 8336*
- THERAPY
  - TRANSPLANTATION, 2888*

HYPERBILIRUBINEMIA, HEREDITARY
- SEE ALSO CRIGLER-NAJJAR SYNDROME
- HEPATOCYTES
  - TRANSPLANTATION, 1974*

HYPERCALCEMIA
- CHOLELITHIASIS
  - DISEASES ASSOCIATED WITH, 6564*
- PANCREAS
  - NEOPLASM METASTASIS, 5776
- SERUM
  - GASTRIN, 6591*

HYPERCHLORHYDRIA
- SEE ALSO ACID SECRETION, SECRETION
- ANTRUM
  - GASTRIN, 2257
- BURNS
  - ULCER, PEPTIC, 3142*
- DRUG-INDUCED, 2828
- DUODENUM
  - ULCER, PEPTIC, 7976
- ENTERECTOMY, 4573*
- GASTRITIS, ATROPHIC, 3143*
- STOMACH
  - CALCIUM, 3669*
  - DISTENTION, 3673*
  - ULCER, PEPTIC, 6926, 7976
- ULCER, PEPTIC
  - DRUG EFFECTS ON, 7976
  - ETIOLOGY, 3142*
- VAGOTOMY, 4573*

HYPERCHOLESTEREMIA
- LIVER CIRRHOSIS
  - CHOLESTASIS, 4336*
- PORTACAVAL SHUNT
  - CHOLESTEROL, 1653
  - LIPOPROTEINS, 1653

HYPERGLYCEMIA
    DUMPING SYNDROME
        MOTILITY, 2754
    PANCREAS
        BICARBONATE SECRETION, 7380
        ENZYMES, 7986*
        GLUCOSE, 2856
        SECRETION, 7380
    PANCREATIC DISEASES
        SIMULATION, 3121
    SECRETION
        PROTEINS, 7380
    STOMACH
        ACID SECRETION, 4572*

HYPERLIPEMIA
    INTESTINES
        SUCROSE, 2976
    MITOCHONDRIA
        ULTRASTRUCTURE, 8282*
    PANCREATITIS
        ETIOLOGY, 4596*
    SHUNT, INTESTINAL
        MORPHOMETRY, 5692
    THERAPY
        SHUNT, INTESTINAL, 8217

HYPERLIPOPROTEINEMIA
    CHOLELITHIASIS, 8428*
    HEPATITIS, INFECTIOUS
        LIPIDS, 5869*
    INTESTINES
        CARBOHYDRATES, 3857
    LIVER
        BIOPSY, 5034*
        ULTRASTRUCTURE, 5034*
    PANCREATITIS
        ETIOLOGY, 3355
        PATHOLOGY, 3355
    PANCREATITIS, CHRONIC
        DISEASES ASSOCIATED WITH, 3342*

HYPERPLASIA
    ANTACIDS
        THERAPY, 1914
        ULCER, PEPTIC, 1876*
    ANTRUM
        DIAGNOSIS, 2256
        GASTRIN, 2257
    DUODENUM
        CELIAC DISEASE, 6979*
        CELLS, 6979*
    ENTERECTOMY
        HUMORAL FACTORS, 4698
    FATS
        INTESTINE, SMALL, 2971
    GASTRIN
        CELLS, 2693
    GASTRITIS, ATROPHIC
        CELLS, 2693
    ILEUM
        SURGERY, 1749*
    INTESTINE, SMALL
        CELIAC DISEASE, 6979*
        CELLS, 6979*
        GASTRIN, 4685*
        HORMONE EFFECTS ON, 4685*
        SURGERY, 860, 1749*

HYPERPLASIA (continued)
    INTESTINES
        HYPOGAMMAGLOBULINEMIA, 6288*
    JEJUNUM
        GASTRIN, 4685*
        HORMONE EFFECTS ON, 4685*
    LIVER
        ABSCESS, 1249
        ANGIOGRAPHY, 1249
        BIOCHEMISTRY, 5411*
        CARCINOGENS, 2151
        CONTRACEPTIVES, ORAL, 8297*
        DIAGNOSIS, 2460*, 5033*
        DRUG-INDUCED, 171
        HEPATECTOMY, 8035*
        HISTOCHEMISTRY, 5411*
        HORMONES, 8297*
        PHENOBARBITAL, 171
        SHUNT, 8035*
        SURGERY, 5033*
    LYMPHATIC SYSTEM
        DIAGNOSIS, 1330
        NEOPLASMS, BENIGN, 1666
        STOMACH, 1330
    PANCREATECTOMY
        REGENERATION, 2839*
    PANCREATIC DUCT
        INTESTINE, SMALL, 2980
        SURGERY, 2980
    STOMACH
        ANTACIDS, 1914
        GASTRIN, 1236
        SURGERY, 860, 2693
        ULCER, PEPTIC, 4864
    ULCER, PEPTIC
        ANTRUM, 2256
        GASTRIN, 1876*
    ZOLLINGER-ELLISON SYNDROME
        DISEASES ASSOCIATED WITH, 5181

HYPERPROTEINEMIA
    LIVER CIRRHOSIS
        CHOLESTASIS, 4336*

HYPERSENSITIVITY
    ATROPHY
        VILLI, 4914
    CELIAC DISEASE
        DISEASES ASSOCIATED WITH, 2347*
        GLIADIN, 4902*
        RESPIRATORY SYSTEM, 449
    COLITIS
        ANTIHYPERTENSIVE AGENTS, 2481*
    COLITIS, ULCERATIVE
        DRUG THERAPY, 515
        THERAPY, 6356
    CROHN'S DISEASE
        BACTERIAL INFECTIONS, 4481
    ENTEROCOLITIS
        MILK, 2327
    GASTRITIS
        TECHNIQUES, 3172
    GASTROINTESTINAL DISEASES
        IMMUNOLOGY, 8231
    GASTROINTESTINAL SYSTEM
        REVIEW, 3528
    GLUTEN
        GENETIC FACTORS, 4144
        IMMUNOLOGY, 4144

- HYPERSENSITIVITY (continued)
  - HEPATITIS
    - ANESTHETICS, 6447*
    - ANTIHYPERTENSIVE AGENTS, 2481*
  - HEPATITIS, SERUM
    - DIAGNOSIS, 5093
  - INFLAMMATORY BOWEL DISEASES
    - IMMUNITY, 1732*
  - INTESTINE, SMALL, 8099*
  - INTESTINES
    - ANTIGENS, 3025
  - JAUNDICE
    - ANTIBIOTICS, 6446*
    - CONTRACEPTIVES, ORAL, 1496
    - DRUG-INDUCED, 6446*
    - ETIOLOGY, 6446*
  - LACTOSE INTOLERANCE
    - DIAGNOSIS, 6984
    - MILK, 6984
  - MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 2347*
    - IMMUNOGLOBULINS, 2347*
  - SCHISTOSOMIASIS
    - IMMUNOLOGY, 6645*
  - THERAPY
    - BILE, 6093

- HYPERTENSION
  - ALCOHOLISM, 5898*, 6417*
    - REVIEW, 7809
  - COLON
    - MOTILITY, 7327
    - MUSCLES, 7327
  - DRINKING, 5898*
  - GALLBLADDER
    - INFARCTION, 7192
  - LIVER FUNCTION TESTS, 6417*
  - LIVER INJURY, 5898*, 6417*
  - SCHISTOSOMIASIS
    - LIVER, 1709*
  - ULCER, PEPTIC
    - DRUG THERAPY, 6927

- HYPERTENSION, PORTAL
  - ANGIOGRAPHY
    - DIAGNOSIS, 721, 5129*
    - MESENTERY, 721
    - TECHNIQUES, 5129*
  - BILE DUCTS
    - OBSTRUCTION, 3905
  - BLOOD PLATELETS, 6400*
  - CHILD
    - DIAGNOSIS, 1250
    - SCANNING, SCINTILLATION, 7094*
  - CHOLIC ACID
    - RADIOIMMUNOASSAY, 4341
    - TOLERANCE TEST, 4341
  - DRUG-INDUCED
    - ALKALOIDS, 6450*
  - EDEMA
    - LIVER CIRRHOSIS, 1556*
  - ESOPHAGUS
    - HEMORRHAGE, 6200*
    - MORPHOMETRY, 7901*
    - SURGERY, 4608*
    - VARICES, 4608*, 6200*
  - ETIOLOGY, 7112*
  - FAMILIAL FACTORS
    - HEMORRHAGE, 6533*

- HYPERTENSION, PORTAL (continued)
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 1213
  - HEME
    - METABOLISM, 8400*
  - HEMORRHAGE
    - ESOPHAGUS, 6533*
  - HEPATECTOMY, 6398*
  - HEPATIC VEIN THROMBOSIS, 1502
  - HEPATITIS, CHRONIC
    - CHILD, 5893
    - PRESSURE STUDY, 4300
  - HEPATITIS, INFECTIOUS
    - PRESSURE STUDY, 4300
  - HYPERBILIRUBINEMIA
    - NEONATE, 8286*
  - JAUNDICE, OBSTRUCTIVE, 8436
  - LIVER
    - FIBROSIS, 4257*, 6414*
    - MORPHOLOGY, 6453*, 7112*
    - NEOPLASMS, MALIGNANT, 2564
    - PATHOLOGY, 7112*
    - SURGERY, 6398*
    - ULTRASTRUCTURE, 6453*
  - LIVER CIRRHOSIS, 5136
    - ANGIOGRAPHY, 5129*
    - BLOOD PLATELETS, 718
    - CIRCULATION, 5118*, 8402*
    - DIAGNOSIS, 8392
    - HEME, 8400*
    - PORTACAVAL SHUNT, 4340*
  - LIVER COMA, 4349, 4352
  - LIVER DISEASES, ALCOHOLIC
    - DIAGNOSIS, 8392
    - SIMULATION, 3806
  - LIVER FUNCTION TESTS
    - AMMONIA, 4343
  - LIVER INJURY
    - CARCINOGENS, 6453*
  - PANCREATITIS, CHRONIC
    - HEMORRHAGE, 7079*
  - PREGNANCY
    - COMPLICATIONS, 8403*
    - REVIEW, 5908*
  - PRESSURE STUDY, 6200*
  - SCHISTOSOMIASIS
    - LYMPHATIC SYSTEM, 841
  - SHUNT
    - AGE FACTORS, 2565
    - CHILD, 2565
    - HEME, 8400*
  - SPLEEN
    - ARTERIES, 6534*
  - SPLENECTOMY
    - HEME, 8400*
  - SURGERY, 4352, 6414*
    - LIVER CIRRHOSIS, 6535*
    - SPLEEN, 6534*, 6535*
    - THERAPY, 6534*, 6535*
  - VARICES
    - BLEEDING, 4352
    - HEMORRHAGE, 6200*
  - VEINS
    - EMBOLIZATION, 8402*
    - HYPOPLASIA, 7464
    - MOTILITY, 2885*
    - MUSCLES, 2885*

- HYPERTHERMIA
  - YERSINIA, 8476

- HYPERTROPHY
  - CARCINOGENS
    - PANCREAS, 3037
  - CECUM
    - ION TRANSPORT, 1796
  - DUODENUM
    - BRUNNER'S GLANDS, 8212
  - ESOPHAGUS
    - MORPHOLOGY, 2234
    - RUPTURE, 8148*
  - INTESTINAL OBSTRUCTION
    - PYLORUS, 4109*
  - INTESTINE, SMALL
    - COLLAGEN, 7488*
    - SECRETION, 7290*
    - SHUNT, INTESTINAL, 3888
  - INTESTINES
    - ANTRUM, 197
    - SURGERY, 197
  - ION TRANSPORT
    - ABSORPTION, 1796
  - LIVER
    - ANOMALY, 1492
    - CHILD, 1492, 5017*
    - DIAGNOSIS, 5017*
    - DRUG-INDUCED, 171
    - NEOPLASMS, 6406*
    - NEOPLASMS, BENIGN, 7770
    - NEOPLASMS, MALIGNANT, 7770
    - PHENOBARBITAL, 171
    - PRESSURE STUDY, 1709*
  - PANCREATECTOMY
    - REGENERATION, 2839*
  - PANCREATIC DUCT
    - INTESTINE, SMALL, 2980
    - SURGERY, 2980
  - PYLORUS
    - STENOSIS, 4741*, 5619
  - STOMACH
    - MORPHOLOGY, 2234
  - ULCER
    - STOMACH, 6247

- HYPNOTIC AGENTS
  - CHOLESTASIS
    - DRUG METABOLISM, 2047, 5025*
    - EXCRETION, 2047
  - HEPATITIS, TOXIC
    - DRUG METABOLISM, 2047
    - EXCRETION, 2047
  - INTESTINE, SMALL
    - DRUG METABOLISM, 6396*
    - METABOLISM, 6396*
  - LIVER
    - DRUG METABOLISM, 2047
    - EXCRETION, 2047
    - MICROSOMES, 2047

- HYPOCALCEMIA
  - ETIOLOGY
    - THYROCALCITONIN, 7076*
  - PANCREATITIS
    - ALBUMINS, 5789*
    - COMPLICATIONS, 7076*
    - ETIOLOGY, 4233
    - GLUCAGON, 4233

- HYPOCALCEMIA (continued)
  - PANCREATITIS (continued)
    - HORMONES, 4233

- HYPOCHLORHYDRIA
  - SEE ALSO ACID SECRETION. SECRETION
  - NEONATE, 4553*

- HYPOCHOLESTEREMIA
  - LIVER
    - ENZYMES, 5437

- HYPOCHOLESTEREMIC AGENTS
  - LIVER
    - DRUG METABOLISM, 1170
    - TRANSPORT, 1170
  - NEOPLASMS
    - LIVER, 159
    - MICROBODIES, 159
  - STOMACH
    - SECRETION, 1316
  - ULCER
    - STRESS, 1316

- HYPOGLYCEMIA
  - DIETARY FACTORS, 3397
  - ESOPHAGUS
    - REFLUX, 4550*
  - GASTRECTOMY
    - COMPLICATIONS, 5598*
    - PREVENTION, 5598*
  - GLYCOGENESIS, 3396, 3397
  - INFANT
    - NEOPLASMS, 3335
  - INSULIN
    - ACID SECRETION, 1340*
    - GASTRIN, 1340*
  - IRON, 6448*
  - MOTILIN, 4858
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 6379*
    - SOMATOSTATIN, 6378*
  - PYLOROPLASTY
    - COMPLICATIONS, 5598*
  - STOMACH
    - ULCER, 4862
  - VAGOTOMY
    - COMPLICATIONS, 5598*
    - ELECTROPHYSIOLOGY, 3658
    - GASTRIN, 6285

- HYPOGLYCEMIC AGENTS
  - CHOLESTASIS
    - DRUG-INDUCED, 6444*
  - COMPLICATIONS
    - CHOLESTASIS, 6444*
  - ILEUM
    - ABSORPTION, 1787
  - INTESTINE, SMALL
    - ABSORPTION, 1787
  - JEJUNUM
    - ABSORPTION, 1787
  - TRANSPORT
    - GALACTOSE, 27
    - GLUCOSE, 27

- HYPOLIPEMIA
  - LIVER
    - PEROXISOMES, 7454

- HYPOLIPEMIC AGENTS
  - BILIRUBIN
    - GLUCURONYLTRANSFERASE, 3811
    - PROTEINS, 3811
  - CARBOHYDRATES
    - LIVER, 1039
  - CATALASE
    - SYNTHESIS, 8018*
  - FATTY ACIDS
    - LIVER, 1039
  - FATTY LIVER
    - ACIDS, 6809
  - HEPATOMEGALY
    - DRUG-INDUCED, 7454
  - LIVER
    - DRUG EFFECTS ON, 7454, 8018*
    - PEROXISOMES, 7454

- HYPOPLASIA
  - BILE DUCTS
    - ANOMALY, 581
    - CHILD, 4259*
    - COMPLICATIONS, 4259*
    - ENDOCRINE DISEASES, 4259*
    - GROWTH FACTORS, 4259*
    - INFANT, 3112
  - GALLBLADDER, 8438
  - INTESTINE, SMALL
    - LYMPHANGIECTASIS, 6946
    - PANCREAS, 2851
  - LIVER
    - VEINS, 7464
  - PANCREAS, 4218
    - ENTEROKINASE, 5700*
  - VEINS
    - HYPERTENSION, PORTAL, 7464

- HYPOPROTEINEMIA
  - CHILD
    - PROTEIN-LOSING ENTEROPATHIES, 3257*
  - LEAKAGE
    - PLASMA, 2531*
  - LIVER CIRRHOSIS
    - PLASMA, 2531*
  - LIVER DISEASES, ALCOHOLIC
    - PLASMA, 2531*
  - PROTEIN-LOSING ENTEROPATHIES
    - VILLI, 3257*

- HYPOTENSION
  - GASTROINTESTINAL SYSTEM
    - HORMONE EFFECTS ON, 1836
  - INTESTINE, SMALL
    - NERVOUS SYSTEM, 6832*
    - SHOCK, 6832*
  - LIVER
    - AMINO TRANSFERASES, 612
  - LIVER COMA
    - ETIOLOGY, 5027*
  - LIVER INJURY
    - ETIOLOGY, 5027*

- HYPOTHALAMUS
  - ACID SECRETION
    - LESIONS, 1896
  - CHOLECYSTITIS
    - HORMONES, 753

- HYPOTHALAMUS (continued)
  - PATHOLOGY
    - STOMACH, 2822
  - STOMACH
    - ACID SECRETION, 106, 1896, 2781*

- HYPOTHERMIA
  - DUODENUM
    - TRANSPLANTATION, 1130
  - INTESTINES
    - TRANSPLANTATION, 2122
  - LIVER
    - GLYCOGEN, 7457
    - LIVER FUNCTION TESTS, 6103
    - MORPHOLOGY, 6103
    - PERFUSION, 6103
    - STRESS, 7457
    - ULTRASTRUCTURE, 7457
  - LIVER COMA
    - TRANSFUSION, 8322
  - PANCREAS
    - TRANSPLANTATION, 1130

- HYPOXIA
  - DUODENUM
    - CIRCULATION, 1141
  - GASTROINTESTINAL SYSTEM
    - MORPHOLOGY, 5464*
  - HEPATITIS, CHRONIC
    - COMPLICATIONS, 5892
  - INTESTINE, SMALL
    - SHOCK, 3877
  - INTESTINES
    - VASODILATOR AGENTS, 2125
  - LIVER
    - HEMATOLOGY, 2019
    - METABOLISM, 2019
    - OXYGEN, 3750*
  - LIVER CIRRHOSIS
    - COMPLICATIONS, 5892
  - LIVER DISEASES
    - COMPLICATIONS, 5892
    - SHUNT, 2474
  - STOMACH
    - CIRCULATION, 1141
    - MOTILITY, 2771

- ICTERUS
  - SEE JAUNDICE

- ILEAL DISEASES
  - CHOLIC ACID
    - EXCRETION, 2311*
    - TRACER STUDY, 2311*
  - DUODENUM
    - BILE ACIDS AND SALTS, 2311*
  - FATS
    - DIET, 2311*
  - OXALATES
    - CALCULI, 8227*

- ILEITIS
  - DRUG THERAPY, 5989
  - INTESTINAL OBSTRUCTION
    - JEJUNUM, 5666
  - ISCHEMIA, 8209
  - MALABSORPTION SYNDROMES
    - JEJUNUM, 6940*, 6941*

ILEITIS (continued)
    REVIEW, 8208
    YERSINIA, 5665
        DIAGNOSIS, 2342

ILEOCOLITIS
    COMPLICATIONS, 4469*

ILEOSTOMY
    ANTIDIARRHEALS, 5709*
    BACTERIA, 2323
    BILE ACIDS AND SALTS
        METABOLISM, 2323, 4877*
    BLEEDING
        LIVER CIRRHOSIS, 1565
        VARICES, 1565
    CHILD
        ION TRANSPORT, 3224
    COMPLICATIONS, 2322, 4892
        HERNIA, 5691
    FECES
        ANTIDIARRHEALS, 4097*
    HERNIA
        DIAGNOSIS, 5691
        INTESTINAL OBSTRUCTION, 5691
        SURVIVAL, 5691
    ION TRANSPORT
        SODIUM, 3224
    MALABSORPTION SYNDROMES
        PATHOLOGY, 3262
        THERAPY, 3262
    TECHNIQUES
        COMPLICATIONS, 1356

ILEUM
    SEE ALSO DUODENUM, INTESTINE- SMALL,
      JEJUNUM
    ABSORPTION
        AMINO ACIDS, 5305
        BILE ACIDS AND SALTS, 849, 3606*,
          5425*
        CALCIUM, 6014
        CROHN'S DISEASE, 849
        ELECTROLYTES, 4499*
        FATTY ACIDS, 3602*
        HYPOGLYCEMIC AGENTS, 1787
        PEPTIDES, 1778*, 5305
        VITAMIN K, 7314
        WATER, 4499*, 7305*
    ACIDS
        MARKER STUDY, 1750*
        ULTRASTRUCTURE, 1750*
    ADENOSINE TRIPHOSPHATASE
        HYDROLYSIS, 2076
    ALBUMINS
        VILLI, 1773*
    AMINO ACIDS
        ABSORPTION, 1778*
    AMMONIA
        METABOLISM, 3842
    ANOMALY
        UROGENITAL SYSTEM, 6970
    BACTERIA, 8464
    BACTERIAL INFECTIONS
        YERSINIA, 5665
    BARIUM
        ENEMA, 6851*
    BEZOARS
        DIAGNOSIS, 347

ILEUM (continued)
    BILE
        ABSORPTION, 412
    BILE ACIDS AND SALTS
        LACTOSE, 3606*
        PHENOBARBITAL, 2721
        TRANSPORT, 2720, 2721
    BREATH TEST
        DIARRHEA, 5648*
        RADIOTHERAPY, 5648*
    CALCIUM
        ABSORPTION, 2702*
        TRANSPORT, 2722, 5288*
    CECUM
        BARIUM, 7054
        NEOPLASMS, 6294
        PROLAPSE, 5667
        TUBERCULOSIS, 434
    CELLS
        NEONATE, 5471*
    CHLORIDES
        ABSORPTION, 412
    CHOLERA
        IMMUNITY, 223
        MOTILITY, 2657
        TOXINS, 2657
        TRANSPORT, 1086*
    CIRCULATION
        OXYGEN, 2126
        RADIOLOGY, 3586*
    COLECTOMY
        TRANSPLANTATION, 2755
    COLONOSCOPY
        CECUM, 5527
    CONTRAST MEDIA
        TECHNIQUES, 6851*
    CROHN'S DISEASE
        DRUG THERAPY, 7276*
        FISTULA, 8509*
        IMMUNOGLOBULINS, 1730*
        WATER, ELECTROLYTE BALANCE, 3577*
    DISEASE, 3240
    DYSTROPHY, 212
    ELECTROPHYSIOLOGY
        GLUCOSE, 2694*
        RADIOLOGY, 2729*
        TECHNIQUES, 2757
    ENDOMETRIOSIS
        THERAPY, 7617
    ENDOSCOPY
        COMPLICATIONS, 1373
        PERFORATION, 1373
        PNEUMATOSIS, 1373
    ENTERECTOMY
        AUTORADIOGRAPHY, 4709*
        CELLS, 4709*
        OXALATES, 5703*
    ENTERITIS, REGIONAL
        WATER, ELECTROLYTE BALANCE, 3577*
    ENZYMES
        BILE, 4688
    EPITHELIUM
        ACIDS, 1750*
    ESOPHAGUS, ARTIFICIAL, 8160
    FEEDING
        MITOSIS, 2986*
    FERRITIN
        TRANSPORT, 7917*

ILEUM (continued)
  FISTULA
    CROHN'S DISEASE, 7898
    SIGMOID, 7898
    SURGERY, 8211
    THERAPY, 8211
  GALLBLADDER
    MORPHOLOGY, 2851
  GLYCOPROTEINS
    METABOLISM, 1100
  GLYCOSIDES
    CALCIUM, 5315*
  GRANULOMA
    DIAGNOSIS, 6585*
  GROWTH SUBSTANCES
    BILE, 5443*
    ENTERECTOMY, 5443*
    PANCREAS, 5443*
  GUANYL CYCLASE
    ALCOHOLS, 7338*
  HEMANGIOMA
    RUPTURE, 430
  HEMORRHAGE
    DYSPLASIA, 7657*
  HETEROTOPIA
    STOMACH, 424
  HISTAMINE
    METABOLISM, 2091
  HORMONES, GASTROINTESTINAL, 1872*
    ASSAY, 6820*
    DIGESTION, 6820*
    RADIOIMMUNOASSAY, 5468*
  IMMUNOGLOBULINS
    CHILD, 2345*
    CROHN'S DISEASE, 851
    INFLAMMATION, 1730*
    TRANSPORT, 7917*
  INTESTINAL ABSORPTION, 6134
  INTRINSIC FACTOR, 7495*
    ANALYSIS, 2062*
    CHEMICAL COMPOSITION, 2062*
    SOLUBILITY, 2062*
    TECHNIQUES, 1125
  INTUSSUSCEPTION
    ANGIOGRAPHY, 3218*
  ION TRANSPORT
    ALCOHOLS, 4498*
    BACTERIA, 34
    BILE ACIDS AND SALTS, 4499*
    CATECHOLAMINES, 34
    CHLORIDES, 5284*
    CHOLERA, 6012
    DRUG EFFECTS ON, 4498*
    ELECTROPHYSIOLOGY, 4504*, 7925
    HORMONE CONTROL, 7313
    HORMONES, 34
    HORMONES, ADRENAL CORTEX, 7313
    NERVOUS CONTROL, 7925
    PROSTAGLANDINS, 34
    SODIUM, 5284*
    THYROCALCITONIN, 5298
    TOXINS, 34, 6012
  ISCHEMIA
    GLUCOSE, 3866*
    OXYGEN, 3866*
  JEJUNUM
    ULCER, 5657*
  LACTOSE
    INTESTINAL ABSORPTION, 6005*

ILEUM (continued)
  LYMPH
    SECRETION, 7498*
  METABOLISM
    BILE ACIDS AND SALTS, 5425*
  MORPHOLOGY, 5472, 6134
    DETERGENTS, 3837
    ISCHEMIA, 3837
    PANCREAS, 2851
  MOTILITY
    ADENOSINE TRIPHOSPHATASE, 61
    ANDROGENS, 7952
    ANTI-INFLAMMATORY AGENTS, 5316*
    BILE, 6093
    BRADYKININ, 936, 2758
    DOPAMINE, 62
    DRUG EFFECTS ON, 62, 5316*, 7939*, 7948
    DYES, 2982*
    ENKEPHALINS, 4529*, 7325
    ESTROGENS, 7952
    HORMONE EFFECTS ON, 7952
    PEPTIDES, 4534
    PROSTAGLANDINS, 4529*, 5316*, 7939*
    PURINES, 7946
    RADIOLOGY, 2729*
    SOLVENTS, 7948
    SYMPATHOMIMETICS, 62
    TRANQUILIZING AGENTS, 7948
    TRANSPORT, 6710
  MUSCLES
    CAFFEINE, 4530*
    CATECHOLAMINES, 918
    DRUG EFFECTS ON, 913*
    ENZYMES, 4530*
    PROSTAGLANDINS, 1853
  NEOPLASMS
    CROHN'S DISEASE, 7278
    DIAGNOSIS, 6294
    INTESTINAL OBSTRUCTION, 6955
    RADIOLOGY, 6294
    SURGERY, 4889
  NEOPLASMS, MALIGNANT
    APPENDICITIS, 408
  NERVOUS CONTROL
    GLYCOSIDES, 5315*
  NERVOUS SYSTEM
    NEOPLASMS, MALIGNANT, 7612
  NUCLEIC ACIDS
    BILE, 4688
  OBSTRUCTION
    CYSTIC FIBROSIS, 6364*
    DISEASES ASSOCIATED WITH, 6364*
    GRANULOMA, 3242
    POLYPS, 3242
    SURGERY, 6364*
  PANCREAS
    SECRETION, 4688
  PEPTIDE HYDROLASES
    DIGESTION, 1085*
  PERFORATION
    SURGERY, 8211
    THERAPY, 8211
  PERFUSION
    TRANSPORT, 776
  PERISTALSIS
    ANTI-INFLAMMATORY AGENTS, 5316*

- ILEUM (continued)
  - PERISTALSIS (continued)
    - DRUG EFFECTS ON, 2741*, 5316*
    - POTASSIUM, 60
    - PROSTAGLANDINS, 5316*, 5317*
    - PURINES, 7946
  - PERMEABILITY
    - TECHNIQUES, 5277*
  - PHOSPHATES
    - TRANSPORT, 2722
  - PLASMA
    - PROTEINS, 1773*
  - POLYPS
    - INTUSSUSCEPTION, 2339
    - OBSTRUCTION, 1371
  - POTASSIUM
    - ABSORPTION, 6001*
  - PROTEINS
    - BILE, 4688
    - CROHN'S DISEASE, 851
    - MEMBRANES, 5261*
    - VILLI, 1773*
  - RADIOLOGY
    - TECHNIQUES, 7054
  - SALMONELLOSIS
    - PERFORATION, 2655
  - SECRETION
    - CALCIUM, 2078
    - ELECTROLYTES, 4499*
    - GLUCOSE, 6132
    - WATER, 4499*
  - SODIUM
    - POTASSIUM, 6001*
    - SECRETION, 1086*
    - SULFATES, 2728
    - TRANSPORT, 32, 6001*
  - STARVATION
    - MITOSIS, 2986*
  - STENOSIS
    - ENDOMETRIOSIS, 5653*
  - STOMACH
    - ACID SECRETION, 5367*
    - SECRETION, 5367*
  - SUCRASE
    - BILE, 4688
  - SULFATES
    - ABSORPTION, 2728
  - SURGERY, 3227, 4161
    - ABSORPTION, 4865*
    - BILE ACIDS AND SALTS, 5663
    - DISEASES ASSOCIATED WITH, 4385
    - GALLBLADDER DISEASES, 4385
    - HYPERPLASIA, 1749*
    - MITOSIS, 1749*
    - MOTILITY, 4865*
    - VITAMIN B12, 5663
  - TRANSPORT
    - BILE ACIDS AND SALTS, 7915*
    - CALCIUM, 6014
    - CATHARTICS, 1784
    - ELECTROLYTES, 4498*, 4499*, 7313
    - GLUCOSE, 6011
    - LYSOSOMES, 6023
    - NEONATE, 6023
    - NUCLEOSIDES, 5290*
    - NUCLEOTIDES, 5290*
    - SODIUM, 4507*
    - SULFATES, 6023
    - VITAMIN K, 7314

- ILEUM (continued)
  - TRANSPORT (continued)
    - WATER, 4498*, 4499*, 4507*, 7305*, 7313
  - TUBERCULOSIS
    - RADIOLOGY, 2341
  - ULCER
    - ENDOSCOPY, 5657*
    - PERFORATION, 4898
    - SURGERY, 5657*
  - VIABILITY
    - DYES, 2982*
  - WATER
    - CROHN'S DISEASE, 849
    - TRANSPORT, 849
  - WATER, ELECTROLYTE BALANCE, 6134
  - YERSINIA
    - PSEUDOTUMORS, 8223

- ILEUS
  - SEE INTESTINAL OBSTRUCTION

- IMMUNITY
  - ABSCESS
    - BACTERIAL INFECTIONS, 2648
    - LIVER, 2648
    - SIMULATION, 2648
  - ACRODERMATITIS
    - HEPATITIS, INFECTIOUS, 3442
  - ASCARIASIS
    - INTESTINES, 6149
  - AUSTRALIA ANTIGEN
    - CARRIER STATE, 2018
    - CIRCULATION, 5866*
    - HEPATITIS, INFECTIOUS, 8354*
  - BACTERIAL INFECTIONS
    - HOST FACTORS, 5948
    - IRON, 5948
  - CHOLESTASIS
    - AUSTRALIA ANTIGEN, 7151*
    - PLASMA, 8433*
  - CHOLIC ACID
    - METABOLISM, 1112
  - COLITIS, ULCERATIVE, 4975
    - CIRCULATION, 5768
    - LYMPHOCYTES, 1732*, 3321*
  - COLON
    - NEOPLASMS, MALIGNANT, 5714*
  - CROHN'S DISEASE, 4482
    - IMMUNOSUPPRESSION, 855
    - LYMPHOCYTES, 1732*, 3321*
  - DEFICIENCY
    - INTESTINAL ABSORPTION, 6303
  - FASCIOLIASIS, 5489
  - GASTROENTERITIS, 5173*
  - GASTROINTESTINAL DISEASES, 8167
  - GASTROINTESTINAL SYSTEM
    - HOST FACTORS, 811
    - NEOPLASMS, 5949
    - REVIEW, 811
  - GIARDIASIS, 4737
    - SIMULATION, 4462
  - HELMINTHIASIS
    - TRANSMISSION, 5509
  - HEPATITIS, 7146*
    - AUSTRALIA ANTIGEN, 3441
    - CHILD, 6487

IMMUNITY (continued)
- HEPATITIS, CHRONIC
  - ANTIGENS, 4314
  - AUSTRALIA ANTIGEN, 3441, 5868*, 7151*
  - HEPATOCYTES, 5882*
  - PROTEINS, 1024
- HEPATITIS, INFECTIOUS, 4297*, 4298*, 7146*
  - AUSTRALIA ANTIGEN, 3427*, 3440
  - CHILD, 6487
  - HEMODIALYSIS, 3440
  - PATHOLOGY, 1518*
  - PROTEINS, 1024
  - REVIEW, 1515*
- HEPATITIS, SERUM
  - GLOBULINS, 5855*
- ILEUM
  - CHOLERA, 223
- INFLAMMATORY BOWEL DISEASES
  - HYPERSENSITIVITY, 1732*
  - LYMPHOCYTES, 1732*, 3321*
  - SERUM, 5987
- INTESTINE, LARGE
  - LYMPHOCYTES, 3016
- INTESTINE, SMALL
  - CELLS, 4676*
  - DEFICIENCY, 6303
- INTESTINES
  - CHOLERA, 2133
  - IMMUNOGLOBULINS, 6818*
- LIPODYSTROPHY, INTESTINAL
  - BACTERIA, 5705*
  - ETIOLOGY, 4137*
- LIPOPROTEINS
  - HEPATITIS, INFECTIOUS, 8354*
- LIVER
  - NEOPLASMS, 7151*
  - NEOPLASMS, MALIGNANT, 8414
  - PROTEINS, 1024
- LIVER CIRRHOSIS, 8414
  - AUSTRALIA ANTIGEN, 7151*
  - HEPATOCYTES, 5882*
  - LYMPHOCYTES, 4334*
  - PLASMA, 8433*
- LIVER DISEASES
  - AUSTRALIA ANTIGEN, 3441
  - HEPATOCYTES, 5882*
  - LYMPHOCYTES, 4334*
- LIVER DISEASES, ALCOHOLIC
  - ANTIGENS, 2535
- PARASITES AND PARASITIC DISEASES
  - ASSAY, 6640*
  - ENZYMES, 6640*
  - IMMUNOGLOBULINS, 6145*
- PROTEIN-LOSING ENTEROPATHIES, 6634
- RECTUM
  - NEOPLASMS, MALIGNANT, 5714*
- SALMONELLOSIS, 3869*, 8116
  - ESCHERICHIA COLI, 2652
  - SIMULATION, 2651, 2652
- SCHISTOSOMIASIS
  - EOSINOPHILS, 2670
  - FASCIOLIASIS, 7467
  - PRIMATES, 1729
  - SIMULATION, 6790

IMMUNOGLOBULINS
- ALCOHOLISM
  - DIAGNOSIS, 7804*
  - SERUM, 8391
- ANISAKIASIS
  - EPIDEMIOLOGY, 6657
- ATRESIA
  - CHILD, 5102*
- AUSTRALIA ANTIGEN
  - HEPATOCYTES, 626
- BILIARY TRACT DISEASES
  - INFLAMMATION, 3383
- CELIAC DISEASE
  - ANTIBODIES, 4130*
  - CHILD, 447
  - INTESTINE, SMALL, 4130*
  - JEJUNUM, 447
- CHILD
  - CELIAC DISEASE, 2345*
- CHOLESTASIS
  - MYCOSES, 1654
- COLITIS, ULCERATIVE, 6351*
  - CIRCULATION, 6350*
  - CROHN'S DISEASE, 6350*
  - SERUM, 5513*
- COMPLEMENT
  - ANTIBODIES, 215
- CROHN'S DISEASE
  - ILEUM, 1730*
  - SERUM, 5513*
  - SURGERY, 4183
  - THERAPY, 4183
- DERMATITIS HERPETIFORMIS
  - CELLS, 4869*
  - DIETARY FACTORS, 4869*
- DRUG DEPENDENCE
  - HEPATITIS, INFECTIOUS, 2518
- DUODENUM
  - CHILD, 2345*
  - TRANSPORT, 7917*
- ENZYMES
  - TECHNIQUES, 3562
- GALLBLADDER DISEASES, 6430
  - BILE, 5047
  - SERUM, 5047
- GASTRIN, 6845
  - BINDING, 320
- GASTROENTERITIS
  - VIRUSES, 1110, 1703
- GASTROINTESTINAL SYSTEM
  - REVIEW, 3528
- GIARDIASIS
  - DEFICIENCY, 2664
- HEPATITIS, 8351*
  - PREVENTION, 2515, 5086*
  - TRANSFUSION, 5086*
- HEPATITIS, CHRONIC, 6401*, 6498*
  - ADOLESCENCE, 3457
  - AUSTRALIA ANTIGEN, 4309*
  - CHILD, 3457
  - PATHOLOGY, 6500*
  - PROGNOSIS, 3457
  - SERUM, 5888
- HEPATITIS, INFECTIOUS, 8350*, 8351*, 8372
  - ANTIGENS, 8355*
  - AUSTRALIA ANTIGEN, 4309*
  - DRUG THERAPY, 7786*
  - HEPATOCYTES, 8356*

- IMMUNOGLOBULINS (continued)
  - HEPATITIS, INFECTIOUS (continued)
    - MUSCLES, 2519
    - OCCUPATIONAL FACTORS, 2489*
    - PREVENTION, 7147*
    - REVIEW, 7147*
    - TRANSMISSION, 2489*, 7786*
  - HYPERBILIRUBINEMIA
    - PHOTOTHERAPY, 8337*
  - HYPOGAMMAGLOBULINEMIA
    - IMMUNOCYTES, 5174*
  - ILEUM
    - CHILD, 2345*
    - CROHN'S DISEASE, 851
    - INFLAMMATION, 1730*
    - TRANSPORT, 7917*
  - INTESTINAL ABSORPTION
    - PROTEINS, 7917*
  - INTESTINE, SMALL
    - BINDING, 7319, 7902*
    - CELIAC DISEASE, 7634*
    - CHILD, 2345*
    - DEFICIENCY, 5686, 6949
    - DISEASE, 5686
    - MORPHOLOGY, 216
    - TRANSPORT, 7318, 7319
    - ULTRASTRUCTURE, 2345*
  - INTESTINES
    - CELLS, 6818*
    - CHOLERA, 4697
    - COLITIS, ULCERATIVE, 852
    - CROHN'S DISEASE, 852
    - DISEASE, 6430
    - IMMUNITY, 6818*
    - MORPHOLOGY, 852, 1776*
    - NEONATE, 6818*
    - SYNTHESIS, 1776*
    - TRANSPORT, 1776*
    - VIRUSES, 1110
  - JAUNDICE
    - PHOTOTHERAPY, 8337*
  - JEJUNUM, 6972
    - BINDING, 7319
    - CELIAC DISEASE, 7634*
    - TRANSPORT, 7318, 7319
  - LIVER
    - NEOPLASMS, 8356*
    - SCHISTOSOMIASIS, 6646*
  - LIVER CIRRHOSIS, 5120*
    - AUSTRALIA ANTIGEN, 3476*, 4309*
    - HEPATITIS, CHRONIC, 711
    - LIVER DISEASES, ALCOHOLIC, 4321*
    - NEONATE, 5102*
    - SERUM, 4321*
    - SYNTHESIS, 4350
  - LIVER DISEASES, 6401*, 6430, 6498*
    - BILE, 5047
    - CHILD, 5102*
    - DIAGNOSIS, 3956
    - INFLAMMATION, 3383
    - SERUM, 5047
    - STEROIDS, 691
  - LIVER DISEASES, ALCOHOLIC, 6401*
    - DIAGNOSIS, 4327
    - FATTY LIVER, 7804*
    - HEPATITIS, 7804*
    - LIVER CIRRHOSIS, 7804*
    - SERUM, 4321*

- IMMUNOGLOBULINS (continued)
  - LYMPHOMA
    - INTESTINE, SMALL, 4104*
  - MALABSORPTION SYNDROMES, 8226*
    - HYPERSENSITIVITY, 2347*
    - METABOLISM, 2350
    - REVIEW, 2350
  - MUSCLES
    - ANTIBODIES, 2518
  - NUTRITION DISORDERS
    - CHILD, 4408
    - INTESTINES, 4408
  - OXIDOREDUCTASES
    - LACTATES, 6153
  - PANCREAS
    - NEOPLASMS, 2857
    - SECRETION, 2857, 6067
  - PANCREATIC DISEASES
    - SECRETION, 2857
  - PANCREATITIS
    - SECRETION, 2857
  - PANCREATITIS, CHRONIC
    - SECRETION, 2857
  - PARASITES AND PARASITIC DISEASES
    - ENZYMES, 6640*
    - IMMUNITY, 6145*
  - PELLAGRA
    - XYLOSE, 2366
  - SALIVARY GLANDS
    - VIRUSES, 1110
  - SCHISTOSOMIASIS
    - IMMUNOLOGY, 6645*
    - KIDNEYS, 6670
  - SERUM
    - DEFICIENCY, 5174*
    - HYPOGAMMAGLOBULINEMIA, 5174*
  - STOMACH
    - SECRETION, 85
  - VIRUSES
    - COLOSTRUM, 1111
    - GASTROENTERITIS, 1111
    - TRANSMISSION, 1111
  - ZOLLINGER-ELLISON SYNDROME
    - PANCREAS, 2857

- IMMUNOSUPPRESSION
  - CROHN'S DISEASE
    - DRUG THERAPY, 5978*
    - IMMUNITY, 855
  - HEPATITIS
    - DRUG THERAPY, 5091
  - HEPATITIS, CHRONIC
    - THERAPY, 6494*
  - HEPATITIS, INFECTIOUS
    - DRUG THERAPY, 5091
    - GALACTOSAMINE, 1041
  - INTESTINE, LARGE
    - NECROSIS, 4123
    - NEOPLASMS, 221
    - PERFORATION, 4123
  - INTESTINE, SMALL
    - NECROSIS, 4123
    - PERFORATION, 4123
  - INTESTINES
    - NECROSIS, 4123
    - PERFORATION, 4123
  - JEJUNUM
    - TRANSPLANTATION, 3884

IMMUNOSUPPRESSION (continued)
- PARASITES AND PARASITIC DISEASES
  - DIARRHEA, 393*
- PROTOZOA
  - DIARRHEA, 393*
- SCHISTOSOMIASIS, 6150

IMMUNOTHERAPY
- COLITIS, ULCERATIVE
  - DRUG THERAPY, 7719
- COLON
  - CROHN'S DISEASE, 8516
  - NEOPLASMS, MALIGNANT, 6144*
- CROHN'S DISEASE, 8515, 8516
  - DRUG THERAPY, 7719
- GASTROINTESTINAL SYSTEM
  - NEOPLASMS, 5949
- HEPATITIS, CHRONIC, 5885
- HEPATITIS, INFECTIOUS
  - ANTIBODIES, 3428*
  - REVIEW, 5853*
  - TRANSFUSION, 1516*
- INTESTINES
  - INFLAMMATION, 7719
- LIVER
  - NEOPLASMS, 3391
- STOMACH
  - NEOPLASMS, 6877*

INCONTINENCE
- ANORECTUM
  - ETIOLOGY, 4949
  - NERVOUS CONTROL, 4949
- ANUS
  - DEFECATION, 1430
  - MORPHOLOGY, 1432
  - REVIEW, 1433
- CHILD
  - DEFECATION, 1430
- RECTUM
  - DEFECATION, 1430
  - MORPHOLOGY, 1432
  - REVIEW, 1433

INDOCYANINE GREEN
- ASCITES
  - LIVER DISEASES, ALCOHOLIC, 1561
- BILIARY TRACT DISEASES
  - DIAGNOSIS, 3974
- CLEARANCE STUDY
  - CIRCULATION, 7432*
  - DRUG EFFECTS ON, 7432*
- GILBERT'S DISEASE
  - EXCRETION, 4246*
- HEPATITIS
  - EXCRETION, 4246*
- HEPATOCYTES
  - TRANSPORT, 4246*
- KINETICS
  - NEONATE, 5061*
- LIVER
  - CIRCULATION, 598, 4339*
  - CLEARANCE STUDY, 259, 3793, 7432*
- LIVER CIRRHOSIS
  - CIRCULATION, 4339*
  - DIAGNOSIS, 1531
  - TECHNIQUES, 1531
- LIVER DISEASES
  - DRUG METABOLISM, 1468

INDOCYANINE GREEN (continued)
- LIVER DISEASES, ALCOHOLIC
  - DIAGNOSIS, 1531
  - TECHNIQUES, 1531
- LIVER FUNCTION TESTS, 3974
  - CLEARANCE STUDY, 1023
- NEONATE
  - HYPERBILIRUBINEMIA, 5061*
- PROTEINS
  - BINDING, 679
- SULFOBROMOPHTHALEIN
  - EXCRETION, 4246*

INFANT
- ABDOMEN
  - SURGERY, 807
- ABSORPTION
  - CALCIUM, 1798
- ACID SECRETION
  - PENTAGASTRIN, 1903
- ACRODERMATITIS
  - THERAPY, 2351
  - ZINC, 2351
- APPENDICITIS, 6347
- AUSTRALIA ANTIGEN
  - HEPATITIS, INFECTIOUS, 2495*
  - TRANSMISSION, 5858*
- BILE DUCTS
  - ATRESIA, 3112
  - HYPOPLASIA, 3112
  - PERFORATION, 3506*
- BILIARY TRACT
  - ATRESIA, 1639, 5142*
- CALCIUM
  - MARKER STUDY, 5192
- CHOLECYSTITIS, 758
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 7105*
  - DIAGNOSIS, 3112
  - FAMILIAL FACTORS, 2450*
  - LIVER FUNCTION TESTS, 4274*
  - MORPHOLOGY, 4274*
- COLITIS, ULCERATIVE
  - MEGACOLON, 517
- COLON
  - ELECTROPHYSIOLOGY, 1766*
  - PERMEABILITY, 1766*
  - POLYPS, 4194, 7710
- COLONIC DISEASES
  - DIAGNOSIS, 4008
  - RADIOGRAPHY, 4008
- COMMON BILE DUCT
  - CYSTS, 5146*
- DEHYDRATION
  - THERAPY, 5937*
- DIARRHEA
  - BILE ACIDS AND SALTS, 5198
  - DEHYDRATION, 5934*, 5937*
  - DIAGNOSIS, 5936*
  - ETIOLOGY, 4910*
  - INFECTION, 7261
  - PARENTERAL ALIMENTATION, 1684
  - REVIEW, 7258, 7261
  - THERAPY, 5936*, 7261
- ENDOSCOPY
  - GASTROINTESTINAL SYSTEM, 2169*
- ENEMA
  - COMPLICATIONS, 7683

INFANT (continued)

- ENTERECTOMY
  - SHORT BOWEL SYNDROME, 4891
- ENTEROCOLITIS, NECROTIZING, 7255
  - BREAST FEEDING, 8469
  - DIAGNOSIS, 5696
  - NEONATE, 793
  - PROGNOSIS, 5696
  - THERAPY, 5696
- ESOPHAGEAL REFLUX
  - DIAGNOSIS, 5564*
- ESOPHAGUS
  - MANOMETRY, 2223*
- EXCRETION
  - CALCIUM, 1798
- FEEDING
  - TECHNIQUES, 6638
- GALLBLADDER DISEASES
  - OBSTRUCTION, 1602
- GASTRIN
  - SYNTHESIS, 6038*
- GASTROENTERITIS, 4430
  - BACTERIA, 6612
  - BACTERIAL INFECTIONS, 3538
  - COMPLICATIONS, 8483
  - DIAGNOSIS, 7863, 7870
  - ETHNIC FACTORS, 7875
  - ETIOLOGY, 4429, 5205, 6612, 7871, 7875
  - REVIEW, 8460
  - THERAPY, 8483
  - VIRUS DISEASES, 7251
  - VIRUSES, 791, 5935*
- GASTROINTESTINAL DISEASES
  - DIET, 7883
  - NUTRITION, 7883
  - VOMITING, 7878
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 8109
  - BLEEDING, 1669
  - MOTILITY, 8109
  - POLYPS, 4124
  - SURGERY, 7880
- HEPATITIS
  - BILE ACIDS AND SALTS, 3368*, 7105*
  - DIAGNOSIS, 3368*
- HEPATITIS, CHRONIC
  - TRANSMISSION, 5858*
- HEPATITIS, INFECTIOUS, 3422*, 5092
  - AUSTRALIA ANTIGEN, 2492*
  - NUCLEOTIDASE, 4750*
- HIRSCHSPRUNG'S DISEASE
  - DIAGNOSIS, 1427
- HYPERBILIRUBINEMIA
  - DIAGNOSIS, 4277*
  - ENZYMES, 7999*
  - PARENTERAL ALIMENTATION, 3407*
  - PHOTOTHERAPY, 5062*
- HYPOGLYCEMIA
  - NEOPLASMS, 3335
- INFECTION
  - PROTEINS, 6620
- INTESTINE, SMALL
  - FISTULA, 7618
  - HEMANGIOMA, 5683
  - INTUSSUSCEPTION, 5683
  - ULTRASTRUCTURE, 5996

INFANT (continued)

- INTESTINES
  - ABSORPTION, 4116
  - BACTERIA, 7253
  - INFECTION, 8200
  - INTUSSUSCEPTION, 4953
  - PARASITES AND PARASITIC DISEASES, 4458*
- INTUSSUSCEPTION
  - EPIDEMIOLOGY, 5671
  - SURGERY, 425
  - THERAPY, 5671
- JAUNDICE
  - BILE ACIDS AND SALTS, 3368*
  - DIAGNOSIS, 4277*, 5035*
  - LACTOSE INTOLERANCE, 637
  - NUCLEOTIDASE, 4750*
  - PHOTOTHERAPY, 637, 5062*
  - PROGNOSIS, 1495
  - SURGERY, 5035*
- JAUNDICE, CHOLESTATIC
  - DIAGNOSIS, 3409*
- JAUNDICE, OBSTRUCTIVE
  - DIAGNOSIS, 3112
  - LIPOPROTEINS, 4278
  - SCANNING, SCINTILLATION, 7094*
- JEJUNUM
  - DILATATION, 3231
- KWASHIORKOR
  - DIAGNOSIS, 3526*
  - GEOGRAPHICAL FACTORS, 1692
  - GLUCOSE, 4146
  - HORMONES, 4146
  - METABOLISM, 4146
  - PROTEINS, 4146
- LACTOSE INTOLERANCE, 4907*
  - CYTOLOGY, EXFOLIATIVE, 2364
  - MILK, 4907*
  - VILLI, 2364
- LIPIDS
  - ABSORPTION, 1656
  - BLOOD, 792
- LIVER
  - ALCOHOLS, 6121
  - BILIRUBIN, 7999*
  - MORPHOMETRY, 5795*
  - NEOPLASMS, 6406*
  - SURGERY, 7880
- LIVER CIRRHOSIS
  - HEMOSIDEROSIS, 5042*
- LIVER DISEASES
  - ALPHA 1 ANTITRYPSIN, 8287*
  - AMINO TRANSFERASES, 4750*
  - ENZYMES, 4750*
  - NUCLEOTIDASE, 4750*
  - SCANNING, SCINTILLATION, 7094*
- MALABSORPTION SYNDROMES
  - PROTEINS, 5716*
- MEGACOLON
  - DIAGNOSIS, 3231
  - PATHOLOGY, 3231
  - SURGERY, 3231
- NUTRITION DISORDERS
  - DIARRHEA, 7853*
  - PARENTERAL ALIMENTATION, 7853*
  - THERAPY, 7853*
- PANCREAS
  - PSEUDOCYSTS, 6374

INFANT (continued)
- PROTEINS
  - INTOLERANCE, 5716*
- PYLORUS
  - STENOSIS, 1310, 3146*, 4815*, 6242
- RADIOLOGY
  - GASTROINTESTINAL SYSTEM, 2169*
- RECTUM
  - BIOPSY, 3042*, 8133
  - ENDOSCOPY, 3042*
- SALIVARY GLANDS
  - NEOPLASMS, 6600
- SALMONELLOSIS
  - TRANSMISSION, 2653
- SERUM
  - ACID SECRETION, 1890
  - AMYLASES, 6744*
  - GASTRIN, 1890, 5372, 6038*
- SHIGELLOSIS
  - ANTIBIOTICS, 803
- SIGMOID
  - POLYPS, 7710
- STOMACH
  - ACID SECRETION, 6038*
  - BLEEDING, 8128
  - MORPHOLOGY, 3002
  - SECRETION, 3002
  - ULCER, 8128
- URINE
  - AMYLASES, 6744*
- VIRUS DISEASES
  - GASTROENTERITIS, 8460

INFARCTION
- HEPATIC VEIN THROMBOSIS
  - LIVER, 2475
- HYPERTENSION
  - GALLBLADDER, 7192
- INTESTINE, SMALL
  - BARIUM, 7606*
  - BLOOD GROUPS, 5656*
  - CHILD, 5957*
  - CONTRACEPTIVES, ORAL, 5656*
  - DIAGNOSIS, 4763
  - PARASITES AND PARASITIC DISEASES, 5957*
  - RADIONUCLIDES, 4763
  - SCANNING, SCINTILLATION, 4763
  - SMOKING, 5656*
- INTESTINES
  - CLEARANCE STUDY, 2993*
  - CONTRACEPTIVES, ORAL, 3217*
  - DIAGNOSIS, 4763
  - ETIOLOGY, 3217*
  - RADIONUCLIDES, 4763
  - SCANNING, SCINTILLATION, 4763
- LIVER
  - DIAGNOSIS, 547*

INFECTION
- BILIARY TRACT
  - DRUG THERAPY, 2582
- CHILD
  - AUSTRALIA ANTIGEN, 5082*
- COLON
  - SURGERY, 7046
- DIARRHEA
  - CHILD, 7261
  - INFANT, 7261

INFECTION (continued)
- ELECTROLYTES
  - DEFECATION, 6629
- GASTROINTESTINAL SYSTEM
  - ELECTROLYTES, 6629
  - TOXICITY, 6629
- INFANT
  - PROTEINS, 6620
- INTESTINE, LARGE
  - PREVENTION, 7056
  - SURGERY, 7056
- INTESTINES
  - INFANT, 8200
- KWASHIORKOR
  - ALBUMINS, 5951
  - GROWTH DISORDERS, 5951
- LIVER DISEASES
  - WOUNDS AND INJURIES, 2645
- MARASMUS
  - ALBUMINS, 5951
  - GROWTH DISORDERS, 5951
- NUTRITION, 5944
- PARASITES AND PARASITIC DISEASES
  - INTESTINES, 6653
- PARENTERAL ALIMENTATION
  - CHILD, 5946
- PROTEINS
  - THERAPY, 6620
- RECTUM
  - SURGERY, 7046
- ULCER, PEPTIC
  - COMPLICATIONS, 8488

INFECTION, BACTERIA
- SEE BACTERIAL INFECTIONS

INFECTION, FUNGUS
- SEE MYCOSES

INFECTION, RICKETTSIAL
- SEE RICKETTSIAL DISEASES

INFECTION, VIRUS
- SEE VIRUS DISEASES

INFLAMMATION
- ANUS
  - SPHINCTER, 4954
- APPENDIX
  - THERAPY, 1404
- BILIARY TRACT
  - CHOLELITHIASIS, 7847
  - ODDI'S SPHINCTER, 728
  - SURGERY, 728
- BILIARY TRACT DISEASES
  - IMMUNOGLOBULINS, 3383
- CECUM
  - CHILD, 7044
  - LEUKEMIA, 7044
  - NEOPLASMS, 7702
- CELIAC DISEASE
  - RESPIRATORY SYSTEM, 449
- COLITIS, ULCERATIVE
  - CELLS, 4960*
  - EOSINOPHILS, 4208
  - HISTOCHEMISTRY, 7067
  - LYMPHOCYTES, 4468*
  - ULTRASTRUCTURE, 7067

INFLAMMATION (continued)
- COLON
  - CIRCULATION, 8262
  - CYTOLOGY, 8238
  - DIAGNOSIS, 8238
  - THROMBOSIS, 8262
- DUODENITIS
  - CELLS, 8191*
  - MORPHOLOGY, 8191*
- DUODENUM
  - ANGIOGRAPHY, 7608*
  - DRUG THERAPY, 354
  - ELECTROPHYSIOLOGY, 1823*
  - ENDOSCOPY, 1823*
- GALLBLADDER
  - ANGIOGRAPHY, 1621
  - ENZYMES, 1578*
  - LYSOSOMES, 1578*
  - PHOSPHOLIPASE, 1578*
- GASTROINTESTINAL DISEASES, 6321
- ILEUM
  - IMMUNOGLOBULINS, 1730*
- INTESTINAL OBSTRUCTION
  - JEJUNUM, 5666
  - POLYPS, 3242
- INTESTINE, LARGE
  - PARASITES AND PARASITIC DISEASES, 3870*
- INTESTINE, SMALL
  - PARASITES AND PARASITIC DISEASES, 4739
- INTESTINES
  - ANTI-INFLAMMATORY AGENTS, 7719
  - DRUG THERAPY, 7719
  - IMMUNOTHERAPY, 7719
  - NEOPLASMS, 4880*
- LIVER
  - ANTI-INFLAMMATORY AGENTS, 8032*
  - CHOLECYSTITIS, 3503*
  - CHOLELITHIASIS, 3503*
  - COMMON BILE DUCT CALCULI, 3503*
  - TRANQUILIZING AGENTS, 8032*
- LIVER DISEASES
  - ANTIBODIES, 3371*
  - IMMUNOGLOBULINS, 3383
- MALABSORPTION SYNDROMES
  - MUSCLES, 3256*
- MICROSOMES
  - LIVER, 8032*
- PANCREAS
  - DRUG THERAPY, 2427
  - FISTULA, 7729
  - STEROIDS, 2427, 7736*
- PANCREATITIS, 4235
  - COLON, 7735*
- POLYPS
  - INTUSSUSCEPTION, 2339
- RECTUM
  - BIOPSY, 3307
  - CYTOLOGY, 8238
  - DIAGNOSIS, 8238
  - ENDOSCOPY, 3307
  - RADIOLOGY, 1253
- SALIVARY GLANDS
  - DIAGNOSIS, 7246
  - THERAPY, 7246
  - ULTRASONOGRAPHY, 6635
  - ULTRASTRUCTURE, 7269

INFLAMMATION (continued)
- SHUNT, INTESTINAL
  - COMPLICATIONS, 8193*
- SIGMOID
  - CYTOLOGY, 8238
  - DIAGNOSIS, 8238
- STOMACH
  - ASPIRIN, 2143
  - DUODENUM, 354
  - EOSINOPHILS, 6235
  - SIMULATION, 2143
- TRICHINOSIS, 3870*
- UROGENITAL SYSTEM
  - DIAGNOSIS, 6194

INFLAMMATORY BOWEL DISEASES
- ADOLESCENCE
  - ENDOCRINE DISEASES, 7287
- ANERGY, 1438
- ANORECTUM
  - ULTRASTRUCTURE, 4926*
- ANTIBODIES
  - FAMILIAL FACTORS, 4211, 4962*
- ANTIGENS
  - DISEASES ASSOCIATED WITH, 5748
  - GENETICS, 8263*
- BACTERIA, 4719
- BIOCHEMISTRY
  - TECHNIQUES, 2406*
- CHILD
  - ENDOCRINE DISEASES, 7287
  - EPIDEMIOLOGY, 844
  - REVIEW, 6953
- CHYMOTRYPSIN
  - DIAGNOSIS, 4199*
- CLEARANCE STUDY
  - ALBUMINS, 4972
- COLITIS, ULCERATIVE
  - REVIEW, 2408
- COLON
  - BIOPSY, 7551
  - CHYMOTRYPSIN, 4199*
- COLONOSCOPY, 7527*
- COMPLICATIONS
  - AMYLOIDOSIS, 4964*
  - URINARY SYSTEM, 3578*
- CONTRACEPTIVES, ORAL, 5757*
- CROHN'S DISEASE
  - REVIEW, 2408
- DIAGNOSIS
  - CHILD, 7900
  - ELECTROPHORESIS, 7900
  - ENDOSCOPY, 3320*
  - LYMPHOCYTES, 7900
  - REVIEW, 5767
- DISEASES ASSOCIATED WITH
  - HEMORRHOIDS, 4204
- EPIDEMIOLOGY, 4479
  - REVIEW, 5767
- ETIOLOGY, 5757*, 5984
  - IMMUNOLOGY, 4718
- HYPERALIMENTATION
  - REVIEW, 1734
- IMMUNITY
  - HYPERSENSITIVITY, 1732*
  - LYMPHOCYTES, 1732*, 3321*
  - SERUM, 5987
- IMMUNOLOGY, 1735, 5984
  - REVIEW, 2408

- INFLAMMATORY BOWEL DISEASES (continued)
  - INTESTINE, LARGE
    - MORPHOLOGY, 7707
  - INTESTINES
    - BACTERIA, 4970
  - LIVER DISEASES
    - BILE ACIDS AND SALTS, 6348*
  - LYMPHOCYTES, 5984
    - ANTIBODIES, 4210
    - TRANSMISSION, 4210
  - LYSOZYMES
    - SERUM, 5548
  - NUCLEIC ACIDS
    - ANTIBODIES, 4211
    - FAMILIAL FACTORS, 4211
    - SYNTHESIS, 7635*
  - OXALATES
    - EXCRETION, 6586*
  - PARENTERAL ALIMENTATION, 5765
    - THERAPY, 5764
  - PATHOLOGY, 4718
  - PSYCHOLOGICAL FACTORS, 5760, 7628
  - RECTUM
    - BIOPSY, 7551
    - SPHINCTER, 5736
    - ULTRASTRUCTURE, 4926*
  - REVIEW, 5988
  - SERUM
    - LYSOZYMES, 3076, 3077
  - SURGERY
    - COMPLICATIONS, 6676*
    - TECHNIQUES, 5736
  - THERAPY
    - REVIEW, 5767, 6356
    - TECHNIQUES, 5765
  - TRANSMISSION, 4477*
  - UROGENITAL SYSTEM
    - COMPLICATIONS, 6676*
    - OBSTRUCTION, 6676*
  - VIRUSES
    - BIOCHEMISTRY, 2406*
    - TECHNIQUES, 2406*

- INSECTICIDES
  - CYTOCHROMES
    - METABOLISM, 3818
  - DRUG METABOLISM
    - LIVER, 1981
    - MICROSOMES, 1981
  - DUODENUM
    - GLUCOSE, 5299
  - HORMONES
    - METABOLISM, 1113
  - LIVER
    - ABSORPTION, 2919
    - DRUG METABOLISM, 1062
    - LYSOSOMES, 6089*
    - METABOLISM, 2919, 3818

- INSECTS
  - AUSTRALIA ANTIGEN, 6473*

- INSULIN
  - ACID SECRETION
    - GASTRIN, 345
    - GLUCOSE, 962

- INSULIN (continued)
  - DUODENUM
    - HORMONES, GASTROINTESTINAL, 7956*
    - ULCER, 2309
    - ULCER, PEPTIC, 7598
  - HEME
    - SYNTHESIS, 2012
  - HEPATITIS, INFECTIOUS
    - LIVER INJURY, 2883*
  - HYPOGLYCEMIA
    - ACID SECRETION, 1340*
    - GASTRIN, 1340*
  - INTESTINE, SMALL
    - ELECTRICAL CONTROL, 1825*
  - KERNICTERUS
    - DIURESIS, 2473
  - LIVER
    - ADENOSINE TRIPHOSPHATASE, 3771
    - BILE ACIDS AND SALTS, 3771
    - ESTROGENS, 8008*
    - METABOLISM, 8008*
    - REGENERATION, 2883*
    - TRIGLYCERIDES, 2005
  - LIVER INJURY
    - HORMONE EFFECTS ON, 2883*
  - PANCREAS, 806
    - DIABETES, 1747*
    - MORPHOLOGY, 1747*
  - PARENTERAL ALIMENTATION
    - METABOLISM, 5180*
  - SECRETION
    - BILE, 6092
    - STOMACH, 1233
    - ULCER, 1233
  - SERUM
    - PARENTERAL ALIMENTATION, 3854
  - STOMACH
    - ACID SECRETION, 4862
    - GASTRIN, 4862
    - MOTILITY, 3645
    - SECRETION, 103
  - SYNTHESIS, 7379
  - TRANSPLANTATION
    - PANCREAS, 5482*
  - ULCER
    - SECRETION, 2309
  - ULCER, PEPTIC
    - SERUM, 7598

- INTEGUMENTARY SYSTEM
  - AMEBIASIS
    - COLITIS, ULCERATIVE, 1714
  - ANUS
    - NEOPLASMS, 7011
  - CELIAC DISEASE
    - GLUTEN, 4744*
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 1600
  - CROHN'S DISEASE
    - WOUNDS AND INJURIES, 2674
  - ESOPHAGUS
    - RADIOLOGY, 1275
  - MALABSORPTION SYNDROMES
    - GLUTEN, 1386
  - SHORT BOWEL SYNDROME
    - KWASHIORKOR, 6951

- INTERFERON
  - GASTROENTERITIS
    - VIRUSES, 420

INTERFERON (continued)
    HEPATITIS
        CARRIER STATE, 2516
    HEPATITIS, CHRONIC
        ANTIGENS, 2516
        THERAPY, 2516
    LIVER
        CYTOCHROMES, 2900
        ENZYMES, 2900

INTESTINAL ABSORPTION
    ACIDS, 5296
    ALKALOIDS
        AMINO ACIDS, 6686*
    AMINO ACIDS, 7298*
        BILE ACIDS AND SALTS, 7911*
        DRUG EFFECTS ON, 2968
    ANTACIDS
        HEMODIALYSIS, 8230
    BILE ACIDS AND SALTS
        CIRCULATION, 6523*
    CADMIUM
        NEONATE, 7299*
    CALCIUM
        TECHNIQUES, 2724
    CHILD
        REVIEW, 6953
    CHOLESTEROL, 1005*
    CHYLOMICRONS
        SYNTHESIS, 7924
    L-DOPA, 7298*
    DRUG EFFECTS ON
        ACETYLCHOLINE, 2968
        SEROTONIN, 2968
    DRUGS, 5300
    ENDOTOXINS, 8101*
    ENZYMES, 7306
    FOLIC ACID
        ANTICONVULSANTS, 7923
        DRUG EFFECTS ON, 7923
        METABOLISM, 7923
    GLUCOSE
        DRUG EFFECTS ON, 2968
        MOTILITY, 6694*
    ILEUM, 6134
        LACTOSE, 6005*
    IMMUNITY
        DEFICIENCY, 6303
    INTESTINE, SMALL
        NEONATE, 7304*
        TECHNIQUES, 5276*
    IRON
        ANTACIDS, 8230
        DEFICIENCY, 3620
        HEMODIALYSIS, 8230
    JEJUNUM, 6134
    LACTOSE
        BILE ACIDS AND SALTS, 6005*
    LIPIDS
        NEONATE, 5289*
    LIPOPROTEINS
        LYMPH, 7497*
    NEONATE
        TRANSMISSION, 7304*
    PHOSPHOLIPIDS, 7924
    PROTEINS
        FERRITIN, 7917*
        IMMUNOGLOBULINS, 7917*

INTESTINAL ABSORPTION (continued)
    SURGERY
        VITAMIN D, 7609*
    TRANSMISSION
        PROTEINS, 7304*
    TRIGLYCERIDES
        EMULSIFIERS, 7493*
        FATS, 7493*
        ULTRASTRUCTURE, 5291*
    VITAMIN D
        PLASMA, 7609*
    VITAMIN E, 5280*
    WATER
        MOTILITY, 6694*

INTESTINAL OBSTRUCTION
    ANOMALY
        GENETICS, 4109*
        VEINS, 7661*
    ANTIBACTERIALS
        ABSORPTION, 891
        METABOLISM, 891
    ANTIBIOTICS
        ABSORPTION, 891
        METABOLISM, 891
    ANTIEMETICS
        REVIEW, 8479
    BILE ACIDS AND SALTS
        BREATH TEST, 5670
        METABOLISM, 5670
    BILIARY TRACT
        CALCULI, 767
        SURGERY, 8213
    CALCULI
        RADIOLOGY, 1613
    CECUM
        DISTENTION, 7709
        ISCHEMIA, 7709
    CELIAC DISEASE
        DISEASES ASSOCIATED WITH, 437
    CHOLELITHIASIS
        DIAGNOSIS, 3306, 5166, 5924*
        ENDOSCOPY, 5924*
        SURGERY, 5166
        THERAPY, 3306, 5166
    CHYLOPERITONEUM, 3230
    CIRCULATION
        OXYGEN, 4707*
        SIMULATION, 4726, 4728
    COLON
        ADOLESCENCE, 5735
        AGE FACTORS, 5740
        CHILD, 5735
        CLASSIFICATION, 6336*
        COMPLICATIONS, 7709
        CONSTIPATION, 5724*
        DIAGNOSIS, 2398, 5735
        EPIDEMIOLOGY, 2398
        ETIOLOGY, 2397
        MUSCLES, 3656
        PATHOLOGY, 5740
        RADIOLOGY, 5740
        REVIEW, 2398
        SIMULATION, 3656
        SURGERY, 5724*, 6336*
        THERAPY, 5724*
    COLONIC DISEASES, 5676
    COLOSTOMY
        COMPLICATIONS, 2397

NTESTINAL OBSTRUCTION (continued)
- COMPLICATIONS
  - CECUM, 7709
- CONSTIPATION
  - CHILD, 3536
- CYSTIC FIBROSIS
  - COMPLICATIONS, 6364*
  - MECONIUM, 2413*
- DIAGNOSIS, 3305, 4764
- DRAINAGE, 4952
- DRUG-INDUCED
  - BILE ACIDS AND SALTS, 7765
  - CHILD, 7765
- DRUG THERAPY
  - BILE ACIDS AND SALTS, 7765
- DUODENUM
  - ETIOLOGY, 7113*
  - HERNIA, 423
  - NEONATE, 7113*
- ELECTROPHYSIOLOGY
  - DISEASES ASSOCIATED WITH, 4109*
  - PERISTALSIS, 4109*
- EPITHELIUM
  - TRANSPORT, 870*
- ESOPHAGUS
  - OBSTRUCTION, 4800
- FOOD, 5660
- GASES
  - DISTENTION, 6292*
- GRANULOMA, 3242
- HERNIA, 5678
- HIRSCHSPRUNG'S DISEASE
  - REVIEW, 7007
- ILEOSTOMY
  - HERNIA, 5691
- ILEUM
  - NEOPLASMS, 6955
- INTESTINE, SMALL
  - DIETARY FACTORS, 4120, 6967
  - ETHNIC FACTORS, 6967
  - GASES, 6292*
  - SEROTONIN, 4120
- JEJUNUM
  - ILEITIS, 5666
  - INFLAMMATION, 5666
  - NEOPLASMS, MALIGNANT, 4888
- NEONATE
  - DIAGNOSIS, 3304
  - ETIOLOGY, 7113*
  - HIRSCHSPRUNG'S DISEASE, 7007
  - MILK, 6954
  - THERAPY, 3304
- NEOPLASMS
  - ETIOLOGY, 4880*
  - IATROGENESIS, 4880*
- NEOPLASMS, MALIGNANT
  - PROGNOSIS, 474
  - RADIOLOGY, 431
  - SURVIVAL, 474
- NERVOUS CONTROL
  - ELECTROPHYSIOLOGY, 3627*
- OXYGEN
  - THERAPY, 5675
- POLYPS
  - COLITIS, ULCERATIVE, 3282*
  - COLON, 3282*
  - INFLAMMATION, 3242
- PROGNOSIS, 5733

INTESTINAL OBSTRUCTION (continued)
- PROSTAGLANDINS
  - SIMULATION, 1118
- PYLORUS
  - HYPERTROPHY, 4109*
- RADIOLOGY
  - NEONATE, 2168*
- RETROPERITONEAL SPACE
  - CYSTS, 6298
- SHORT BOWEL SYNDROME
  - GENETICS, 4109*
- SIGMOID
  - CONSTIPATION, 5724*
  - SURGERY, 5724*, 8240
  - THERAPY, 5724*
- SIMULATION
  - OXYGEN, 5310*
- STOMACH
  - HIATAL HERNIA, 5562*
  - RADIOLOGY, 3184
- SURGERY
  - COMPLICATIONS, 8240
  - DIAGNOSIS, 6299
  - PROGNOSIS, 3305
- THERAPY, 3305, 5688
- TRANSPORT
  - BILE ACIDS AND SALTS, 870*
- UROGENITAL SYSTEM
  - SURGERY, 6302

INTESTINE, LARGE
- SEE ALSO CECUM, COLON
- ABSORPTION
  - VITAMIN K, 7314
- AGE FACTORS
  - ENZYMES, 3824*
  - MORPHOLOGY, 3824*
- ANTIBACTERIALS
  - SURGERY, 1672
- ARTERIES
  - ANEURYSM, 7686
- BACTERIA
  - TOXINS, 5699*
- BACTERIAL INFECTIONS
  - SURGERY, 1672
- BARIUM
  - ENEMA, 8239
- BLEEDING
  - DIAGNOSIS, 5230
  - THERAPY, 5230
- CALCIUM
  - HOMEOSTASIS, 1770*
  - TRANSPORT, 2723
- CARCINOEMBRYONIC ANTIGEN
  - NEOPLASMS, MALIGNANT, 452*, 460
- CIRCULATION
  - COLITIS, ULCERATIVE, 3318*
  - CROHN'S DISEASE, 3318*
  - NERVOUS CONTROL, 4705*
  - SURGERY, 3318*
- COLONIC DISEASES
  - BACTERIA, 4147*
  - DIAGNOSIS, 4004
- CROHN'S DISEASE
  - AGE FACTORS, 1742
  - PROGNOSIS, 1742
  - SURGERY, 1742

INTESTINE, LARGE (continued)
- CYSTS
  - COLITIS, 481
- DIAGNOSIS
  - ENDOSCOPY, 3288
- DIVERTICULITIS, 6343
  - DIAGNOSIS, 6346
  - RADIOLOGY, 6346
  - SURGERY, 489
- DIVERTICULUM, 487
  - DIAGNOSIS, 6346
  - EPIDEMIOLOGY, 1414
  - RADIOLOGY, 6346
- DYSPLASIA
  - HEMORRHAGE, 2371*
- ELECTROPHYSIOLOGY
  - DRUG EFFECTS ON, 7922, 7951
  - STEROIDS, 7922
  - VASODILATOR AGENTS, 7951
- ENDOSCOPY, 4004
  - BARIUM, 1240
- ENEMA
  - APPENDIX, 8239
  - BARIUM, 1240
- ESOPHAGUS, ARTIFICIAL, 8160, 8161
- FECES, 2736*
- GASES
  - RADIOLOGY, 4745*
- HEMORRHAGE
  - ANGIOGRAPHY, 1255
- INFECTION
  - SURGERY, 7056
- INFLAMMATORY BOWEL DISEASES
  - MORPHOLOGY, 7707
- INTUSSUSCEPTION
  - RADIOLOGY, 8244
- ION TRANSPORT
  - DRUG EFFECTS ON, 7922
  - HORMONE EFFECTS ON, 7922
  - HORMONES, ADRENAL CORTEX, 7922
  - STEROIDS, 7922
- ISCHEMIA
  - PNEUMATOSIS, 4879*
  - STENOSIS, 5722*
- LYMPHOCYTES
  - IMMUNITY, 3016
- MEGACOLON
  - MOTILITY, 937
- METAPLASIA
  - CYTOLOGY, 5592*
- MICROCIRCULATION
  - COLITIS, ULCERATIVE, 3318*
  - CROHN'S DISEASE, 3318*
  - SURGERY, 3318*
- MICROORGANISMS
  - AMINO ACIDS, 3834*
- MOBILITY
  - SURGERY, 2393
- MORPHOMETRY
  - RENAL INSUFFICIENCY, 8091*
- MOTILITY
  - ADRENERGIC RECEPTOR AGONISTS, 2739*
  - ADRENERGIC RECEPTOR BLOCKADERS, 2739*
  - DIETARY FACTORS, 2736*
  - DRUG EFFECTS ON, 1397, 7949, 7951
  - NUCLEOSIDES, 46*
  - NUCLEOTIDES, 46*

INTESTINE, LARGE (continued)
- MOTILITY (continued)
  - POTASSIUM, 7949
  - PROSTAGLANDINS, 2739*
  - VASODILATOR AGENTS, 7949, 7951
- MUSCLES
  - ELECTROPHYSIOLOGY, 7328
  - MOTILITY, 7949, 7951
  - NEOPLASMS, 5223
  - NEOPLASMS, BENIGN, 5223
  - NEOPLASMS, MALIGNANT, 5223
- MYCOSES
  - RADIOLOGY, 4393*
- NECROSIS
  - IMMUNOSUPPRESSION, 4123
- NEONATE
  - OBSTRUCTION, 2394
- NEOPLASM METASTASIS
  - DIAGNOSIS, 4162
  - RADIOLOGY, 4162
- NEOPLASMS
  - CERULOPLASMIN, 5613
  - COPPER, 5613
  - DIAGNOSIS, 3288, 4174, 4175, 4814*
  - EPIDEMIOLOGY, 469, 1396
  - GROWTH FACTORS, 221
  - IMMUNOSUPPRESSION, 221
  - RADIOLOGY, 3288, 4175
  - REVIEW, 4174
  - SCHISTOSOMIASIS, 1728
  - STATISTICAL STUDY, 6601
  - SURVIVAL, 469
  - THERAPY, 4174
  - ULTRASONOGRAPHY, 4814*
- NEOPLASMS, BENIGN
  - DIAGNOSIS, 7711
- NEOPLASMS, MALIGNANT, 7038
  - AGE FACTORS, 2383
  - DIAGNOSIS, 4004, 4162, 4169, 6325*, 7711
  - EPIDEMIOLOGY, 2400
  - IMMUNOLOGY, 1136
  - NUCLEIC ACIDS, 6325*
  - PROGNOSIS, 4169
  - RADIOLOGY, 4162
  - REVIEW, 1425
  - SIMULATION, 1136
  - THERAPY, 4169
  - TUBERCULOSIS, 453*
- OBSTRUCTION
  - CYSTIC FIBROSIS, 6364*
  - DIAGNOSIS, 2394
  - DISEASES ASSOCIATED WITH, 6364*
  - SURGERY, 6364*
- PARASITES AND PARASITIC DISEASES
  - IMMUNOLOGY, 3870*
  - INFLAMMATION, 3870*
- PERFORATION
  - IMMUNOSUPPRESSION, 4123
  - PANCREATITIS, 3333
- PNEUMATOSIS
  - ETIOLOGY, 4879*
  - PATHOLOGY, 4879*
- POLYPS
  - DIAGNOSIS, 4196, 7711
  - ENDOSCOPY, 1416, 7669
  - EPIDEMIOLOGY, 1414, 2400
  - FAMILIAL FACTORS, 7048, 7058
  - NEOPLASMS, 1394*, 7048, 7058

INTESTINE, LARGE (continued)
- POLYPS (continued)
  - PRECANCEROUS CONDITIONS, 1394*
  - THERAPY, 4196
- PREVENTION
  - INFECTION, 7056
- RADIOLOGY
  - APPENDIX, 8239
  - MASSAE, 8259
  - TECHNIQUES, 4162, 4925*
- REGENERATION
  - GASTRIN, 2801
  - HORMONE EFFECTS ON, 2801
- SECRETION
  - POTASSIUM, 7271
- SEPSIS
  - ANEURYSM, 7686
- SURGERY
  - ANTIBIOTICS, 7056
  - DIET, 7712
- TRANSPORT
  - CALCIUM, 6016
  - VITAMIN K, 7314
- ULTRASONOGRAPHY
  - GASES, 7684
  - TECHNIQUES, 7684

INTESTINE, SMALL
- SEE ALSO DUODENUM, ILEUM, JEJUNUM
- ABSORPTION, 3010
  - AGE FACTORS, 4406, 4913
  - ALBUMINS, 2707*
  - AMINO ACIDS, 16*, 3011, 3609*, 5304, 6686*, 7297*, 7912*, 7914*, 7929
  - ANTIGENS, 2707*
  - BILE ACIDS AND SALTS, 400, 5425*
  - CALCIUM, 2606, 5287*, 6014
  - CARBOHYDRATES, 1811, 2725, 2726, 3830*, 4406, 7931
  - CARCINOGENS, 5336
  - CATHARTICS, 3611*, 3825*
  - CELLS, 6690*
  - CIRCULATION, 7297*
  - DEVELOPMENT, 4454
  - DIETARY FACTORS, 400, 873
  - DRUG EFFECTS ON, 3605*, 3825*, 6825, 7931
  - DRUGS, 874, 1782, 5342
  - ELECTROLYTES, 4500*
  - EMBRYOLOGY, 7309, 7310, 7312
  - ENVIRONMENTAL FACTORS, 1805
  - FATS, 3827*, 6003*, 7312
  - FATTY ACIDS, 3602*, 7316, 7317, 7505
  - FETUS, 7309, 7312
  - FOLIC ACID, 1809
  - FOOD POISONING, 3244
  - FRUCTOSE, 2725, 4508*
  - GALACTOSE, 2725
  - GLUCOSE, 1777*, 2725, 2961*, 4500*, 4508*, 6825
  - HELMINTHIASIS, 5485
  - HORMONE EFFECTS ON, 2961*, 4500*, 7932
  - HORMONES, GASTROINTESTINAL, 2961*
  - HYPOGLYCEMIC AGENTS, 1787
  - IRON, 3621, 4512
  - LACTOSE, 2725

INTESTINE, SMALL (continued)
- ABSORPTION (continued)
  - MORPHOLOGY, 7309
  - MOTILITY, 7297*
  - NEONATE, 7311, 7312
  - PARENTERAL ALIMENTATION, 3614
  - PEPTIDES, 16*
  - PHOSPHATES, 3605*
  - SALICYLATES, 1808
  - TECHNIQUES, 1777*, 2714
  - VITAMIN B1, 2706*
  - VITAMIN B2, 1814
  - VITAMIN B6, 6021
  - VITAMIN B12, 400, 3610*, 4509*, 4510*
  - VITAMIN K, 7314
  - WATER, 3611*, 4500*, 7305*
  - XYLOSE, 2188, 2725, 4454
  - ZINC, 5292*
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - CHOLERA, 3840
  - DRUG EFFECTS ON, 6814*
  - SHIGELLOSIS, 3840
  - TOXINS, 3840
- ADENOSINE TRIPHOSPHATASE
  - ALKALINE PHOSPHATASE, 2076
  - HYDROLYSIS, 2076
- ADENOSINE TRIPHOSPHATE
  - ELECTRICAL CONTROL, 1854
- ADHESIONS
  - SURGERY, 2321
- AGE FACTORS
  - ENZYMES, 3824*
  - MORPHOLOGY, 3824*
- ALBUMINS
  - VILLI, 1773*
- ALCOHOLS, 3531
- ALKALINE PHOSPHATASE
  - FATTY ACIDS, 7486*
  - TRANSPORT, 8087*
  - WOUNDS AND INJURIES, 6135
- ALKALOIDS
  - VILLI, 1852
- AMINES
  - ENZYMES, 180, 1099
  - METABOLISM, 180
- AMINO ACIDS, 4677*
  - ABSORPTION, 1778*
  - DRUG EFFECTS ON, 5297
  - ENZYMES, 7491*
  - GROWTH FACTORS, 3012
  - HYPEREMIA, 3767
  - KINETICS, 7491*
  - SYNTHESIS, 2092
  - TRANSPORT, 5297
- AMMONIA
  - METABOLISM, 3842
- AMYLASES, 6823
- ANALGESICS AND ANTIPYRETICS
  - METABOLISM, 2973
  - TRANSPORT, 2973
- ANEMIA
  - ABSORPTION, 4413
  - FOLIC ACID, 4413
  - GLUCOSE, 4413
  - XYLOSE, 4413
- ANOMALY
  - DIAGNOSIS, 4885
  - RADIOLOGY, 4885

INTESTINE. SMALL (continued)

- ANTIGENS
  - SCLEROSIS, 7391
- ANTRECTOMY
  - ESOPHAGUS, 6030
- ASPIRIN
  - WOUNDS AND INJURIES, 2324
- ATRESIA
  - EPIDEMIOLOGY, 4098*
- ATROPHY
  - GALLBLADDER, 6061
  - GASTRIN, 4685*
  - HORMONE EFFECTS ON, 4685*
  - HORMONES, 6061
  - PANCREAS, 6061
  - PARENTERAL ALIMENTATION, 6061
- AUTOLYSIS
  - TECHNIQUES, 175
- BACTERIA, 8464
  - ANTIBIOTICS, 8454*
  - ANTIGENS, 8454*
  - BREATH TEST, 1198, 5649*
  - DIARRHEA, 7653
  - DRUG EFFECTS ON, 3544
  - GASTRECTOMY, 1117
  - LIVER CIRRHOSIS, 6520*
  - REVIEW, 7653
- BARIUM
  - TECHNIQUES, 3598*
- BILE
  - HYPEREMIA, 3767
  - LACTATION, 5293*
  - MORPHOLOGY, 3585*
  - PANCREAS, 5293*
- BILE ACIDS AND SALTS
  - ABSORPTION, 1775*
  - BINDING, 7485*
  - CHOLECYSTECTOMY, 7394*
  - PHENOBARBITAL, 2721
  - STARVATION, 7394*
  - TRANSPORT, 2720, 2721
- BILE DUCTS
  - NEOPLASMS, MALIGNANT, 562
  - OBSTRUCTION, 5433*
- BIOCHEMISTRY
  - ENTEROTOXINS, 187
  - SYNTHESIS, 192
  - TECHNIQUES, 192
- BIOPSY
  - INTUBATION, 2167*
- BLEEDING
  - DIAGNOSIS, 3985
  - ENDOSCOPY, 3985
- CADMIUM
  - ENZYMES, 184
- CAFFEINE
  - DRUG EFFECTS ON, 4684*
  - SECRETION, 4684*
  - TRANSPORT, 4684*
- CALCIUM
  - ABSORPTION, 2702*
  - CARBOHYDRATES, 5288*
  - ION TRANSPORT, 2078
  - TRANSPORT, 881, 882, 5288*
  - ULTRASTRUCTURE, 6129*
  - WATER, ELECTROLYTE BALANCE, 2078
- CARCINOID TUMOR
  - ANGIOGRAPHY, 4101*
  - PROGNOSIS, 3272*

INTESTINE, SMALL (continued)

- CARCINOID TUMOR (continued)
  - RADIOLOGY, 4101*
  - THERAPY, 3272*
- CATHARTICS
  - TOXICITY, 7484*
- CELIAC DISEASE
  - BIOPSY, 4904*
  - CHILD, 1380
  - IMMUNOGLOBULINS, 4130*
  - MORPHOLOGY, 6995
  - REVIEW, 5685
  - ULTRASTRUCTURE, 1380
- CELLS
  - AMINO ACIDS, 2970
  - ANTIGENS, 3881
  - CHLORIDES, 6690*
  - CYTOLOGY, 4903*
  - EMBRYOLOGY, 7288*
  - ENZYMES, 8989*
  - HYPERPLASIA, 6979*
  - IMMUNITY, 4676*
  - ISCHEMIA, 5469*
  - MEMBRANES, 5270
  - MITOSIS, 4708*
  - TERPENES, 6827
  - ULTRASTRUCTURE, 7904
- CHILD
  - BIOPSY, 394, 395
  - DIGESTION, 6953
  - DISEASE, 2166*
  - ENDOSCOPY, 395
  - LYMPHOCYTES, 2166*
  - REVIEW, 394
  - ULTRASTRUCTURE, 5996
- CHOLECYSTOKININ
  - MOTILITY, 2129
  - RADIOIMMUNOASSAY, 2082
- CHOLELITHIASIS
  - MORPHOLOGY, 8194*
- CHOLERA
  - ENTEROTOXINS, 2084
  - WATER, ELECTROLYTE BALANCE, 2085
- CHOLESTEROL
  - METABOLISM, 3221*
  - SYNTHESIS, 4618*
- CHOLINE
  - ADRENERGIC RECEPTOR BLOCKADERS, 2073
- CHYLOMICRONS
  - ULTRASTRUCTURE, 3827*
- CHYMOTRYPSIN
  - METABOLISM, 1929*
- CIRCULATION
  - DISTENTION, 4707*
  - HEMODYNAMICS, 1121
  - NERVOUS CONTROL, 4705*
  - OXYGEN, 4707*
  - RADIOLOGY, 3586*
  - SECRETIN, 208
  - ULTRASTRUCTURE, 6142*
- COBALT
  - PERMEABILITY, 1804
  - WATER, ELECTROLYTE BALANCE, 1804
- COLECTOMY
  - TRANSPLANTATION, 3020
- COLLAGEN
  - SYNTHESIS, 7488*

INTESTINE, SMALL (continued)

- COLON
  - KINETICS, 2099*
- COMPLICATIONS
  - PERISTALSIS, 1131
- COMPUTERS
  - CHILD, 3062
- CROHN'S DISEASE
  - NEOPLASMS, 5986, 7278
  - PRECANCEROUS CONDITIONS, 5986
  - SIMULATION, 7278
  - SURGERY, 2321
- CYTOLOGY
  - IRRADIATION, 5467*
  - RADIATION EFFECTS ON, 5467*
- DEFICIENCY
  - NEONATE, 1369
- DIABETES
  - CHILD, 5681
  - LIPIDS, 5681
- DIARRHEA
  - BACTERIA, 1353, 5169*
  - CHILD, 5169*
- DIET
  - MORPHOLOGY, 1119, 6140
  - MOTILITY, 6140
- DIGESTION
  - CARBOHYDRATES, 2725
  - GALACTOSE, 2725
  - GLUCOSE, 2725
  - LACTOSE, 2725
- DISACCHARIDASES
  - ANTIMETABOLITES, 1094
  - DIET, 5449
  - ENTERITIS, 8207
  - HORMONE EFFECTS ON, 2979
- DISACCHARIDES
  - HYDROLYSIS, 3849
- DISEASE
  - MORPHOLOGY, 6950
- DISTENTION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2963*
  - SECRETION, 2963*
- DIURETICS
  - TRANSPORT, 1812
- DIVERTICULUM, 7615
- DRUG EFFECTS ON, 5450, 5456
  - ABSORPTION, 2715
  - DIGESTION, 2715
  - ENZYMES, 5440*
  - MORPHOLOGY, 5440*
- DRUG METABOLISM
  - HYPNOTIC AGENTS, 6396*
- DRUGS
  - ABSORPTION, 2716
  - DRUG EFFECTS ON, 2716
  - WATER, ELECTROLYTE BALANCE, 5342
- DUMPING SYNDROME
  - MOTILITY, 3655
  - THERAPY, 3655
- DUODENUM, 8197
- ELECTROLYTES
  - TRANSPORT, 18*
- ELECTROPHYSIOLOGY, 3626*, 7920*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 56
  - BILE ACIDS AND SALTS, 1794
  - CARBOHYDRATES, 29

INTESTINE, SMALL (continued)

- ELECTROPHYSIOLOGY (continued)
  - DRUG EFFECTS ON, 56, 5311*
  - ELECTROLYTES, 29
  - FEEDING, 3654
  - GLUCOSE, 2695*
  - PENTAGASTRIN, 3651
  - SOMATOSTATIN, 6711
  - SURGERY, 5190, 6697*
  - TECHNIQUES, 2737*
  - TRANSPORT, 2695*
- ENDOMETRIOSIS
  - THERAPY, 7617
- ENDOSCOPY
  - COMPLICATIONS, 2319, 2320, 4388*, 6158
  - OBSTRUCTION, 2319
  - REVIEW, 7535
  - STRANGULATION, 2319
  - TECHNIQUES, 2320, 5528
  - WOUNDS AND INJURIES, 2320
- ENDOTOXINS
  - ABSORPTION, 2708*
- ENEMA
  - TECHNIQUES, 7526*
- ENTERECTOMY
  - ADAPTATION, 7501*
- ENTERITIS
  - INTUSSUSCEPTION, 6297
  - VIRUS DISEASES, 2962*
- ENTEROCOLITIS, NECROTIZING
  - DISTENTION, 2192
- ENTEROKINASE
  - BLOOD GROUPS, 7490*
  - CHEMICAL COMPOSITION, 7490*
  - DEFICIENCY, 1369
  - VILLI, 7490*
- ENTEROTOXINS
  - MOTILITY, 1850
  - MUSCLES, 1851
- ENZYMES, 3010, 3846, 6131, 6823
  - AMINO ACIDS, 6815*
  - CADMIUM, 7507
  - CHEMICAL PROPERTIES, 7506
  - CHROMATOGRAPHY, 7506
  - CIRCADIAN RHYTHM, 3843
  - DEFICIENCY, 4143
  - DIARRHEA, 7632
  - HORMONE EFFECTS ON, 2979
  - METABOLISM, 1929*
  - MORPHOLOGY, 1093
  - NUTRITION DISORDERS, 7632
  - PARENTERAL ALIMENTATION, 3854
  - PERFUSION, 7489*
  - REVIEW, 4143
  - SECRETION, 5433*
  - TEMPERATURE, 6824, 8097
- EPITHELIUM, 3019
  - AMINO ACIDS, 2092
  - COLON, 1123
  - DRUG EFFECTS ON, 5440*
  - FEEDING, 1759
  - IRRADIATION, 5460
  - KINETICS, 1760
  - MOTILITY, 4486*
  - OSMOTIC PRESSURE, 2711
  - RADIATION EFFECTS ON, 5460
- ERYTHROCYTES
  - IMMUNOLOGY, 2985*

INTESTINE, SMALL (continued)
- ESCHERICHIA COLI
  - MOTILITY, 1850
  - MUSCLES, 1851
- ESOPHAGUS, ARTIFICIAL, 8153, 8160
- FATS
  - CIRCULATION, 2971
  - FEEDING, 2971
  - HYPERPLASIA, 2971
- FATTY ACIDS, 7926
  - ABSORPTION, 1775*
  - ALKALINE PHOSPHATASE, 7487*
  - ELECTROPHYSIOLOGY, 213
  - HYPEREMIA, 3767
- FEEDING
  - REGENERATION, 1759
- FISTULA
  - ENZYMES, 3590
  - INFANT, 7618
  - PARENTERAL ALIMENTATION, 7618
  - RADIOLOGY, 1627
  - TECHNIQUES, 2964*
  - THERAPY, 7618
- FOOD
  - MORPHOLOGY, 3585*
- GALACTOSE
  - VILLI, 1852
- GALLBLADDER
  - SECRETION, 2851
- GANGRENE
  - CHILD, 5957*
  - PARASITES AND PARASITIC DISEASES, 5957*
- GASES, 6973
  - CYSTS, 2338
  - INTESTINAL OBSTRUCTION, 6292*
  - PATHOLOGY, 2338
  - RADIOLOGY, 2338
- GASTRECTOMY
  - INTUSSUSCEPTION, 2258
- GASTRIN
  - LIVER EXTRACTS, 2780
- GASTROENTERITIS
  - EPITHELIUM, 2962*
  - VIRUS DISEASES, 2962*
- GASTROINTESTINAL DISEASES
  - ULTRASTRUCTURE, 4899
- GIARDIASIS
  - DIAGNOSIS, 2659*
  - DIARRHEA, 3559
  - STEATORRHEA, 3559
  - TRICHINOSIS, 2988*
- GLUCAGON, 4690
- GLUCOSE, 3849
  - ENZYMES, 1096, 2089
  - METABOLISM, 7300*
  - PARENTERAL ALIMENTATION, 3854
  - PERFUSION, 1096, 2089
  - TRANSPORT, 1812
- GLYCOLIPIDS
  - CHEMICAL COMPOSITION, 7496*
  - FATTY ACIDS, 7496*
- GLYCOPROTEINS
  - CHOLERA, 3850
  - TOXINS, 3850
- GRANULOMA
  - DIAGNOSIS, 6585*
- GROWTH FACTORS
  - HORMONE CONTROL, 7502

INTESTINE, SMALL (continued)
- GROWTH FACTORS (continued)
  - MORPHOLOGY, 1127
  - THYROID GLAND, 7502
- GUANYL CYCLASE
  - CIRCADIAN RHYTHM, 2090
  - FEEDING, 2090
- HELMINTHIASIS
  - IRON, 5508
  - MOTILITY, 1827*
  - PROTEINS, 5508
  - REVIEW, 826
  - TRACER STUDY, 1827*
- HEMANGIOMA
  - INFANT, 5683
  - INTUSSUSCEPTION, 5683
- HEMODIALYSIS
  - MORPHOLOGY, 6587*
- HEMORRHAGE
  - ANTICOAGULANTS, 2237*
  - BURNS, 5229
  - REVIEW, 422
  - STRESS, 2237*
- HEPATECTOMY
  - BILE ACIDS AND SALTS, 7448*
- HERNIA
  - MORPHOLOGY, 8194*
- HIRSCHSPRUNG'S DISEASE
  - SIMULATION, 4711*
- HISTAMINE
  - DRUG EFFECTS ON, 7289*
  - METABOLISM, 180
- HORMONE EFFECTS ON, 5293*
  - LACTATION, 5293*
- HORMONES
  - ELECTROPHYSIOLOGY, 206
  - GROWTH FACTORS, 8085*
  - MORPHOLOGY, 1087
  - SURGERY, 1087
- HORMONES, ADRENAL CORTEX
  - GROWTH FACTORS, 8085*
- HORMONES, GASTROINTESTINAL, 1872*
- HYDROLYSIS
  - AGE FACTORS, 4406
  - CARBOHYDRATES, 4406
- HYPEREMIA
  - CHYME, 2972
- HYPERPLASIA
  - CELIAC DISEASE, 6979*
  - GASTRIN, 4685*
  - HORMONE EFFECTS ON, 4685*
  - SURGERY, 860
- HYPERSENSITIVITY, 8099*
- HYPERTROPHY
  - COLLAGEN, 7488*
- HYPNOTIC AGENTS
  - METABOLISM, 6396*
- HYPOPLASIA
  - PANCREAS, 2851
- HYPOTENSION
  - NERVOUS SYSTEM, 6832*
  - SHOCK, 6832*
- IMMUNITY
  - DEFICIENCY, 6303
- IMMUNOGLOBULINS
  - BINDING, 7319, 7902*
  - CELIAC DISEASE, 7634*
  - CHILD, 2345*
  - DEFICIENCY, 5686, 6949

INTESTINE, SMALL (continued)
- IMMUNOGLOBULINS (continued)
  - DISEASE, 5686
  - MORPHOLOGY, 216
  - ULTRASTRUCTURE, 2345*
- INFANT
  - ULTRASTRUCTURE, 5996
- INFARCTION
  - BARIUM, 7606*
  - BLOOD GROUPS, 5656*
  - CHILD, 5957*
  - CONTRACEPTIVES, ORAL, 5656*
  - DIAGNOSIS, 4763
  - PARASITES AND PARASITIC DISEASES, 5957*
  - RADIONUCLIDES, 4763
  - SCANNING, SCINTILLATION, 4763
  - SMOKING, 5656*
- INSULIN
  - ELECTRICAL CONTROL, 1825*
- INTESTINAL ABSORPTION
  - TECHNIQUES, 5276*
- INTESTINAL OBSTRUCTION
  - DIETARY FACTORS, 4120, 6967
  - ETHNIC FACTORS, 6967
  - SEROTONIN, 4120
- INTESTINES
  - CHOLERA, 4697
  - SECRETION, 2083
- INTRINSIC FACTOR, 7495*
  - VITAMIN B12, 3014
- INTUBATION
  - COMPLICATIONS, 2318
  - DRUG EFFECTS ON, 2167*
  - OBSTRUCTION, 2318
  - TECHNIQUES, 2167*, 2318
- INTUSSUSCEPTION
  - AGE FACTORS, 5684
  - ANGIOGRAPHY, 3218*
  - INFANT, 5683
  - REVIEW, 5684
  - ULTRASONOGRAPHY, 7025
- ION TRANSPORT, 6000*, 6002*
  - AMINO ACIDS, 6009
  - BILE ACIDS AND SALTS, 1794, 6689*
  - CARBOHYDRATES, 6009
  - ELECTROPHYSIOLOGY, 7925
  - GLUCOSE, 2694*, 6009
  - HORMONE CONTROL, 7313
  - HORMONES, ADRENAL CORTEX, 7313
  - NERVOUS CONTROL, 7925
  - SHUNT, 1803
- IRON
  - ABSORPTION, 1771*, 2703*, 5341
  - DEFICIENCY, 4686*
  - PERMEABILITY, 1804
  - STARCH, 1771*
  - TRANSPORT, 1805
  - WATER, ELECTROLYTE BALANCE, 1804
- IRRADIATION
  - ULTRASTRUCTURE, 5460
- ISCHEMIA, 4690, 6956
  - BLOOD GROUPS, 5656*
  - CONTRACEPTIVES, ORAL, 5656*
  - DIAGNOSIS, 2329
  - GLUCOSE, 3866*
  - KINETICS, 2100*
  - MITOSIS, 2100*

INTESTINE, SMALL (continued)
- ISCHEMIA (continued)
  - MORPHOLOGY, 2990*
  - OXYGEN, 3866*
  - PARASITES AND PARASITIC DISEASES, 5957*
  - PATHOLOGY, 2990*
  - PEPTIDE HYDROLASES, 4713*
  - RADIOLOGY, 2329
  - SMOKING, 5656*
  - ULCER, 2990*
  - VIABILITY, 2982*
  - VILLI, 2100*
- JAUNDICE, OBSTRUCTIVE
  - BILE, 6579*
- JEJUNUM
  - TECHNIQUES, 3075
- KIDNEY DISEASES
  - MORPHOLOGY, 6587*
- LACTASE
  - BIOPSY, 5065
  - HORMONE EFFECTS ON, 2979, 5444*
  - TECHNIQUES, 5065
- LACTATES
  - METABOLISM, 7339*
  - SYNTHESIS, 7339*
- LACTOSE INTOLERANCE, 3075
- LIPIDS
  - CHILD, 5681
  - METABOLISM, 7505
  - SYNTHESIS, 815
- LIPOPROTEINS
  - LYMPH, 7497*
  - SYNTHESIS, 3855, 3856, 7497*
- LYMPH
  - SECRETION, 7498*
- LYMPHANGIECTASIS, 8214
  - HYPOPLASIA, 6946
  - PROTEIN-LOSING ENTEROPATHIES, 6946
- LYMPHATIC SYSTEM
  - DISEASE, 8215
  - FATTY ACIDS, 7926
  - TRIGLYCERIDES, 7926
- LYMPHOCYTES
  - CHILD, 1645*
  - IMMUNOLOGY, 3015
- LYMPHOMA
  - ALPHA-CHAIN DISEASE, 6977*
  - IMMUNOGLOBULINS, 4104*
  - MALABSORPTION SYNDROMES, 6309*, 6977*, 7643
- MAGNESIUM
  - DEFICIENCY, 2336
  - SURGERY, 2336
- MALABSORPTION SYNDROMES
  - ANOMALY, 4868*
  - BACTERIA, 399, 7653
  - BIOPSY, 4904*
  - GIARDIASIS, 2659*
  - SURGERY, 2321, 3867*
  - VILLI, 8226*
- MECKEL'S DIVERTICULUM
  - HEALING, 8224
  - SURGERY, 2321
- MEMBRANES
  - ADENOSINE TRIPHOSPHATASE, 2076
  - EPITHELIUM, 48*
  - ION TRANSPORT, 6688*
  - MOTILITY, 48*

INTESTINE, SMALL (continued)
  MEMBRANES (continued)
    ULTRASTRUCTURE, 48*
  MESENTERY
    CYSTS, 6305
  METABOLISM
    BILE ACIDS AND SALTS, 5425*
    CARBOHYDRATES, 3830*
  METALS
    CADMIUM, 7507
  METAPLASIA
    CYTOLOGY, 5592*
    REVIEW, 5685
  MICROORGANISMS
    AMINO ACIDS, 3834*
  MITOCHONDRIA
    CALCIUM, 2701*
    VITAMIN D, 6839
  MITOSIS
    AGE FACTORS, 5455
    DRUG EFFECTS ON, 7500*
    ENTERECTOMY, 4708*
    IRRADIATION, 5467*
    KINETICS, 7500*
    RADIATION EFFECTS ON, 5467*
  MORPHOLOGY
    ACRODERMATITIS, 8225*
    AGE FACTORS, 5455
    BACTERIAL INFECTIONS, 4695
    CATHARTICS, 7484*
    DIARRHEA, 4695
    DRUG EFFECTS ON, 7484*
    EPITHELIUM, 7307
    GIARDIASIS, 7892*
    LACTOSE INTOLERANCE, 3255*
    PERISTALSIS, 1131
    REVIEW, 5685
    SECRETAGOGUES, 7484*
    SPRUE, 4695
  MORPHOMETRY
    RENAL INSUFFICIENCY, 8091*
    SEX FACTORS, 5692
    SHUNT, INTESTINAL, 5692
  MOTILIN, 4693
  MOTILITY
    ACIDS, 1855
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 56
    ALKALOIDS, 7941
    ANDROGENS, 7952
    BILE, 6093
    BREATH TEST, 4743*
    CHOLECYSTOKININ, 4528*, 5314*
    CIRCULATION, 3863*
    COMPUTERS, 55, 932
    DIARRHEA, 4424
    DRUG EFFECTS ON, 56, 924, 4542, 5307*, 5314*, 7939*, 7941, 7948
    DUMPING SYNDROME, 2754
    DYES, 2982*
    ELECTRICAL CONTROL, 55, 2752
    ELECTROPHYSIOLOGY, 4525*, 4526*, 4528*, 5190, 7938*
    ENKEPHALINS, 4529*
    ESTROGENS, 7952
    GASTRECTOMY, 4743*
    HORMONE EFFECTS ON, 7324, 7952
    MALABSORPTION SYNDROMES, 3256*
    MESENTERY, 2753

INTESTINE, SMALL (continued)
  MOTILITY (continued)
    MORPHOLOGY, 7938*
    MOTILIN, 7324
    NARCOTICS, 5307*
    NERVOUS CONTROL, 921, 4525*, 4526*, 4542, 5313*
    PEPTIDES, 3652
    PHYSICAL FACTORS, 921
    PRESSURE STUDY, 4542
    PROSTAGLANDINS, 924, 4529*, 7939*
    PURINES, 7946
    SOLVENTS, 7948
    SURGERY, 2764, 3657, 8218
    TEMPERATURE, 7944
    TRANQUILIZING AGENTS, 7948
    ULTRASTRUCTURE, 4486*
  MUCUS
    IMMUNOLOGY, 6128*
  MUSCLES
    COLLAGEN, 7488*
    DRUG EFFECTS ON, 5311*
    ELECTROPHYSIOLOGY, 4528*
    HISTAMINE, 7494*
    NEOPLASMS, 5223
    NEOPLASMS, BENIGN, 5223
    NEOPLASMS, MALIGNANT, 5223
    NERVOUS CONTROL, 5313*, 7910
  MYCOSES
    ENTERITIS, 4393*
    RADIOLOGY, 4393*
  NARCOTICS, 5462
    TOLERANCE, 5307*
  NECROSIS
    ANGIOGRAPHY, 6960
    EMBOLIZATION, 6960
    IMMUNOSUPPRESSION, 4123
    PARASITES AND PARASITIC DISEASES, 5957*
    RADIOLOGY, 6952
  NEONATE
    ATRESIA, 4867*
    FEEDING, 2066
    GROWTH FACTORS, 7502
    HORMONE CONTROL, 7502
    INTESTINAL ABSORPTION, 7304*
    REGENERATION, 3018
    STENOSIS, 4867*
    SURGERY, 8220
    THYROID GLAND, 7502
    TRANSPLANTATION, 3018
  NEOPLASM METASTASIS, 6289*
  NEOPLASMS, 6289*
    DIAGNOSIS, 4814*
    POLYPS, 6943
    ULTRASONOGRAPHY, 4814*
  NEOPLASMS, BENIGN, 8196
  NEOPLASMS, MALIGNANT
    DIAGNOSIS, 6287*, 6307
    REVIEW, 5664
    SURGERY, 2321, 6287*
  NERVOUS CONTROL
    L-DOPA, 1084*
    DOPAMINE, 1084*
    ELECTROPHYSIOLOGY, 2*
    MORPHOGENESIS, 2*
    MOTILITY, 2*
    ULTRASTRUCTURE, 2*, 7910

INTESTINE, SMALL (continued)
- NERVOUS SYSTEM
  - MORPHOLOGY, 2127
  - NEOPLASMS, MALIGNANT, 7612
- NUCLEIC ACIDS
  - COLON, 6813
  - ENTERECTOMY, 4708*
  - JEJUNUM, 6813
  - SYNTHESIS, 4708*, 6813
  - VITAMIN D, 6839
- NUTRITION DISORDERS
  - ABSORPTION, 3621
- OBESITY
  - GASES, 2337
  - MORPHOLOGY, 2332, 8194*
  - SURGERY, 2332
- OBSTRUCTION, 8213
  - CYSTIC FIBROSIS, 6364*
  - DISEASES ASSOCIATED WITH, 6364*
  - GRANULOMA, 3242
  - MALABSORPTION SYNDROMES, 7643
  - NEONATE, 3229
  - PATHOLOGY, 4121
  - POLYPS, 3242
  - SURGERY, 6364*
  - TRANSPORT, 2717
- ORGAN CULTURE
  - DRUG EFFECTS ON, 3839
  - GLUCOSE, 7300*
  - METABOLISM, 7300*
  - MORPHOLOGY, 7903*
  - MORPHOMETRY, 7903*
  - PENTAGASTRIN, 3839
  - TECHNIQUES, 3883
  - ULTRASTRUCTURE, 7903*
- OSMOTIC PRESSURE
  - GLUCOSE, 8095
- OXYGEN
  - DISTENTION, 4707*
  - PARASITES AND PARASITIC DISEASES, 3882
- PAIN
  - SURGERY, 5682
- PANCREAS
  - LACTATION, 5293*
  - SECRETION, 2851, 2980, 3585*, 5293*
- PANCREATIC DUCT
  - HYPERPLASIA, 2980
  - HYPERTROPHY, 2980
- PARASITES AND PARASITIC DISEASES
  - CHILD, 5957*
  - INFLAMMATION, 4739
  - LYMPHOCYTES, 4739
  - MORPHOLOGY, 6662
  - MOTILITY, 1827*
  - SEX FACTORS, 6662
  - ULTRASTRUCTURE, 6662
- PARENTERAL ALIMENTATION
  - CHILD, 4866*
  - DISEASE, 4866*
  - MORPHOLOGY, 1119
- PATHOLOGY
  - DISEASES ASSOCIATED WITH, 5938*
  - HEMODIALYSIS, 5938*
  - TRANSPLANTATION, 3890
- PEPTIDE HYDROLASES
  - DIGESTION, 1085*

INTESTINE, SMALL (continued)
- PEPTIDES
  - ABSORPTION, 7499*
  - HYDROLYSIS, 1085*
  - TRANSPORT, 7499*
- PERFORATION
  - CLEARANCE STUDY, 2993*
  - FETUS, 6962
  - IATROGENESIS, 6545*
  - IMMUNOSUPPRESSION, 4123
  - LYMPHOMA, 5679
  - NEONATE, 6962
  - NEOPLASM METASTASIS, 4455
  - PANCREATITIS, 3333
- PERFUSION
  - BLOOD, 7489*
  - TECHNIQUES, 3883
- PERISTALSIS
  - PURINES, 7946
  - SURGERY, 8218
- PERITONEUM
  - GASES, 6968
- PERMEABILITY, 5276*
  - DIURETICS, 5446
  - GLUCOSE, 5446
  - OSMOTIC PRESSURE, 877
  - WATER, 2712
- PHOSPHATES
  - TRANSPORT, 802, 887
- PHOSPHOLIPIDS
  - BILE ACIDS AND SALTS, 1775*
  - FATTY ACIDS, 1775*
  - HYDROLYSIS, 1775*
- PLASMA
  - PROTEINS, 1773*
- PNEUMATOSIS
  - PATHOLOGY, 8163*
- POTASSIUM
  - ULCER, 6939*
- PROTEINS, 1773*
  - CADMIUM, 7507
  - ENZYMES, 6133
  - MEMBRANES, 5261*
  - PARENTERAL ALIMENTATION, 3854
  - SERUM, 2070
  - SURGERY, 1126, 2070, 2136
  - VITAMIN D, 6839
- PURINES
  - ELECTRICAL CONTROL, 1854
- RADIATION EFFECTS ON
  - SURGERY, 1354
  - ULTRASTRUCTURE, 5460
- RADIOLOGY
  - BARIUM, 6829*
  - CHILD, 3062
  - INTUBATION, 3996
  - TECHNIQUES, 3996
- REGENERATION
  - GASTRIN, 2801
  - HORMONE EFFECTS ON, 2801
  - PARENTERAL ALIMENTATION, 4689
  - SECRETION, 1759
- REVIEW
  - ANCYLOSTOMIASIS, 826
- RUPTURE
  - CHILD, 6306
- SCANNING, SCINTILLATION
  - BLEEDING, 6959

INTESTINE, SMALL (continued)
- SCLERODERMA
  - ABSORPTION, 5219
- SCLEROSIS
  - MALABSORPTION SYNDROMES, 5674
- SECRETAGOGUES
  - TOXICITY, 7484*
- SECRETION
  - ALKALINE PHOSPHATASE, 4690
  - AMYLASES, 6822
  - CALCIUM, 2078, 2084
  - CATHARTICS, 3825*
  - CELLS, 6827, 7288*
  - CHOLERA, 2084, 3840
  - CHYLOMICRONS, 3827*, 5439*
  - DEFICIENCY, 7290*
  - DILATATION, 7290*
  - DRUG EFFECTS ON, 3825*
  - ENTEROKINASE, 4690
  - ENZYMES, 3838
  - GLYCOPROTEINS, 3850
  - HORMONE EFFECTS ON, 2961*
  - HORMONES, GASTROINTESTINAL, 2961*
  - HYPERTROPHY, 7290*
  - IMMUNOLOGY, 6128*
  - LIPASE, 6822
  - MORPHOLOGY, 7290*
  - MUCUS, 6128*
  - PANCREATECTOMY, 3838
  - PHYSICAL FACTORS, 2068
  - PRESSURE STUDY, 2058*
  - PROTEINS, 4690
  - SHIGELLOSIS, 3840
  - SODIUM, 2961*
  - TERPENES, 6827
  - TOXINS, 3840
  - VEINS, 2058*
  - WATER, 2961*
- SEROTONIN
  - HISTOCHEMISTRY, 7513*
  - NERVOUS CONTROL, 7513*
- SHOCK
  - ENZYMES, 3877
  - HYPOXIA, 3877
  - NERVOUS SYSTEM, 4727, 6832*
  - ULCER, 4727
- SHUNT
  - COMPLICATIONS, 2314*
  - RADIOLOGY, 2314*
- SHUNT, INTESTINAL
  - BIOCHEMISTRY, 6944
  - COMPLICATIONS, 3226
  - HYPERTROPHY, 3888
  - LIVER FUNCTION TESTS, 4732
  - MORPHOLOGY, 6944, 8194*
  - OBESITY, 5692, 6944
  - PARENTERAL ALIMENTATION, 3888
  - PREGNANCY, 3226
- SODIUM
  - BINDING, 8088*
  - SULFATES, 2728
- STENOSIS
  - ISCHEMIA, 432
  - PATHOLOGY, 432
- STIMULATION
  - MORPHOLOGY, 2098
- STOMACH
  - ACID SECRETION, 5367*

INTESTINE, SMALL (continued)
- STOMACH (continued)
  - MOTILITY, 3631*
  - SECRETION, 5367*
- STRANGULATION, 1370
- STRICTURE
  - DIAGNOSIS, 7607*
  - ISCHEMIA, 7607*
- SUCRASE
  - HORMONE EFFECTS ON, 5444*
- SULFATES
  - ABSORPTION, 2728
  - MARKER STUDY, 2728
- SURFACTANTS
  - ULTRASTRUCTURE, 8086*
  - WATER, 8086*
- SURGERY
  - ALKALINE PHOSPHATASE, 8087*
  - CELLS, 2135, 2334
  - CHOLESTEROL, 3221*
  - COLON, 1748*
  - COMPLICATIONS, 407
  - ENZYMES, 1360, 1361
  - ESOPHAGUS, 6030
  - GANGRENE, 407
  - GASTRIN, 2069
  - HEALING, 8224
  - HORMONES, 3886, 3887
  - HYPERPLASIA, 1749*
  - INTESTINES, 1748*
  - KINETICS, 2334
  - MECKEL'S DIVERTICULUM, 8224
  - MITOSIS, 1748*, 1749*
  - MORPHOLOGY, 1127
  - NEONATE, 6961
  - NUCLEIC ACIDS, 1748*
  - NUTRITION, 2069
  - OBESITY, 2324
  - PENTAGASTRIN, 2069
  - PERISTALSIS, 1131
  - STOMACH, 2965*
  - TRACER STUDY, 2135
  - VITAMIN D, 7609*
- TISSUE ADHESIVES, 3880
- TRANSPLANTATION, 3533
  - ABSORPTION, 2726
  - CIRCULATION, 3889
  - IMMUNOLOGY, 199, 3871*, 3885
  - MESENTERY, 3889
  - METABOLISM, 4699
  - PATHOLOGY, 3871*
  - SIMULATION, 199, 1128
- TRANSPORT
  - AGE FACTORS, 1818
  - AMINO ACIDS, 7914*, 7929
  - ANGIOTENSIN, 7303*
  - CALCIUM, 5287*, 6014
  - CARBOHYDRATES, 4513, 7920*
  - CARDIOVASCULAR SYSTEM, 4507*
  - CHYLOMICRONS, 5439*
  - DRUG EFFECTS ON, 4542, 7303*
  - ELECTROLYTES, 4500*
  - GLUCOSE, 3854, 4500*, 6011, 6823
  - HORMONE EFFECTS ON, 4500*, 7303*, 7932
  - IMMUNOGLOBULINS, 7318, 7319
  - KINETICS, 1789, 2710, 5278*
  - LYSOSOMES, 6023
  - MONOSACCHARIDES, 1813

- INTESTINE, SMALL (continued)
  - TRANSPORT (continued)
    - NEONATE, 6023
    - NERVOUS CONTROL, 4542
    - NUCLEOSIDES, 5290*
    - NUCLEOTIDES, 5290*
    - PRESSURE STUDY, 4542
    - SIMULATION, 4544*
    - SODIUM, 4507*, 4513, 6009
    - SULFATES, 6023
    - VITAMIN B1, 2706*
    - VITAMIN K, 7314
    - WATER, 1815, 1816, 1817, 2712, 4500*, 4507*, 5278*, 7305*
    - ZINC, 5292*
  - TRICHINOSIS
    - LYMPHOCYTES, 4464
  - TRIGLYCERIDES, 7926
  - TRYPSIN
    - METABOLISM, 1929*
    - PANCREAS, 7723*
  - TUBERCULOSIS
    - MALABSORPTION SYNDROMES, 7643
  - ULCER
    - ANTI-INFLAMMATORY AGENTS, 1132
    - PERITONITIS, 6304
  - ULTRASTRUCTURE
    - PARASITES AND PARASITIC DISEASES, 3026
  - UREA
    - ENZYMES, 183
  - VIABILITY
    - DYES, 2982*
  - VILLI
    - ATROPHY, 8099*
    - CIRCULATION, 1120, 2124
    - DRUG EFFECTS ON, 6833*
    - ENZYMES, 1088
    - MORPHOMETRY, 3010
    - MOTILITY, 2738*
    - PROTEINS, 4682*
    - RADIATION EFFECTS ON, 6833*
    - SURGERY, 1088
  - VIRUSES
    - PARTICLES, 228
    - SCLEROSIS, 7877, 7891
  - VITAMIN B12
    - PANCREATITIS, CHRONIC, 4510*
  - WATER
    - TRANSPORT, 8086*
  - WATER, ELECTROLYTE BALANCE
    - EPITHELIUM, 5279*
    - SEROTONIN, 1781*
    - TRANSPORT, 5279*
  - WILSON'S DISEASE
    - COPPER, 3404
    - ETIOLOGY, 3404
  - WOUNDS AND INJURIES
    - ANTI-INFLAMMATORY AGENTS, 4127
    - DRUG-INDUCED, 4127
    - PREVENTION, 4127
    - PROSTAGLANDINS, 4127
  - XYLOSE
    - ABSORPTION, 901
  - ZINC
    - ACRODERMATITIS, 8225*
- INTESTINES
  - ABSORPTION
    - AMINO ACIDS, 2617, 7913*
- INTESTINES (continued)
  - ABSORPTION (continued)
    - ANTIBACTERIALS, 1675
    - CADMIUM, 1797
    - CALCIUM, 1362
    - CATHARTICS, 3825*
    - CHYLOMICRONS, 7302*
    - DRUG EFFECTS ON, 3605*, 3825*
    - DRUGS, 3613
    - ELECTROLYTES, 900, 4503*
    - ETHNIC FACTORS, 5301
    - FATS, 2727, 6695
    - FATTY ACIDS, 2727
    - GLUCOSE, 3832*
    - INFANT, 4116
    - IRON, 3619, 6018
    - KINETICS, 22, 5338
    - LEAD, 21
    - LIPIDS, 7302*
    - NEONATE, 4116
    - NITROGEN, 7913*
    - PEROXIDASES, 1807
    - PHOSPHATES, 3605*
    - PHOSPHORUS, 1362
    - PROSTAGLANDINS, 7919*
    - SODIUM, 3622, 4503*
    - TECHNIQUES, 4694
    - TRIGLYCERIDES, 2727, 6162
    - VITAMIN E, 4116
    - WATER, 900, 3622
    - XYLOSE, 4511
  - ACIDS
    - MARKER STUDY, 1750*
    - ULTRASTRUCTURE, 1750*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    - ESCHERICHIA COLI, 2131
    - TOXINS, 2131
  - ADENOSINE TRIPHOSPHATASE
    - MEMBRANES, 5452
  - AFFERENT LOOP SYNDROME
    - MOTILITY, 5322*
  - AMEBIASIS
    - COLITIS, 6667
    - COMPLICATIONS, 4460
    - DYSENTERY, 6667
    - EPIDEMIOLOGY, 4460, 6667
    - ETIOLOGY, 4460
    - REVIEW, 4460
  - AMINO PEPTIDASES
    - MEMBRANES, 2077
  - AMYLASES, 1092
  - ANOMALY
    - SURGERY, 8219
  - ANOMALY, CONGENITAL, 8210
  - ANTIBIOTICS
    - COMPLICATIONS, 4936
    - ENZYMES, 1097
  - ANTIGENS
    - HYPERSENSITIVITY, 3025
  - APPENDIX, 2667
  - ASCARIASIS
    - IMMUNITY, 6149
  - ATRESIA
    - FISSURE, 7015
  - ATROPINE
    - SECRETIN, 2978
  - BACTERIA, 6840, 6841
    - ANTIBIOTICS, 813, 3530

INTESTINES (continued)
- BACTERIA (continued)
  - BACTERIAL INFECTIONS, 1670
  - BILE ACIDS AND SALTS, 6074*
  - BREATH TEST, 2194
  - CHILD, 3542
  - DIETARY FACTORS, 6589*
  - DRUG THERAPY, 1670
  - GNOTOBIOTICS, 1671
  - INFLAMMATORY BOWEL DISEASES, 4970
  - LEUKOCYTES, 813
  - PREMATURITY, 1670
  - REVIEW, 2375
  - TEMPERATURE, 211
- BACTERIAL INFECTIONS
  - BILE ACIDS AND SALTS, 5931*
  - ELECTROLYTES, 1364
  - EPIDEMIOLOGY, 817
  - SOCIOECONOMIC FACTORS, 817
  - TRANQUILIZING AGENTS, 1364
  - YERSINIA, 3246
- BILE ACIDS AND SALTS
  - ANTIBIOTICS, 7389*
  - BACTERIA, 1116, 7389*, 7440*
  - DIARRHEA, 3799
  - FETUS, 7396*
  - METABOLISM, 3013, 7396*
  - MICROORGANISMS, 3013
  - NEONATE, 7396*
  - TRANSPORT, 1793
- BRADYKININ
  - ENDOTOXINS, 5454
  - SHOCK, 5454
- CALCIUM
  - ABSORPTION, 1799, 1801, 2605
  - SECRETION, 5453
  - TRANSPORT, 2722
- CARBOHYDRATES
  - HYPERLIPOPROTEINEMIA, 3857
- CATHARTICS
  - PERMEABILITY, 1685
  - SECRETION, 1685
- CELIAC DISEASE
  - ABSORPTION, 450
  - NEOPLASMS, MALIGNANT, 3266
  - PATHOLOGY, 451
  - PERFORATION, 3266
  - TRYPSINOGEN, 448
- CELLS
  - BIOCHEMISTRY, 2675*
  - HORMONES, 5273
  - MALABSORPTION SYNDROMES, 7656
  - MITOSIS, 8094
  - REGENERATION, 3679
- CHALONES
  - BIOASSAY, 1114
- CHELATING AGENTS
  - SYNTHESIS, 3795
- CHOLAGOGUES AND CHOLERETICS
  - DRUG EFFECTS ON, 1008*
  - MUSCLES, 1008*
- CHOLELITHIASIS
  - DIAGNOSIS, 3228
  - OBSTRUCTION, 3228
  - THERAPY, 3228
- CHOLERA
  - IMMUNITY, 2133
  - SIMULATION, 2133

INTESTINES (continued)
- CHOLESTEROL
  - ENZYMES, 5461
  - EXCRETION, 1005*
  - SECRETION, 1005*
  - SYNTHESIS, 2086, 2975
- CHOLIC ACID
  - BACTERIA, 7440*
- CHROMATOGRAPHY
  - GASES, 1179*
- CHYLOMICRONS
  - PHOSPHOLIPIDS, 1795
- CHYMOTRYPSIN
  - METABOLISM, 1929*
- CIRCULATION
  - ACETYLCHOLINE, 3878
  - COMPLICATIONS, 6301
  - DISTENTION, 3878
  - ESTROGENS, 4650
  - HORMONES, 2128
  - ISCHEMIA, 6607
  - NERVOUS CONTROL, 4705*
  - TRACER STUDY, 5503
- CLOSTRIDIUM
  - THERAPY, 4115
- CONTRAST MEDIA
  - GALLBLADDER DISEASES, 5913*
- CYSTS
  - NEONATE, 8210
- CYTOCHROMES
  - COBALT, 1012*
- CYTOLOGY
  - PHYSICAL FACTORS, 8
- DIALYSIS
  - NITROGEN, 4407
- DIGESTION
  - PROTEINS, 1089
  - REVIEW, 2967
- DISEASE
  - BILE ACIDS AND SALTS, 7280
  - CHILD, 5191
  - NERVOUS SYSTEM, 7050
- DISTENTION
  - DRUG EFFECTS ON, 2742*
  - NERVOUS CONTROL, 2742*
- ELECTRICAL CONTROL, 3639
  - TECHNIQUES, 1822*
- ELECTROPHYSIOLOGY
  - CALCIUM, 5306*
  - CHOLECYSTECTOMY, 6552*
  - PERFUSION, 2123
  - TECHNIQUES, 1822*, 3642
- ENDOCRINE SYSTEM
  - DISEASE, 6036
  - HORMONES, GASTROINTESTINAL, 6036
  - REVIEW, 6036
- ENDOSCOPY
  - BIOPSY, 396, 3065
  - COMPLICATIONS, 3066
  - PROTEIN-LOSING ENTEROPATHIES, 3065
  - TECHNIQUES, 3997
- ENDOTOXINS
  - ABSORPTION, 2708*
- ENKEPHALINS
  - RADIOIMMUNOASSAY, 5274
- ENTEROCOLITIS, NECROTIZING
  - GANGRENE, 4185
  - PNEUMATOSIS, 1689

NTESTINES (continued)
- ENTEROTOXINS
  - CHOLERA, 2083
- ENVIRONMENTAL FACTORS
  - EPITHELIUM, 2067
  - MITOSIS, 2067
- ENZYMES, 3844, 8092
  - AGE FACTORS, 4678
  - CHENODEOXYCHOLIC ACID, 1955
  - CHILD, 3261
  - DEFICIENCIES, 2360
  - DISACCHARIDASES, 3261
  - DRUG EFFECTS ON, 1363
  - IMMUNOCHEMISTRY, 7492*
  - LIPASE, 3261
  - LIPIDS, 6817*
  - MEMBRANES, 1090, 2360
  - METABOLISM, 1929*
  - PEPTIDASE, 3261
  - TECHNIQUES, 6138
- EPITHELIUM
  - ACIDS, 1750*
  - ENZYMES, 3845
  - ESCHERICHIA COLI, 1761
- ESCHERICHIA COLI
  - ANTIBODIES, 8100*
  - MORPHOLOGY, 2685*
  - ULTRASTRUCTURE, 2685*
- FATTY ACIDS, 3848
  - METABOLISM, 8096
- FECES, 2736*
  - BILE ACIDS AND SALTS, 3799
  - STEROLS, 3799
- FERRITIN
  - ABSORPTION, 884
- FETUS
  - ALKALINE PHOSPHATASE, 6137
  - GLYCOPROTEINS, 3852
- FIBERS
  - MOTILITY, 2376
  - REVIEW, 2376
- FISTULA
  - COMPLICATIONS, 421
  - ENZYMES, 3590
  - METABOLISM, 4117
  - REVIEW, 796
  - SURGERY, 8211
  - THERAPY, 8211
- FOOD
  - DIGESTION, 2967
  - HORMONES, 6838
- GANGRENE, 7680
- GASES
  - DIAGNOSIS, 3933
  - SURGERY, 1179*
- GASTRIN, 3688
- GIARDIASIS
  - DRUG THERAPY, 3572
- GLUCOSE
  - OXIDATION, 176
- GLYCOPROTEINS
  - ENZYMES, 3851
- GLYCOSIDES
  - MUSCLES, 4712*
- HELMINTHIASIS
  - DIAGNOSIS, 821
  - DRUG THERAPY, 830, 1720
  - ELECTROPHYSIOLOGY, 5251
  - EPIDEMIOLOGY, 828

INTESTINES (continued)
- HELMINTHIASIS (continued)
  - FEEDING, 1712
  - IMMUNOLOGY, 227
  - LEAD, 5971
  - MALABSORPTION SYNDROMES, 827
  - MOTILITY, 5251
  - PARENTERAL ALIMENTATION, 1712
  - PATHOLOGY, 5487
- HEMATOMA
  - ANTICOAGULANTS, 4103*
- HEMORRHAGE
  - ETIOLOGY, 3546
- HETEROTOPIA
  - CHILAIDITI'S SYNDROME, 2395
  - RADIOLOGY, 2395
- HORMONE CONTROL
  - SECRETION, 5453
- HORMONES
  - CHROMATIN, 2088
- HORMONES, GASTROINTESTINAL
  - ELECTRICAL CONTROL, 1826*
  - MOTILITY, 1826*
  - RADIOIMMUNOASSAY, 5468*
- HUMORAL FACTORS
  - ACID SECRETION, 1905
- HYPERLIPEMIA
  - SUCROSE, 2976
- HYPERPLASIA
  - HYPOGAMMAGLOBULINEMIA, 6288*
- HYPERTROPHY
  - ANTRUM, 197
  - SURGERY, 197
- HYPOXIA
  - VASODILATOR AGENTS, 2125
- IMMUNOGLOBULINS
  - CELLS, 6818*
  - CHOLERA, 4697
  - COLITIS, ULCERATIVE, 852
  - CROHN'S DISEASE, 852
  - DISEASE, 6430
  - IMMUNITY, 6818*
  - MORPHOLOGY, 852, 1776*
  - SYNTHESIS, 1776*
  - VIRUSES, 1110
- IMMUNOLOGY
  - SOMATOSTATIN, 3832*
- INFANT
  - BACTERIA, 7253
- INFARCTION
  - CLEARANCE STUDY, 2993*
  - CONTRACEPTIVES, ORAL, 3217*
  - DIAGNOSIS, 4763
  - ETIOLOGY, 3217*
  - RADIONUCLIDES, 4763
  - SCANNING, SCINTILLATION, 4763
- INFECTION
  - INFANT, 8200
- INFILTRATION
  - CHILD, 397
- INFLAMMATION
  - ANTI-INFLAMMATORY AGENTS, 7719
  - DRUG THERAPY, 7719
  - IMMUNOTHERAPY, 7719
  - NEOPLASMS, 4880*
- INTESTINE, SMALL
  - CHOLERA, 4697
  - SURGERY, 1748*

INTESTINES (continued)
  INTUSSUSCEPTION
    CHILD, 4953, 6331*
    CYSTS, 480
    DIAGNOSIS, 6331*
    INFANT, 4953
    LYMPHATIC SYSTEM, 480
    THERAPY, 4953, 6331*
  IRON
    ABSORPTION, 884
    BINDING, 6018
  ISCHEMIA, 7680
    CONTRACEPTIVES, ORAL, 3217*
    DIAGNOSIS, 6607
    ETIOLOGY, 3217*
    GLYCOSIDES, 4712*
    MORPHOLOGY, 2990*
    PATHOLOGY, 2990*
    REVIEW, 4119, 6607
    SCANNING, SCINTILLATION, 5537
    SIMULATION, 193*, 2125
    ULCER, 2990*
    VASODILATOR AGENTS, 2125
  LACTASE
    AGE FACTORS, 6130*
    BIOPSY, 5065
    NEONATE, 6130*
    PREGNANCY, 6130*
    PROTEINS, 6130*
    TECHNIQUES, 5065
  LAPAROSCOPY
    TECHNIQUES, 3997
  LEUKEMIA
    COMPLICATIONS, 6419*
  LIPASE, 2727
  LIPIDS
    ABSORPTION, 25
    TECHNIQUES, 4694
  LIPOPROTEINS
    MORPHOLOGY, 182
    PHOSPHOLIPIDS, 1795
    SUCROSE, 2976
  LYMPH
    TRANSPORT, 3603*
  LYMPHANGIECTASIS
    CHILD, 3241
    DIET, 3241
    IMMUNOLOGY, 3241
  LYMPHATIC SYSTEM
    ULTRASTRUCTURE, 2698*
  LYSOSOMES
    EMBRYOLOGY, 172*
    REVIEW, 172*
    SHOCK, 3872*
  MALABSORPTION SYNDROMES
    CHILD, 3261
    GIARDIASIS, 438, 1718
  MEMBRANES
    CHEMICAL COMPOSITION, 2360
  METAPLASIA, 3148
    DIAGNOSIS, 5621
  MORPHOLOGY
    MALABSORPTION SYNDROMES, 7656
  MOTILITY, 3639
    ANALGESICS AND ANTIPYRETICS, 6552*
    ANESTHESIA, 6552*
    BILE ACIDS AND SALTS, 1467, 3799
    CALCIUM, 5306*
    CHOLECYSTECTOMY, 6552*

INTESTINES (continued)
  MOTILITY (continued)
    CHOLECYSTOKININ, 2751
    DIETARY FACTORS, 2736*
    DRUG EFFECTS ON, 1363, 2742*, 5323*
    ESOPHAGUS, ARTIFICIAL, 295
    GNOTOBIOTICS, 1848
    HORMONES EFFECTS ON, 2751
    MARKER STUDY, 2768
    NERVOUS CONTROL, 2742*
    PEPTIDES, 3652
    STEROLS, 3799
    SURGERY, 3657
    TECHNIQUES, 1822*
    TRICHINOSIS, 5486
  MUSCLES
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4527*
    AMINO ACIDS, 4527*
    CALCIUM, 5306*
    CHOLECYSTOKININ, 5312*
    HORMONE EFFECTS ON, 5312*
    SYMPATHOMIMETICS, 918
  MYIASIS, 3310
  NARCOTICS
    METABOLISM, 8093
  NECROSIS
    GASES, 3933
    IMMUNOSUPPRESSION, 4123
  NEONATE
    IMMUNOGLOBULINS, 6818*
  NEOPLASMS, 4409
    ETIOLOGY, 4880*
    FOREIGN BODIES, 4880*
    IATROGENESIS, 4880*
    RADIOLOGY, 7024
  NEOPLASMS, MALIGNANT
    ANTINEOPLASTIC AGENTS, 470
    DRUG THERAPY, 470
  NITROGEN, 6821
    TRANSPORT, 4407
  NUCLEIC ACIDS
    ANTINEOPLASTIC AGENTS, 188
    CELLS, 179
    SYNTHESIS, 179
  NUTRITION DISORDERS
    CHILD, 7262
    IMMUNOGLOBULINS, 4408
    MORPHOLOGY, 7262
  OBSTRUCTION, 3879
    DIAGNOSIS, 3228
    NEONATE, 3229
    PSYCHOLOGICAL FACTORS, 7628
    THERAPY, 3228
  PANCREAS, 5457
    DEFICIENCY, 5457
    SECRETION, 5457
  PARASITES AND PARASITIC DISEASES
    BIOPSY, 1252
    CHILD, 822, 1711
    DIAGNOSIS, 253, 6653
    DRUG THERAPY, 1713
    EPIDEMIOLOGY, 1711, 4458*, 6653, 6665
    ETHNIC FACTORS, 822
    INFANT, 4458*
    INFECTION, 6653
    PATHOLOGY, 6668

NTESTINES (continued)
- PARASITES AND PARASITIC DISEASES (continued)
  - PROSTAGLANDINS, 8119
  - REVIEW, 1710
  - TECHNIQUES, 253
  - THERAPY, 3563
  - TRANSMISSION, 4458*
- PARASYMPATHOMIMETICS
  - SECRETIN, 2978
- PARENTERAL ALIMENTATION, 7504
- PATHOLOGY
  - CHILD, 397
  - IMMUNODEFICIENCY DISEASES, 4410
- PEPTIDASE, 4692
- PERFORATION
  - COMPLICATIONS, 7621
  - FOREIGN BODIES, 7621
  - IMMUNOSUPPRESSION, 4123
  - PANCREATITIS, 3333
  - SURGERY, 7621, 8211
  - SURVIVAL, 5212
  - THERAPY, 8211
  - TUBERCULOSIS, 435
- PERFUSION
  - AMINO ACIDS, 2617
  - RADIOLOGY, 4925*
- PERMEABILITY
  - TECHNIQUES, 5277*
- PHOSPHATES
  - TRANSPORT, 2722
- PHOSPHOLIPASE
  - ACIDITY, 4679*
  - FATTY ACIDS, 4679*
- PHOSPHOLIPIDS
  - CHYLOMICRONS, 2130
- PNEUMATOSIS, 6333*
  - ABDOMEN, 6300
  - BACTERIAL INFECTIONS, 4193
  - DISEASES ASSOCIATED WITH, 2477, 5214
  - SHUNT, INTESTINAL, 3219*
  - SIMULATION, 4193
- POLYPS
  - CHILD, 505
  - RADIOLOGY, 4195
- PROTEIN-LOSING ENTEROPATHIES
  - BIOPSY, 1252
  - LYMPHANGIECTASIS, 1387
- PROTEINS
  - CALCIUM, 2080
  - DEFICIENCY, 5448
  - FEEDING, 2081
  - MEMBRANES, 2064
  - METABOLISM, 8200
  - NEONATE, 5448
  - TRANSPORT, 3603*
  - VITAMIN D, 2081
- PROTOZOAL DISEASES
  - DIAGNOSIS, 3551
  - DRUG THERAPY, 3551, 3572
  - THERAPY, 3551
- PSEUDO-OBSTRUCTION
  - DISEASES ASSOCIATED WITH, 4122
  - ELECTROPHYSIOLOGY, 6290*
  - ETIOLOGY, 5215, 5652*
  - FAMILIAL FACTORS, 4881*
  - MOTILITY, 2340, 6290*
  - MUSCLES, 5652*

INTESTINES (continued)
- PSEUDO-OBSTRUCTION (continued)
  - NEUROMUSCULAR DISEASES, 5215
  - PATHOLOGY, 5652*
- RADIATION EFFECTS ON
  - EPITHELIUM, 2067
  - MITOSIS, 2067
- RADIOLOGY
  - COMPLICATIONS, 6858
  - DISEASE, 6858
- REGENERATION
  - GASTRIN, 2801
  - HORMONE EFFECTS ON, 2801
- REVIEW, 2189
- SALMONELLOSIS
  - DRUG EFFECTS ON, 7921*
  - PERFORATION, 6633
- SCLERODERMA
  - FAMILIAL FACTORS, 6598
- SECRETION
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2060*
  - CATHARTICS, 3825*
  - CELLS, 5273
  - CHOLERA, 2083
  - DRUG EFFECTS ON, 2083, 3825*
  - ENTEROTOXINS, 2083
  - HORMONES, 2128
  - INTESTINE, SMALL, 2083
  - LIPOPROTEINS, 3857
  - PROSTAGLANDINS, 2093
- SEROMUCOIDS
  - DIAGNOSIS, 5690
- SHIGELLOSIS
  - SIMULATION, 1696
- SHOCK
  - ALBUMINS, 3872*
  - NERVOUS SYSTEM, 4727
  - PREVENTION, 3872*
  - ULCER, 4727
- SHUNT, INTESTINAL
  - METABOLISM, 3222*
  - PATHOLOGY, 3222*
- SPHINCTER
  - NERVOUS CONTROL, 64
- STOMACH
  - FEEDING, 1137
- STRANGULATION
  - CLOSTRIDIUM, 2987*
- SUCRASE
  - IMMUNOCHEMISTRY, 7492*
- SURGERY
  - ANTIDIARRHEALS, 5709*
  - COMPLICATIONS, 7626
  - LASER, 196
  - OXALATES, 4258*
  - PROGNOSIS, 2101*
  - TECHNIQUES, 401, 2101*, 4163
- TEMPERATURE
  - EPITHELIUM, 2067
  - MITOSIS, 2067
- TISSUE ADHESIVES
  - NEOPLASMS, 3879
- TOXICOLOGY, 1044
- TOXINS, 5073
  - CHOLERA, 3617
- TRANSPLANTATION
  - DRUG EFFECTS ON, 2122
  - HYPOTHERMIA, 2122

INTESTINES (continued)
    TRANSPLANTATION (continued)
        PERFUSION, 2122
        SIMULATION, 2122
    TRANSPORT
        AMINO ACIDS, 4692, 7913*
        CALCIUM, 880
        CHYLOMICRONS, 7302*
        DRUGS, 875
        ELECTROLYTES, 3617
        GALACTOSE, 27
        GLUCOSE, 27
        IMMUNOGLOBULINS, 1776*
        IRON, 3619
        KINETICS, 5338
        LIPIDS, 7302*
        NITROGEN, 7913*
        PEPTIDES, 4692, 7913*
        TOXINS, 3617
        ULTRASTRUCTURE, 878
        VILLI, 878
        WATER, 7921*
    TRYPSIN
        METABOLISM, 1929*
        TECHNIQUES, 3998
    TUBERCULOSIS
        DIAGNOSIS, 6588*
        DRUG THERAPY, 6588*
        PATHOLOGY, 2341
        PROGNOSIS, 5182
        RADIOLOGY, 2341
        REVIEW, 2341
        SURGERY, 5182
        THERAPY, 5182
    ULCER
        ANTI-INFLAMMATORY AGENTS, 8102*
        BACTERIA, 8102*
        DRUG-INDUCED, 8102*
        PROSTAGLANDINS, 8102*
    VITAMIN B12
        ABSORPTION, 897, 1779*
    VITAMIN D
        ADENOSINE CYCLIC 3',5'
          MONOPHOSPHATE, 2075
        BINDING, 5458
        CHROMATIN, 2088
        ORGAN CULTURE, 2075
    WOUNDS AND INJURIES
        COMPLICATIONS, 7620
        HEALING, 808
        IMMUNOGLOBULINS, 6296
        LYSOZYMES, 6296
        PERFORATION, 7621
        RUPTURE, 6903

INTOLERANCE
    FRUCTOSE
        BIOCHEMISTRY, 8232
        CHILD, 8229
        GENETIC FACTORS, 4142
        GENETICS, 8232
        PATHOLOGY, 8232
    PROTEINS
        COLITIS, 5716*
        DIARRHEA, 5716*
        INFANT, 5716*

INTRINSIC FACTOR
    DUODENUM
        ANEMIA, PERNICIOUS, 1377

INTRINSIC FACTOR (continued)
    ILEUM, 7495*
        ANALYSIS, 2062*
        CHEMICAL COMPOSITION, 2062*
        SOLUBILITY, 2062*
        TECHNIQUES, 1125
    INTESTINE, SMALL, 7495*
        VITAMIN B12, 3014
    PROTEINS
        BINDING, 2062*
        VILLI, 2062*
    PYLORUS, 7495*
    STOMACH, 7495*
        ADENOSINE CYCLIC 3',5'
          MONOPHOSPHATE, 3711
        NUCLEOTIDES, 3711
        PARASYMPATHOMIMETICS, 964
        PENTAGASTRIN, 964
        SECRETION, 3711
    VITAMIN B12
        ABSORPTION, 871*
        BINDING, 963
        CHROMATOGRAPHY, 3014
        IRRADIATION, 963
        STOMACH, 963

INTUBATION
    CHOLANGITIS
        JAUNDICE, 8422*
    GIARDIASIS
        DUODENUM, 6658
    INTESTINE, SMALL
        BIOPSY, 2167*
        COMPLICATIONS, 2318
        DRUG EFFECTS ON, 2167*
        OBSTRUCTION, 2318
        RADIOLOGY, 3996
        TECHNIQUES, 2167*, 2318
    JAUNDICE
        OBSTRUCTION, 2578*
    ULCER, PEPTIC
        SIMULATION, 2281*

INTUSSUSCEPTION
    CHILD, 496
        EPIDEMIOLOGY, 5671
        ETIOLOGY, 7042
        SURGERY, 425
        THERAPY, 1418, 5671, 7042
    COLON
        NEOPLASMS, 7035
    DUODENUM
        HAMARTOMA, 5659
        HETEROTOPIA, 1375
        NEOPLASMS, BENIGN, 5659
    GASTRECTOMY
        COMPLICATIONS, 2258
        INTESTINE, SMALL, 2258
    ILEUM
        ANGIOGRAPHY, 3218*
        POLYPS, 2339
    INFANT
        EPIDEMIOLOGY, 5671
        SURGERY, 425
        THERAPY, 5671
    INFLAMMATION
        POLYPS, 2339
    INTESTINE, LARGE
        RADIOLOGY, 8244

- NTUSSUSCEPTION (continued)
  - INTESTINE, SMALL
    - AGE FACTORS, 5684
    - ANGIOGRAPHY, 3218*
    - ENTERITIS, 6297
    - HEMANGIOMA, 5683
    - INFANT, 5683
    - REVIEW, 5684
    - ULTRASONOGRAPHY, 7025
  - INTESTINES
    - CHILD, 4953, 6331*
    - CYSTS, 480
    - DIAGNOSIS, 6331*
    - INFANT, 4953
    - LYMPHATIC SYSTEM, 480
    - THERAPY, 4953, 6331*
  - KIDNEY DISEASES, 1376
  - PROLAPSE
    - RECTUM, 497
    - THERAPY, 497
  - RECTUM
    - ETIOLOGY, 7708
    - NEOPLASMS, 7708
  - RECURRENCE
    - NEOPLASMS, MALIGNANT, 1374
  - SIGMOID
    - ETIOLOGY, 7708
    - NEOPLASMS, 7708
  - THERAPY
    - ENEMA, 4953
    - SURGERY, 4953

- ODINE
  - HEPATITIS, TOXIC
    - THYROID GLAND, 700
  - LIVER CIRRHOSIS
    - THYROID GLAND, 700
  - LIVER FUNCTION TESTS
    - RADIOISOTOPES, 3096

- ON-EXCHANGE RESINS
  - VAGOTOMY
    - DIARRHEA, 2591*

- ION TRANSPORT
  - SEE ALSO ELECTRON TRANSPORT
  - ANTRUM, 1871*
    - ACIDITY, 4570*
    - BICARBONATE SECRETION, 5285*
  - BILIARY TRACT
    - DRUG EFFECTS ON, 4646
  - CALCIUM
    - DEFICIENCY, 5495
  - CECUM
    - CALCIUM, 5495
    - HYPERTROPHY, 1796
    - MAGNESIUM, 5495
  - CHLORIDES
    - ILEUM, 5284*
    - JEJUNUM, 5284*
  - COLON, 4505*
    - ACIDOSIS, 4501*
    - ALKALOSIS, 4501*
    - BILE ACIDS AND SALTS, 4506*, 6816*
    - CALCIUM, 5441*, 5495
    - CATECHOLAMINES, 6015
    - CATHARTICS, 4506*
    - CHLORIDES, 6013

- ION TRANSPORT (continued)
  - COLON (continued)
    - DRUG EFFECTS ON, 4506*, 7922
    - ELECTROPHYSIOLOGY, 2696*
    - EPINEPHRINE, 6015
    - HORMONE EFFECTS ON, 7922
    - HORMONES, ADRENAL CORTEX, 7922
    - MAGNESIUM, 5495
    - POTASSIUM, 6013, 7918*
    - SODIUM, 6013
    - STEROIDS, 7922
  - DIARRHEA
    - ETIOLOGY, 6816*
  - ESOPHAGUS
    - PEPSIN, 2697*
  - GALLBLADDER
    - SODIUM, 1769*
    - WATER, ELECTROLYTE BALANCE, 1769*
  - HYPERTROPHY
    - ABSORPTION, 1796
  - ILEOSTOMY
    - CHILD, 3224
    - SODIUM, 3224
  - ILEUM
    - ALCOHOLS, 4498*
    - BACTERIA, 34
    - BILE ACIDS AND SALTS, 4499*
    - CATECHOLAMINES, 34
    - CHOLERA, 6012
    - DRUG EFFECTS ON, 4498*
    - ELECTROPHYSIOLOGY, 4504*, 7925
    - HORMONE CONTROL, 7313
    - HORMONES, 34
    - HORMONES, ADRENAL CORTEX, 7313
    - NERVOUS CONTROL, 7925
    - PROSTAGLANDINS, 34
    - THYROCALCITONIN, 5298
    - TOXINS, 34, 6012
  - INTESTINE, LARGE
    - DRUG EFFECTS ON, 7922
    - HORMONE EFFECTS ON, 7922
    - HORMONES, ADRENAL CORTEX, 7922
    - STEROIDS, 7922
  - INTESTINE, SMALL, 6000*, 6002*
    - AMINO ACIDS, 6009
    - BILE ACIDS AND SALTS, 1794, 6689*
    - CALCIUM, 2078
    - CARBOHYDRATES, 6009
    - ELECTROPHYSIOLOGY, 7925
    - GLUCOSE, 2694*, 6009
    - HORMONE CONTROL, 7313
    - HORMONES, ADRENAL CORTEX, 7313
    - MEMBRANES, 6688*
    - NERVOUS CONTROL, 7925
    - SHUNT, 1803
  - JEJUNUM, 6002*
    - ALCOHOLS, 4498*
    - ANTI-INFLAMMATORY AGENTS, 2059*
    - BILE ACIDS AND SALTS, 6689*
    - CELLS, 3607*
    - CHOLERA, 2059*, 6012
    - DRUG EFFECTS ON, 4498*
    - ENTEROTOXINS, 2059*
    - HORMONE CONTROL, 7313
    - HORMONES, ADRENAL CORTEX, 7313
    - SODIUM, 3607*
    - TOXINS, 6012
  - LIVER
    - HYALURONIDASE, 2718

- ION TRANSPORT (continued)
  - MAGNESIUM
    - DEFICIENCY, 5495
  - RECTUM
    - DIURETICS, 2756
    - DRUG EFFECTS ON, 2756
    - STEROIDS, 2756
    - TECHNIQUES, 2756
  - SALIVARY GLANDS
    - CALCIUM, 7340
  - SODIUM
    - ILEUM, 5284*
    - JEJUNUM, 5284*
  - SPRUE, TROPICAL, 6982*
  - STOMACH, 1871*, 6017, 7354, 7928
    - ACID-BASE BALANCE, 1875*
    - ACIDITY, 4570*
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1907
    - ALCOHOLS, 36
    - ANALGESICS AND ANTIPYRETICS, 1884*
    - ANESTHETICS, 7315
    - BILE ACIDS AND SALTS, 974
    - CHOLECYSTITIS, 754
    - DRUG EFFECTS ON, 1884*, 7315
    - ENDOTOXINS, 6006*
    - ENZYMES, 1768*
    - EPITHELIUM, 949*
    - H2 RECEPTOR ANTAGONISTS, 974
    - HISTAMINE, 974
    - LIVER CIRRHOSIS, 1551*
    - NEOPLASMS, MALIGNANT, 8176
    - PERMEABILITY, 1551*
    - SECRETION, 949*, 1875*, 1907
    - ULCER, 4574*
    - WOUNDS AND INJURIES, 1551*
  - SULFOBROMOPHTHALEIN
    - MITOCHONDRIA, 6007*
  - SURGERY, 4655
  - ULCER
    - STRESS, 4574*

- IRON
  - ABSORPTION, 2112
    - CARBOHYDRATES, 885
    - DIET, 886
    - DIETARY FACTORS, 6691*
    - DUODENUM, 2703*
    - FIBERS, 5339
    - INTESTINE, SMALL, 869*, 2703*
    - PREGNANCY, 3619
    - STARCH, 1771*
  - ANEMIA
    - DEFICIENCY, 1262*
  - BACTERIAL INFECTIONS
    - IMMUNITY, 5948
    - PREVENTION, 5948
  - BINDING
    - PROTEINS, 5459
  - CYSTIC FIBROSIS
    - ABSORPTION, 7749*, 8268*
    - CHILD, 7749*
  - DEFICIENCY
    - ANEMIA, 6696
    - DISEASES ASSOCIATED WITH, 1262*
  - DIET
    - ABSORPTION, 6692*
    - SIMULATION, 6692*

- IRON (continued)
  - DIETARY FACTORS
    - ABSORPTION, 886
  - DUODENUM
    - ABSORPTION, 31, 1771*
    - FERRITIN, 2187
    - KINETICS, 17*
    - PROTEINS, 5459
    - STARCH, 1771*
  - FATTY LIVER
    - ALCOHOLS, 4725
    - METABOLISM, 4725
  - GASTRITIS
    - IMMUNODEFICIENCY DISEASES, 2245
  - GASTROINTESTINAL SYSTEM
    - ABSORPTION, 3618
  - HELMINTHIASIS
    - DEFICIENCY, 5508
  - HEMOCHROMATOSIS
    - GENETICS, 7815*
    - HEPATOCYTES, 5906*
  - HEPATOCYTES
    - METABOLISM, 6772*
  - HERNIA
    - DEFICIENCY, 1262*
  - HYPOGLYCEMIA, 6448*
  - INTESTINAL ABSORPTION
    - ANTACIDS, 8230
    - DEFICIENCY, 3620
    - HEMODIALYSIS, 8230
  - INTESTINE, SMALL
    - ABSORPTION, 1771*, 3621, 4512, 5341
    - DEFICIENCY, 4686*
    - HELMINTHIASIS, 5508
    - PERMEABILITY, 1804
    - STARCH, 1771*
    - TRANSPORT, 1805
    - WATER, ELECTROLYTE BALANCE, 1804
  - INTESTINES
    - ABSORPTION, 884, 3619, 6018
    - BINDING, 6018
    - TRANSPORT, 3619
  - LIVER, 2599
    - ABSORPTION, 2704*
    - ANEMIA, 1494
    - HEMOCHROMATOSIS, 3377, 5907*
    - HISTOCHEMISTRY, 3377
    - METABOLISM, 1494
    - REVIEW, 1494
    - TRANSFERRIN, 7994*
  - LIVER CIRRHOSIS
    - HEPATOCYTES, 5906*
  - LIVER DISEASES, ALCOHOLIC
    - DIET, 2530*
  - LIVER INJURY, 6448*
  - METABOLISM, 4414
    - ANEMIA, 6696
  - NUTRITION DISORDERS
    - ABSORPTION, 4512
  - PORPHYRIA
    - METABOLISM, 8309
    - PATHOLOGY, 7755*
  - PROTEINS
    - LIVER, 2011
    - PREGNANCY, 5459
    - SYNTHESIS, 2011
  - SIDEROSIS
    - HEPATOCYTES, 8389*

- IRON (continued)
  - STOMACH
    - ANEMIA, 325
    - DEFICIENCY, 7909
    - SURGERY, 5614
  - TRANSPORT
    - PREGNANCY, 3619

- IRRADIATION
  - SEE ALSO RADIATION
  - COLITIS
    - COLON, 486
    - REVIEW, 486
  - DUODENUM
    - CYTOLOGY, 5467*
    - MITOSIS, 5467*
  - ENTERITIS
    - RADIOLOGY, 417
  - GASTROINTESTINAL SYSTEM
    - SEQUELAE, 6614
  - INTESTINE, SMALL
    - CYTOLOGY, 5467*
    - EPITHELIUM, 5460
    - MITOSIS, 5467*
    - ULTRASTRUCTURE, 5460
  - INTRINSIC FACTOR
    - VITAMIN B12, 963
  - JEJUNUM
    - MITOSIS, 868
    - REGENERATION, 5178*
  - NEOPLASMS, MALIGNANT
    - DRUG THERAPY, 2631
    - MOUTH, 2630, 2631
    - PHARYNX, 2630, 2631
  - RECTUM
    - NEOPLASMS, 4152*
    - NEOPLASMS, MALIGNANT, 3294
    - SURVIVAL, 4152*
  - SALIVARY GLANDS
    - NEOPLASMS, BENIGN, 5954
    - NEOPLASMS, MALIGNANT, 5236, 5954
  - STOMACH
    - NEOPLASMS, MALIGNANT, 328

- IRRITABLE COLON
  - ADRENERGIC RECEPTOR AGONISTS
    - DRUG THERAPY, 5738
    - ETIOLOGY, 5738
  - DIAGNOSIS, 7043
  - DIVERTICULUM
    - DIARRHEA, 1392*
    - ETIOLOGY, 1392*
  - DRUG THERAPY, 3308
    - PARASYMPATHOLYTICS, 7671
  - ETIOLOGY
    - MOTILITY, 3281*
  - FECES
    - CHEMICAL COMPOSITION, 1392*
  - LACTOSE INTOLERANCE
    - SIMULATION, 6991
  - MOTILITY
    - ELECTROPHYSIOLOGY, 3281*
    - PRESSURE STUDY, 5720*
  - RECTUM
    - AMINES, 5759*
    - BIOPSY, 5759*
    - NERVOUS CONTROL, 5759*
  - THERAPY, 7043
    - DIET, 6332*

- ISCHEMIA
  - BILE
    - SYNTHESIS, 7470
  - CELLS
    - MITOSIS, 2100*
  - COLITIS, 4944
    - DIAGNOSIS, 4155*, 4943, 7706
    - DISEASES ASSOCIATED WITH, 6328*
    - ETIOLOGY, 5476*, 7706
    - RADIOLOGY, 4155*
    - REVIEW, 1413
    - SIMULATION, 5475*, 5476*
  - COLON
    - COLITIS, 498
    - CONTRACEPTIVES, ORAL, 5755
    - DISEASES ASSOCIATED WITH, 6380*
  - DUODENUM, 4690
    - BLEEDING, 4720
    - PATHOLOGY, 4720
  - ENTERITIS, 5698
  - GASTROINTESTINAL DISEASES
    - REVIEW, 4119
  - ILEITIS, 8209
  - ILEUM
    - GLUCOSE, 3866*
    - MORPHOLOGY, 3837
    - OXYGEN, 3866*
  - INTESTINAL OBSTRUCTION
    - CECUM, 7709
  - INTESTINE, LARGE
    - PNEUMATOSIS, 4879*
    - STENOSIS, 5722*
  - INTESTINE, SMALL, 4690, 6956
    - BLOOD GROUPS, 5656*
    - CELLS, 5469*
    - CONTRACEPTIVES, ORAL, 5656*
    - DIAGNOSIS, 2329
    - GLUCOSE, 3866*
    - KINETICS, 2100*
    - MITOSIS, 2100*
    - MORPHOLOGY, 2990*
    - OXYGEN, 3866*
    - PARASITES AND PARASITIC DISEASES, 5957*
    - PATHOLOGY, 2990*
    - PEPTIDE HYDROLASES, 4713*
    - RADIOLOGY, 2329
    - SMOKING, 5656*
    - STENOSIS, 432
    - STRICTURE, 7607*
    - ULCER, 2990*
    - VIABILITY, 2982*
    - VILLI, 2100*
  - INTESTINES, 7680
    - CIRCULATION, 6607
    - CONTRACEPTIVES, ORAL, 3217*
    - DIAGNOSIS, 6607
    - ETIOLOGY, 3217*
    - GLYCOSIDES, 4712*
    - MORPHOLOGY, 2990*
    - PATHOLOGY, 2990*
    - REVIEW, 4119, 6607
    - SCANNING, SCINTILLATION, 5537
    - SIMULATION, 193*, 2125
    - ULCER, 2990*
    - VASODILATOR AGENTS, 2125
  - JEJUNUM, 4690
  - LIVER
    - AMINO TRANSFERASES, 612

- ISCHEMIA (continued)
  - LIVER (continued)
    - ENZYMES, 8042*
    - NEOPLASMS, 4660
    - NUCLEIC ACIDS, 4660
  - LIVER INJURY
    - NECROSIS, 6088*
    - PROTEINS, 124*
  - PANCREAS
    - PEPTIDE HYDROLASES, 4713*
  - PANCREATITIS
    - BONES, 6392
  - STOMACH
    - ELECTROPHYSIOLOGY, 4569*
    - OXYGEN, 3006
    - PATHOLOGY, 4720
    - ULCER, 1311, 8106*
  - VILLI
    - WOUNDS AND INJURIES, 2100*

- ISOENZYMES
  - AMYLASES
    - TEMPERATURE, 6358*
  - BILIARY TRACT DISEASES
    - ALKALINE PHOSPHATASE, 4249*
  - COLITIS, ULCERATIVE
    - ALKALINE PHOSPHATASE, 4209
  - HEPATITIS, INFECTIOUS
    - DIAGNOSIS, 5076*
    - NECROSIS, 3435
  - LIVER
    - ALDOLASE, 8292*
    - FIBROSIS, 2198
    - NECROSIS, 3435
    - NEOPLASMS, MALIGNANT, 8292*
  - LIVER CIRRHOSIS
    - ALKALINE PHOSPHATASE, 679, 3098
  - LIVER DISEASES
    - ALKALINE PHOSPHATASE, 3099, 4249*
    - DIAGNOSIS, 5074*
    - URINE, 6431
  - NEOPLASMS, MALIGNANT
    - ALDOLASE, 8292*
  - PANCREATITIS, CHRONIC
    - AMYLASES, 4224*, 8272*
    - DIAGNOSIS, 8272*
  - ULCER, PEPTIC
    - VITAMINS, 389

- ISOTHIOCYANATES
  - SEE THIOCYANATES

- JAUNDICE
  - AMMONIA
    - METABOLISM, 8298*
  - ANTIBIOTICS
    - ETIOLOGY, 6446*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
  - BILE DUCTS
    - HAMARTOMA, 1622
  - BILIARY TRACT
    - RADIOLOGY, 726
  - BILIRUBIN
    - BLOOD, 5063*
    - CLEARANCE STUDY, 5064*, 5089*
    - ETIOLOGY, 3425*
    - METABOLISM, 5089*
    - PLASMA, 5064*

- JAUNDICE (continued)
  - BILIRUBIN (continued)
    - URINE, 5063*, 5064*
  - BREAST FEEDING
    - FATTY ACIDS, 7771*
  - CHOLANGIOGRAPHY, 4782
    - DIAGNOSIS, 3047*, 4783
    - TECHNIQUES, 279, 6546*
  - CHOLANGITIS
    - DRAINAGE, 8422*
    - INTUBATION, 8422*
    - LAPAROTOMY, 8422*
  - CHOLECYSTITIS
    - THERAPY, 747
  - CHOLESTASIS
    - DIAGNOSIS, 6574*
    - PREGNANCY, 4256*
    - PRURITIS, 4256*
    - ULTRASONOGRAPHY, 6574*
  - CONTRACEPTIVES, ORAL
    - HYPERSENSITIVITY, 1496
    - PREGNANCY, 1496
  - DIAGNOSIS, 7846
    - BIOPSY, 6577*
    - CHOLANGIOGRAPHY, 3111, 3951, 4010, 4012, 6548*
    - CYTOLOGY, 6577*
    - PANCREATOGRAPHY, 3951
    - SCANNING, SCINTILLATION, 3111
    - TECHNIQUES, 1604, 3111
    - ULTRASONOGRAPHY, 3111, 5157*, 6548*, 6575*, 7823*, 8135
  - DRUG-INDUCED
    - ANTIBIOTICS, 6446*
    - ETIOLOGY, 6446*
    - HEPATITIS, CHRONIC, 6443*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
    - TOXICITY, 8344
  - DRUG THERAPY, 1506*
  - DUODENOSCOPY, 4359*
  - ENZYMES
    - LIVER, 1457*
    - SERUM, 1457*
    - URINE, 1457*
  - ETIOLOGY
    - FOOD POISONING, 3414*
    - HYPERSENSITIVITY, 6446*
    - IMMUNOLOGY, 6446*
    - LIVER INJURY, 5237
    - SEPSIS, 5237
    - TRANSFUSION, 5237
    - ULTRASOUND, 3504*
  - GALLBLADDER DISEASES
    - THERAPY, 747
  - GASTROINTESTINAL DISEASES
    - SURGERY, 5161*
  - HEPATITIS
    - NEOPLASMS, 3425*
    - TRANSFUSION, 2525*
  - HEPATITIS, CHRONIC
    - TRANSFUSION, 2525*
  - HORMONES
    - TOXICITY, 8344
  - IATROGENESIS, 7106*
  - INFANT
    - BILE ACIDS AND SALTS, 3368*
    - DIAGNOSIS, 4277*, 5035*
    - NUCLEOTIDASE, 4750*

JAUNDICE (continued)
  INFANT (continued)
    PHOTOTHERAPY, 5062*
    PROGNOSIS, 1495
    SURGERY, 5035*
  LACTOSE INTOLERANCE
    INFANT, 637
  LAPAROSCOPY
    DIAGNOSIS, 5925*
  LIVER, 3520
    BIOPSY, 7846
    ENZYMES, 7407*
  LIVER CIRRHOSIS
    SURVIVAL, 8394
  LIVER DISEASES
    SURGERY, 5161*
  LIVER FUNCTION TESTS, 3926
    PREGNANCY, 1512*
    RADIONUCLIDES, 1512*
  MALABSORPTION SYNDROMES
    LACTOSE, 3406*
  NEONATE, 6437
    AGE FACTORS, 6435*
    ALPHA FETOPROTEIN, 3408*
    BILIRUBIN, 6435*
    COMPLICATIONS, 3406*
    DIAGNOSIS, 3408*, 4277*
    DIARRHEA, 3406*
    DRUG-INDUCED, 7772*
    DRUG THERAPY, 7134
    EPIDEMIOLOGY, 1505*
    ETIOLOGY, 7772*, 8338
    LACTOSE INTOLERANCE, 5065
    NUCLEOTIDASE, 4750*
    OXYTOCIN, 5842*
    PHOTOTHERAPY, 5062*, 7134, 8337*
    PROSTAGLANDINS, 5842*
    THERAPY, 7134
  OBSTRUCTION
    INTUBATION, 2578*
  PANCREAS
    BIOPSY, 4976*
    DIAGNOSIS, 4976*
  PANCREATIC DISEASES
    SURGERY, 5161*
  PANCREATITIS
    CHILD, 541
    CHOLELITHIASIS, 2430*
    THERAPY, 5793*
  PANCREATITIS, CHRONIC
    THERAPY, 5793*
  PHOTOTHERAPY
    COMPLICATIONS, 637
    IMMUNOGLOBULINS, 8337*
    IMMUNOLOGY, 8337*
    INFANT, 637
    LACTOSE INTOLERANCE, 637
  PREGNANCY, 4271
  STOMACH
    SURGERY, 3400
  SURGERY
    COMPLICATIONS, 5161*
    DIAGNOSIS, 7106*
    ETIOLOGY, 7106*
    RADIOLOGY, 4772
  WOUNDS AND INJURIES
    ETIOLOGY, 5237

JAUNDICE, CHOLESTATIC
  CHOLANGIOGRAPHY
    TECHNIQUES, 3048*
  DIAGNOSIS
    REVIEW, 3409*
    SURGERY, 4384
  DRUG-INDUCED
    SEDATIVES, 8346
  DYES, 4383
  ETIOLOGY, 4384
    ANDROGENS, 3379
  INFANT
    DIAGNOSIS, 3409*
  NEONATE
    DIAGNOSIS, 3409*
  VITAMIN D
    DEFICIENCY, 3386

JAUNDICE, CHRONIC IDIOPATHIC
  CLEARANCE STUDY
    SULFOBROMOPHTHALEIN, 3094
  DIAGNOSIS
    CLEARANCE STUDY, 3094
  DISEASES ASSOCIATED WITH
    ANEMIA, HEMOLYTIC, 4275*
    PHOTOSENSITIVITY, 4275*
    PORPHYRIA, 4275*
  DRUG THERAPY, 1506*, 7773*
  LIVER
    LYSOSOMES, 5060*
    PIGMENTS, 638
  METABOLISM, 7773*
  PHENOBARBITAL
    DRUG EFFECTS ON, 4276*
  PREGNANCY, 7774*
    DISEASES ASSOCIATED WITH, 4275*
  SULFOBROMOPHTHALEIN
    KINETICS, 1507
    METABOLISM, 1507

JAUNDICE, OBSTRUCTIVE
  ACYLTRANSFERASES
    CHOLESTEROL, 2586
  ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    GLUCAGON, 5927*
  BILE
    CHEMICAL COMPOSITION, 4370*
    INTESTINE, SMALL, 6579*
    REFLUX, 2054
  BILE DUCTS
    COMPRESSION, 5160*
    NEOPLASMS, BENIGN, 7218*
    RADIOLOGY, 4772
  BILIARY TRACT
    PRESSURE STUDY, 1157
  BILIRUBIN
    DIALYSIS, 4305
  BIOPSY
    DIAGNOSIS, 6578*
  CHILD
    DIAGNOSIS, 6576*
    ETIOLOGY, 5024*
    PATHOLOGY, 5024*
    PROGNOSIS, 5024*
    SCANNING, SCINTILLATION, 7094*
  CHOLANGIOGRAPHY
    TECHNIQUES, 4354*, 5155*
  CHOLIC ACID
    CLEARANCE STUDY, 3519

JAUNDICE, OBSTRUCTIVE (continued)
  COMMON BILE DUCT CALCULI
    SURGERY, 4381
    ULTRASONOGRAPHY, 7229
  DIAGNOSIS, 1605, 3519
    AMINO ACIDS, 3112
    BIOPSY, 6577*
    CHOLANGIOGRAPHY, 4011, 4784, 5155*
    CYTOLOGY, 6577*
    LIPOPROTEINS, 6438
    ULTRASONOGRAPHY, 5157*, 7823*
  DISEASES ASSOCIATED WITH
    NEOPLASMS, MALIGNANT, 5054
  DRAINAGE
    TECHNIQUES, 6579*
  ENDOTOXINS
    BILE ACIDS AND SALTS, 2579*
  ETIOLOGY
    PANCREATITIS, 5002
  GASTROINTESTINAL SYSTEM
    NEOPLASMS, 636
  GLUTAMYLTRANSPEPTIDASE
    SIMULATION, 225
  HEPATITIS, INFECTIOUS
    LIPOPROTEINS, 8368
  HYPERBILIRUBINEMIA, 4305
  HYPERTENSION, PORTAL, 8436
  INFANT
    DIAGNOSIS, 3112
    LIPOPROTEINS, 4278
    SCANNING, SCINTILLATION, 7094*
  KERNICTERUS
    NERVOUS SYSTEM, 7107*
  LEUKEMIA
    COMPLICATIONS, 6419*
  LIPOPROTEINS
    NEONATE, 5159*
    PLASMA, 2586
  LIVER
    BIOPSY, 6578*
    HEMANGIOMA, 2457*
    MORPHOLOGY, 583
    NEOPLASMS, MALIGNANT, 1458*, 3505*
  NEONATE
    ETIOLOGY, 5024*
    PATHOLOGY, 5024*
    PROGNOSIS, 5024*
  NEOPLASM METASTASIS
    CHOLANGIOGRAPHY, 5926*
    DIAGNOSIS, 5926*
    ENDOSCOPY, 5926*
    SURGERY, 7217*
  NEOPLASMS
    BILE DUCTS, 2579*
    PANCREAS, 2579*
  NEOPLASMS, MALIGNANT
    GASTROINTESTINAL SYSTEM, 2898
    SURGERY, 7217*
  PANCREAS
    CYSTS, 7228
    NEOPLASMS, BENIGN, 525
  PANCREATITIS, CHRONIC
    COMPLICATIONS, 8274*
  PLASMA
    LIPOPROTEINS, 8368
  SIMULATION, 164
    PRESSURE STUDY, 1157
  STOMACH
    BEZOARS, 3159

JAUNDICE, OBSTRUCTIVE (continued)
  SURGERY
    PROGNOSIS, 2580*
    SURVIVAL, 2580*
  ULTRASOUND, 3504*
  URINARY SYSTEM
    CHOLELITHIASIS, 2579*
    NEOPLASMS, 2579*
    STRICTURE, 2579*

JEJUNUM
  SEE ALSO DUODENUM, ILEUM, INTESTINE, SMALL
  ABSORPTION
    AMINO ACIDS, 3011, 3236, 7912*
    BILE ACIDS AND SALTS, 5425*
    CALCIUM, 6014
    CARBOHYDRATES, 6010
    CHOLECYSTOGRAPHY, 1785
    CHOLINE, 2709*
    DIETARY FACTORS, 859
    ELECTROLYTES, 6012
    FATTY ACIDS, 7317
    FETUS, 7309
    FRUCTOSE, 4508*, 6010
    GLUCOSE, 2961*, 4508*, 6010
    HORMONE EFFECTS ON, 7932
    HYPOGLYCEMIC AGENTS, 1787
    MORPHOLOGY, 7309
    MOTILITY, 859
    PEPTIDES, 24, 1778*
    SURFACTANTS, 876
    VITAMIN B6, 6021
    VITAMINS, 890
    WATER, 6012, 6025, 7305*
  ACHLORHYDRIA
    MORPHOLOGY, 2312*
  ACIDS, 3630*
  ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    DRUG EFFECTS ON, 6814*
  ADENOSINE TRIPHOSPHATASE
    HYDROLYSIS, 2076
  AMINO ACIDS, 3630*
    ABSORPTION, 23, 1778*, 8083*
    METABOLISM, 23, 8083*
    TRANSPORT, 2699*
  ANTIEMETICS
    BIOPSY, 1184*
    DRUG EFFECTS ON, 1184*
  ANTIGENS
    SCLEROSIS, 7891
  ASPIRIN
    WOUNDS AND INJURIES, 2324
  ATROPHY
    GASTRIN, 4685*
    HORMONE EFFECTS ON, 4685*
  BACTERIA, 4114
    LIVER CIRRHOSIS, 6520*
  BILE ACIDS AND SALTS
    TRANSPORT, 2720
  BIOPSY
    SIMULATION, 4133*
    ULTRASTRUCTURE, 4710
  CALCIUM
    ABSORPTION, 2702*
    TRANSPORT, 883, 5288*
  CELIAC DISEASE
    EPITHELIUM, 3253*
    IMMUNOGLOBULINS, 447

JEJUNUM (continued)
  CELIAC DISEASE (continued)
    MORPHOLOGY, 3252*, 3253*
    PEPTIDES, 2353
  CELLS
    ION TRANSPORT, 3607*
  CHILD
    LYMPHOCYTES, 2166*
    PROTEIN-LOSING ENTEROPATHIES, 3257*
  CHOLECYSTOKININ
    RADIOIMMUNOASSAY, 3592
  CHOLERA
    ENTEROTOXINS, 2059*, 2060*
  CHOLESTEROL
    SYNTHESIS, 4618*
  CIRCULATION
    HORMONE EFFECTS ON, 4700*
    HORMONES, GASTROINTESTINAL, 4700*
    RADIOLOGY, 3586*
  COLON
    ENZYMES, 5990*
    REGENERATION, 5990*
    VILLI, 5990*
  DERMATITIS HERPETIFORMIS
    EPITHELIUM, 3253*
    MORPHOLOGY, 3253*
    NEOPLASMS, 5655*
  DIARRHEA
    MORPHOLOGY, 2312*
  DILATATION
    DIAGNOSIS, 3231
    INFANT, 3231
    PATHOLOGY, 3231
    SURGERY, 3231
  DISTENTION
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2963*
    SECRETION, 2963*
  DIVERTICULITIS
    PERFORATION, 1368
  DIVERTICULUM, 7613, 7615
    PERFORATION, 413
  DRUG METABOLISM, 2071
  DUPLICATION
    COMPLICATIONS, 2227
  ELECTROPHYSIOLOGY
    AMINO ACIDS, 2699*
    BACTERIA, 7323
    CELLS, 2065
    GLUCOSE, 2694*
    RADIOLOGY, 2729*
  ENTERITIS
    VIRUS DISEASES, 2962*
  ENTEROTOXINS
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2060*
    ANTI-INFLAMMATORY AGENTS, 2059*
  ENZYMES
    BILE, 4688
    CARBOHYDRATES, 3829*
    DISEASES ASSOCIATED WITH, 2622
  FATS, 3630*
    ABSORPTION, 6003*
    CALCIUM, 6003*
    MAGNESIUM, 6003*
  FATTY ACIDS
    SECRETION, 2087

JEJUNUM (continued)
  FEEDING
    MITOSIS, 2986*
  FISTULA, 7584
    SURGERY, 7627
    TECHNIQUES, 2964*
  FOLIC ACID
    DEFICIENCY, 4923
  GALLBLADDER
    MORPHOLOGY, 2851
  GASTRECTOMY
    NEOPLASMS, MALIGNANT, 336
    TECHNIQUES, 5597*
  GASTRIN
    RADIOIMMUNOASSAY, 3592
  GASTROENTERITIS
    EPITHELIUM, 2962*
    VIRUS DISEASES, 2962*
  GLUCAGON, 4690
  GLUCONEOGENESIS, 1095
    FEEDING, 191
  GLUCOSE
    ABSORPTION, 28, 4132*
    ENZYMES, 8084*
    KINETICS, 1819
    PERFUSION, 8084*
    TRANSPORT, 30
  HEMORRHAGE
    DYSPLASIA, 7657*
  HORMONES, GASTROINTESTINAL, 1872*
    ASSAY, 6820*
    DIGESTION, 6820*
    MOTILITY, 1826*
    RADIOIMMUNOASSAY, 5468*
  HYPERPLASIA
    GASTRIN, 4685*
    HORMONE EFFECTS ON, 4685*
  ILEUM
    ULCER, 5657*
  IMMUNOGLOBULINS, 6972
    BINDING, 7319
    CELIAC DISEASE, 7634*
  INTESTINAL ABSORPTION, 6134
  INTESTINAL OBSTRUCTION
    ILEITIS, 5666
    INFLAMMATION, 5666
    NEOPLASMS, MALIGNANT, 4888
  INTESTINE, SMALL
    NUCLEIC ACIDS, 6813
    TECHNIQUES, 3075
  ION TRANSPORT, 6002*
    ALCOHOLS, 4498*
    ANTI-INFLAMMATORY AGENTS, 2059*
    BILE ACIDS AND SALTS, 6689*
    CHLORIDES, 5284*
    CHOLERA, 2059*, 6012
    DRUG EFFECTS ON, 4498*
    ENTEROTOXINS, 2059*
    HORMONE CONTROL, 7313
    HORMONES, ADRENAL CORTEX, 7313
    SODIUM, 3607*, 5284*
    TOXINS, 6012
  IRRADIATION
    REGENERATION, 5178*
  ISCHEMIA, 4690
  KINETICS
    CELLS, 2334
  LACTASE
    HORMONE EFFECTS ON, 5444*
    TECHNIQUES, 3075

JEJUNUM (continued)
- LACTOSE INTOLERANCE, 3075
- LIPIDS
  - ABSORPTION, 174*
- MACROGLOBULINEMIA
  - NEOPLASMS, 2623
- MALABSORPTION SYNDROMES
  - BACTERIA, 4113
  - GIARDIASIS, 4113
  - ILEITIS, 6940*, 6941*
- METABOLISM
  - BILE ACIDS AND SALTS, 5425*
- MICROORGANISMS, 4114
- MITOSIS
  - IRRADIATION, 868
- MORPHOLOGY, 6134
  - DIETARY FACTORS, 5271
  - PANCREAS, 2851
  - VAGOTOMY, 2688
- MOTILIN, 4693
- MOTILITY
  - CHOLECYSTOKININ, 5314*
  - DRUG EFFECTS ON, 5314*
  - ELECTROPHYSIOLOGY, 4129*, 7323
  - PRESSURE STUDY, 4129*
  - RADIOLOGY, 2729*
  - SURGERY, 934
  - TECHNIQUES, 933
  - TRANSPORT, 6710
- MUSCLES
  - SURGERY, 934
- NEOPLASMS, BENIGN
  - DIAGNOSIS, 410
- NEOPLASMS, MALIGNANT
  - NEOPLASM METASTASIS, 8222
  - ULCER, 475
- NERVOUS SYSTEM
  - NEOPLASMS, MALIGNANT, 7612
- NUCLEIC ACIDS
  - BILE, 4688
  - SYNTHESIS, 4923
- OBESITY
  - SURGERY, 2332
- OBSTRUCTION
  - CYSTIC FIBROSIS, 6364*
  - DISEASES ASSOCIATED WITH, 6364*
  - SURGERY, 6364*
- ORGAN CULTURE
  - MORPHOLOGY, 7903*
  - MORPHOMETRY, 7903*
  - ULTRASTRUCTURE, 7903*
- OSMOTIC PRESSURE
  - GLUCOSE, 8095
- PANCREAS
  - SECRETION, 4688
  - SURGERY, 1439*
- PANCREATITIS, CHRONIC
  - DIAGNOSIS, 3353
  - ETIOLOGY, 3353
  - PATHOLOGY, 3353
- PELLAGRA
  - MORPHOLOGY, 2366
- PEPTIDASE, 4691
- PEPTIDE HYDROLASES
  - DIGESTION, 1085*
- PEPTIDES
  - ABSORPTION, 7499*
  - TRANSPORT, 7499*
- PERFORATION, 7584

JEJUNUM (continued)
- PERMEABILITY
  - BILE ACIDS AND SALTS, 888
  - CHOLECYSTOGRAPHY, 1785
  - TECHNIQUES, 5277*
- POLYPS
  - PEUTZ-JEGHER'S SYNDROME, 1695
- POTASSIUM
  - SECRETION, 3833*
  - WATER, ELECTROLYTE BALANCE, 3833*
- PROTEINS
  - BILE, 4688
  - FETUS, 7309
  - MEMBRANES, 5261*
- RADIATION, 3005
- RADIATION EFFECTS ON, 3005
- SECRETIN
  - MARKER STUDY, 177
- SECRETION
  - ALKALINE PHOSPHATASE, 4690
  - CHOLESTEROL, 2087
  - CHYLOMICRONS, 5439*
  - ENTEROKINASE, 4690
  - GLUCOSE, 6132
  - PROTEINS, 4690
  - SODIUM, 2961*
  - WATER, 2961*
- SHUNT, INTESTINAL
  - PROTEINS, 2315*
- SODIUM
  - SULFATES, 2728
  - TRANSPORT, 33, 883, 5286*
- SOLUBILITY
  - CHOLECYSTOGRAPHY, 1785
- SPRUE, TROPICAL
  - BIOPSY, 4133*
  - MORPHOLOGY, 4133*
- STARVATION
  - MITOSIS, 2986*
- STOMACH
  - ACID SECRETION, 5367*
  - SECRETION, 5367*
- SUCRASE, 3847
  - BILE, 4688
  - HORMONE CONTROL, 3831*
  - HORMONE EFFECTS ON, 5444*
  - NERVOUS CONTROL, 3831*
  - SUCROSE, 3831*
- SULFATES
  - ABSORPTION, 2728
- SURGERY, 3227
  - KINETICS, 2334
  - MORPHOLOGY, 2332
- TRANSPLANTATION
  - IMMUNOSUPPRESSION, 3884
  - MORPHOLOGY, 3884
- TRANSPORT
  - ANESTHETICS, 872
  - ANGIOTENSIN, 1791, 7303*
  - BILE ACIDS AND SALTS, 4497*
  - CALCIUM, 6014
  - CHYLOMICRONS, 5439*
  - DRUG EFFECTS ON, 7303*
  - DRUGS, 1783
  - ELECTROLYTES, 4498*, 7313
  - ELECTROPHYSIOLOGY, 7308*
  - GLUCOSE, 1819, 4497*, 6011
  - HORMONE EFFECTS ON, 7303*, 7932
  - IMMUNOGLOBULINS, 7318, 7319

- JEJUNUM (continued)
  - TRANSPORT (continued)
    - KINETICS, 1789, 2710
    - MARKER STUDY, 2096*
    - SURVIVAL, 872
    - VITAMIN B1, 893
    - WATER, 4498*, 7305*, 7313
  - TRIGLYCERIDES
    - ENZYMES, 4680*
    - METABOLISM, 4680*
  - ULCER
    - DIAGNOSIS, 3201
    - ENDOSCOPY, 3201, 5657*
    - GASTRECTOMY, 1355
    - HEMORRHAGE, 4128
    - PEPSIN, 2793*
    - RECURRENCE, 6277
    - REVIEW, 1870
    - SIMULATION, 1870
    - STOMACH, 6277
    - SURGERY, 1355, 5657*
  - ULTRASTRUCTURE, 5993
    - VAGOTOMY, 2688
  - VIRUSES
    - SCLEROSIS, 7877, 7891
  - WATER
    - TRANSPORT, 5286*
  - WATER, ELECTROLYTE BALANCE, 5286*, 6134
    - ANTI-INFLAMMATORY AGENTS, 2059*
    - CHOLERA, 2059*
    - ENTEROTOXINS, 2059*

- KALLIKREIN
  - ABSORPTION
    - AMINO ACIDS, 7914*
  - HEPATITIS, INFECTIOUS
    - PLASMA, 5097
  - SALIVARY GLANDS
    - NERVOUS CONTROL, 5345
    - SECRETION, 5350
  - TRANSPORT
    - AMINO ACIDS, 7914*

- KERNICTERUS
  - AMINO ACIDS, 2473
    - DIETARY FACTORS, 3394
    - HEPATITIS, INFECTIOUS, 4295*
    - HEPATITIS, TOXIC, 4295*
    - PLASMA, 3393
  - L-DOPA
    - DRUG THERAPY, 7763
  - DRUG THERAPY, 2536*
  - GLUCAGON
    - DIURESIS, 2473
  - INSULIN
    - DIURESIS, 2473
  - JAUNDICE, OBSTRUCTIVE
    - NERVOUS SYSTEM, 7107*
  - LIVER
    - HEPATITIS, 1564
    - LIVER CIRRHOSIS, 1564
  - LIVER CIRRHOSIS
    - HEMORRHAGE, 717
    - LIVER FUNCTION TESTS, 1552*
    - NERVOUS SYSTEM, 7107*
    - SHUNT, 5904*
  - LIVER DISEASES
    - AMMONIA, 7182*

- KERNICTERUS (continued)
  - LIVER DISEASES (continued)
    - ANTIBIOTICS, 716
    - DOPAMINE, 7182*
  - REYE'S SYNDROME
    - HEPATITIS, 5026*
    - REVIEW, 5026*
  - THERAPY
    - AMINO ACIDS, 3394
    - DIETARY FACTORS, 3394

- KETOSIS
  - STEROIDS
    - CHILD, 669

- KIDNEY DISEASES
  - ABSORPTION
    - CALCIUM, 2606
  - CALCIUM
    - ABSORPTION, 2605
  - CHOLESTASIS
    - LIPIDS, 624
  - COMPLICATIONS
    - PANCREATITIS, 3340*
  - INTESTINE, SMALL
    - MORPHOLOGY, 6587*
  - INTUSSUSCEPTION, 1376
  - LIVER CIRRHOSIS
    - DRUG THERAPY, 698*
  - LIVER COMA
    - COMPLICATIONS, 3416*
  - LIVER DISEASES
    - DISEASES ASSOCIATED WITH, 5058
    - SURGERY, 1490
    - THERAPY, 6416*
  - LIVER INJURY
    - COMPLICATIONS, 3416*
  - SERUM
    - GASTRIN, 8499
  - SHUNT, INTESTINAL
    - OXALATES, 4112
  - ULTRASONOGRAPHY, 8330

- KIDNEYS
  - AMINO ACIDS
    - SYNTHESIS, 6777*
  - ANOMALY
    - NEOPLASMS, BENIGN, 7219*
    - ULTRASONOGRAPHY, 7219*
  - ANTIBIOTICS
    - COMPLICATIONS, 6532*
  - ANTIGENS
    - BILE, 4357*
  - BILE ACIDS AND SALTS
    - EXCRETION, 3362*
    - METABOLISM, 7831
    - SULFATES, 2776
  - CHENODEOXYCHOLIC ACID
    - DRUG EFFECTS ON, 7401*
  - CHOLECYSTITIS
    - ENZYMES, 4378
  - CHOLESTASIS
    - TRANSPLANTATION, 1654
  - CIRCULATION
    - HORMONE EFFECTS ON, 4700*
    - HORMONES, GASTROINTESTINAL, 4700*
  - COLON
    - ABSORPTION, 1790

KIDNEYS (continued)
- DISEASE
  - STOMACH, 8172
- DRUG METABOLISM
  - EXCRETION, 5500
- EXCRETION
  - KINETICS, 7385*
- GASTRIN, 2783*
- GASTROINTESTINAL DISEASES
  - TRANSPLANTATION, 5233
- HEPATECTOMY, 5410*
- HEPATITIS, CHRONIC
  - ANTIBODIES, 5103*
- HORMONES, GASTROINTESTINAL, 7885
- LIPIDS
  - DIETARY FACTORS, 4653
- LIVER CIRRHOSIS, 5410*
  - COMPLICATIONS, 4809*
  - ENDOTOXINS, 4809*
- LIVER DISEASES
  - COMPLICATIONS, 6416*
- LIVER INJURY
  - BILE ACIDS AND SALTS, 2776
- MORPHOLOGY
  - DIETARY FACTORS, 4653
- NEOPLASMS
  - ENZYMES, 1481
  - SIMULATION, 1481
- PANCREATITIS, CHRONIC
  - DISEASES ASSOCIATED WITH, 5792*
- SCHISTOSOMIASIS
  - IMMUNOGLOBULINS, 6670
  - PATHOLOGY, 5506
- TRANSPLANTATION
  - CHOLESTASIS, 5176*
  - COMPLICATIONS, 3340*
  - DISEASES ASSOCIATED WITH, 4816*
  - HEMORRHAGE, 1328
  - HEPATITIS, 5176*
  - HEPATITIS, CHRONIC, 5176*
  - LIVER DISEASES, 5176*
  - PANCREATITIS, 3340*
  - ULCER, PEPTIC, 4816*

KININS
- DUMPING SYNDROME
  - ALCOHOLS, 5477*
  - BLOOD, 5477*
  - DIAGNOSIS, 4044*
  - TECHNIQUES, 4044*
- STOMACH
  - MUCUS, 7355
- ULCER, PEPTIC
  - SERUM, 7597

KWASHIORKOR
- ACID SECRETION
  - CHILD, 6176
- ALBUMINS
  - GROWTH DISORDERS, 5951
- DIARRHEA
  - DIETARY FACTORS, 5199
  - LACTOSE, 5199
- EPIDEMIOLOGY, 7245
- GEOGRAPHICAL FACTORS
  - REVIEW, 1691
- INFANT
  - DIAGNOSIS, 3526*
  - GEOGRAPHICAL FACTORS, 1692
  - GLUCOSE, 4146

KWASHIORKOR (continued)
- INFANT (continued)
  - HORMONES, 4146
  - METABOLISM, 4146
  - PROTEINS, 4146
- INFECTION
  - ALBUMINS, 5951
  - GROWTH DISORDERS, 5951
- NUTRITION DISORDERS
  - HORMONES, 7245
  - PROTEINS, 7245
- SERUM
  - CALCIUM, 6316
- SHORT BOWEL SYNDROME
  - INTEGUMENTARY SYSTEM, 6951
- THERAPY, 5209

LACTASE
- DEFICIENCY
  - CHEMICAL PROPERTIES, 7647
  - ELECTROPHYSIOLOGY, 5210
  - REVIEW, 7647
- DYSENTERY
  - DEFICIENCY, 4444
- ENTERITIS
  - DRUG THERAPY, 3237
  - THERAPY, 3237
- ENTEROCOLITIS
  - DEFICIENCY, 4444
- GASTROENTERITIS
  - FUNGI, 7511*
- INTESTINE, SMALL
  - BIOPSY, 5065
  - HORMONE EFFECTS ON, 2979, 5444*
  - TECHNIQUES, 5065
- INTESTINES
  - AGE FACTORS, 6130*
  - BIOPSY, 5065
  - NEONATE, 6130*
  - PREGNANCY, 6130*
  - PROTEINS, 6130*
  - TECHNIQUES, 5065
- JEJUNUM
  - HORMONE EFFECTS ON, 5444*
  - TECHNIQUES, 3075
- MALABSORPTION SYNDROMES
  - DEFICIENCY, 5210
- NEONATE
  - DEFICIENCY, 3406*
- PROTEINS
  - DEFICIENCY, 6130*
- THYROID GLAND
  - HORMONES, 5444*

LACTASE DEFICIENCY
- SEE LACTOSE INTOLERANCE

LACTATES
- CECUM
  - METABOLISM, 7339*
  - SYNTHESIS, 7339*
- INTESTINE, SMALL
  - METABOLISM, 7339*
  - SYNTHESIS, 7339*
- LIVER
  - ACIDITY, 1045
- OXIDOREDUCTASES
  - IMMUNOGLOBULINS, 6153

- ACTATES (continued)
  - STOMACH
    - METABOLISM, 7339*
    - SYNTHESIS, 7339*

- LACTATION
  - INTESTINE, SMALL
    - BILE, 5293*
    - HORMONE EFFECTS ON, 5293*
    - PANCREAS, 5293*

- LACTIC ACID
  - SEE LACTATES

- LACTOSE
  - BILE ACIDS AND SALTS
    - MICROORGANISMS, 2876*
  - BILIARY TRACT DISEASES
    - MALABSORPTION SYNDROMES, 6318
  - DIGESTION
    - GENETIC FACTORS, 7646
    - REVIEW, 7646
  - DUMPING SYNDROME
    - HYDROLYSIS, 4053
  - GASTROINTESTINAL DISEASES
    - MALABSORPTION SYNDROMES, 6318
  - ILEUM
    - BILE ACIDS AND SALTS, 3606*
    - INTESTINAL ABSORPTION, 6005*
  - INTESTINAL ABSORPTION
    - BILE ACIDS AND SALTS, 6005*
  - INTESTINE, SMALL
    - ABSORPTION, 2725
    - DIGESTION, 2725
  - JAUNDICE
    - MALABSORPTION SYNDROMES, 3406*
  - KWASHIORKOR
    - DIARRHEA, 5199
  - LACTOSE INTOLERANCE, 3255*
  - MALABSORPTION SYNDROMES, 4002, 6980*
    - BONES, 5702*
    - EPIDEMIOLOGY, 7645
    - ETHNIC FACTORS, 1388, 7645
    - GENETIC FACTORS, 5701*, 7646
    - GEOGRAPHICAL FACTORS, 7646
    - REVIEW, 2363, 7646, 7647
    - SOCIOECONOMIC FACTORS, 7645
    - TOLERANCE TEST, 4000
  - NEONATE
    - MALABSORPTION SYNDROMES, 3406*

- LACTOSE INTOLERANCE
  - ADOLESCENCE
    - MILK, 440
  - AGE FACTORS, 2348*
  - ALCOHOLISM
    - MILK, 1385
  - BILIARY TRACT DISEASES, 6318
  - BONES
    - CALCIUM, 6988
    - MINERALS, 6988
  - BREATH TEST, 2348*
  - CARBOHYDRATES
    - ABSORPTION, 4132*
  - CELIAC DISEASE
    - GENETICS, 4905*
  - CHILD
    - ANTIGENS, 4905*
    - LYMPHOCYTES, 2166*
    - THERAPY, 3269

- LACTOSE INTOLERANCE (continued)
  - DIAGNOSIS, 439, 4002, 6990
  - DIET, 5707
  - DIETARY FACTORS, 2348*
  - EPIDEMIOLOGY, 2348*, 6983
    - DIARRHEA, 5706
    - ETHNIC FACTORS, 7645
    - SOCIOECONOMIC FACTORS, 7645
  - ETHNIC FACTORS
    - REVIEW, 439
  - GASTROINTESTINAL DISEASES, 6318
  - GENETIC FACTORS, 7646
  - GEOGRAPHICAL FACTORS, 7646
  - HYPERSENSITIVITY
    - DIAGNOSIS, 6984
  - IMMUNOLOGY
    - REVIEW, 3254*
  - INFANT, 4907*
    - CYTOLOGY, EXFOLIATIVE, 2364
    - VILLI, 2364
  - INTESTINE, SMALL, 3075
    - MORPHOLOGY, 3255*
  - IRRITABLE COLON
    - SIMULATION, 6991
  - JAUNDICE
    - INFANT, 637
    - NEONATE, 5065
    - PHOTOTHERAPY, 637
  - JEJUNUM, 3075
  - LACTOSE, 3255*
  - MALABSORPTION SYNDROMES
    - DIAGNOSIS, 4000
  - MILK, 6317
    - BREATH TEST, 4145
    - HYPERSENSITIVITY, 6984
    - INFANT, 4907*
  - REVIEW, 6990, 7646, 7647
  - THERAPY, 4002
  - TOLERANCE TEST, 3255*

- LAMBLIASIS
  - SEE GIARDIASIS

- LAPAROSCOPY
  - ABDOMEN
    - NEOPLASMS, MALIGNANT, 4769
  - APPENDICITIS
    - DIAGNOSIS, 7700
  - ASCITES
    - DIAGNOSIS, 8410
  - CHOLECYSTITIS
    - CHOLANGIOGRAPHY, 269
    - DIAGNOSIS, 269
  - COMPLICATIONS, 3054
  - DUODENUM
    - TECHNIQUES, 3997
  - GALLBLADDER
    - NEOPLASMS, 262
  - GASTROENTEROSTOMY
    - OBSTRUCTION, 6295
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, 7569
    - PSEUDOTUMORS, 7569
  - INTESTINES
    - TECHNIQUES, 3997
  - JAUNDICE
    - DIAGNOSIS, 5925*
  - LIVER
    - BIOPSY, 8131

- LAPAROSCOPY (continued)
  - LIVER (continued)
    - ECHINOCOCCOSIS, 1723
    - NEOPLASM METASTASIS, 1181*
    - NEOPLASMS, 8318
    - NEOPLASMS, MALIGNANT, 1181*, 7761
  - LIVER CIRRHOSIS
    - DIAGNOSIS, 8392
  - LIVER DISEASES
    - NEOPLASMS, 3104
  - LIVER DISEASES, ALCOHOLIC
    - DIAGNOSIS, 8392
  - NEOPLASMS
    - TECHNIQUES, 8318
  - PANCREATIC DISEASES
    - DIAGNOSIS, 7070
  - PERITONEOSCOPY, 3054

- LAPAROTOMY
  - BILE DUCTS
    - ENDOSCOPY, 3115
  - CHOLANGITIS
    - JAUNDICE, 8422*
  - CROHN'S DISEASE
    - APPENDICITIS, 7277
  - DIAGNOSIS
    - COMPLICATIONS, 5545
    - REVIEW, 5545
  - LIVER DISEASES
    - ANALYSIS, 5534
    - TECHNIQUES, 5534

- LARGE INTESTINE
  - SEE INTESTINE, LARGE

- LASER
  - INTESTINES
    - SURGERY, 196
  - STOMACH
    - BLEEDING, 6146*

- LAXATIVES
  - SEE CATHARTICS

- LEAD
  - ABSORPTION
    - CHELATING AGENTS, 21
    - GASTROINTESTINAL SYSTEM, 879
    - INTESTINES, 21
    - TRACER STUDY, 21
  - INTESTINES
    - HELMINTHIASIS, 5971
  - LIVER
    - GLUCONEOGENESIS, 6770*
  - LIVER INJURY
    - NITROSAMINES, 1165

- LECTINS
  - SEE PLANT AGGLUTININS

- LEISHMANIASIS
  - PARASITES AND PARASITIC DISEASES
    - EPIDEMIOLOGY, 3571
  - TUBERCULOSIS
    - EPIDEMIOLOGY, 2666

- LEUKEMIA
  - CECUM
    - INFLAMMATION, 7044
  - COMPLICATIONS
    - JAUNDICE, OBSTRUCTIVE, 6419*
  - INTESTINES
    - COMPLICATIONS, 6419*
  - LIVER
    - PATHOLOGY, 5036*
  - LIVER INJURY
    - DRUG-INDUCED, 2464*
  - PANCREAS
    - COMPLICATIONS, 6419*
  - SPLEEN
    - PATHOLOGY, 5036*

- LIPASE
  - ACETYLCHOLINE
    - PANCREAS, 2848
  - ANESTHESIA
    - PANCREAS, 3727*
  - BLOOD, 6822
  - CHOLESTASIS, 3516
  - DIGESTION
    - FATS, 6141
  - DUODENUM
    - ULCER, PEPTIC, 7594
  - GALLBLADDER
    - EXTRACTS, TISSUE, 1079
    - NECROSIS, 2432*
  - INTESTINE, SMALL
    - SECRETION, 6822
  - INTESTINES, 2727
    - ENZYMES, 3261
  - LIPIDS
    - DIGESTION, 903
  - LIVER
    - HEPATITIS, 7173*
    - HEPATITIS, INFECTIOUS, 7173*
    - LIVER DISEASES, ALCOHOLIC, 7173*
  - PANCREAS
    - CIRCADIAN RHYTHM, 7377
    - CYSTS, 3346
    - DIETARY FACTORS, 7377
    - EXTRACTS, TISSUE, 1079
    - HORMONES, GASTROINTESTINAL, 1936
    - NEOPLASMS, MALIGNANT, 3346
    - SECRETION, 1936, 3735, 5389*, 5442*
  - PANCREATIC DISEASES
    - DIAGNOSIS, 3975
  - PANCREATITIS
    - DIAGNOSIS, 3902
    - LIPOPROTEINS, 1451
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 3346
  - PANCREATOGRAPHY
    - CIRCULATION, 3329
  - SECRETION
    - ULCER, PEPTIC, 7594
  - SERUM
    - CHOLANGIOGRAPHY, 3947*
    - ENDOSCOPY, 3947*
    - PANCREATOGRAPHY, 3947*

- LIPID STORAGE DISEASE
  - LIVER, 7124

- LIPIDS
  - SEE ALSO FATS, TRIGLYCERIDES
  - ABSORPTION
    - ALCOHOLS, 7916*
    - DETERGENTS, 7927
    - DIETARY FACTORS, 1656
    - DRUG EFFECTS ON, 7916*
    - FLUORIDES, 902
    - INFANT, 1656
    - INTESTINES, 25
    - PHOSPHOLIPIDS, 892
    - REVIEW, 25
  - BILE
    - CHOLAGOGUES AND CHOLERETICS, 4633*
    - DRUG EFFECTS ON, 4633*, 6397*
    - ETHNIC FACTORS, 7835
    - METABOLISM, 2943, 6397*
    - PHENOBARBITAL, 6397*
    - PROSTAGLANDINS, 2890*
    - SECRETION, 2866*
    - SORBITOL, 2943
  - BILE ACIDS AND SALTS
    - DIFFUSION, 7395*
    - PHOSPHOLIPIDS, 4617*
    - SOLUBILITY, 7395*
  - BILIARY TRACT
    - CALCULI, 1583
    - CHENODEOXYCHOLIC ACID, 3496*
    - CHOLESTEROL, 3496*
    - OBESITY, 1583
    - SECRETION, 144, 2926, 4661
    - TRANSPORT, 2006
  - BLOOD
    - ALCOHOLS, 7515*
    - DIETARY FACTORS, 792
    - ENTERITIS, 792
    - INFANT, 792
  - CARBON TETRACHLORIDE
    - PEROXIDATION, 5416*
  - CATHARTICS
    - DRUG THERAPY, 2643
  - CHEMICAL PROPERTIES, 7479
  - CHENODEOXYCHOLIC ACID
    - BILE, 3497*
  - CHOLANGITIS
    - ABSORPTION, 759
    - CHILD, 759
  - CHOLECYSTITIS
    - ABSORPTION, 759
    - CHILD, 759
  - CHOLELITHIASIS
    - SERUM, 3501*
  - CHOLESTASIS, 3385
    - KIDNEY DISEASES, 624
    - MONOAMINE OXIDASE, 6086*
  - COLON
    - CARCINOGENS, 2379
    - NEOPLASMS, 2626
  - CYSTIC FIBROSIS
    - BILE, 2583
  - DIGESTION
    - BILE ACIDS AND SALTS, 903
    - LIPASE, 903
    - REVIEW, 903
  - DRUG EFFECTS ON
    - GALLBLADDER DISEASES, 5138*
  - ERYTHROCYTES, 6085*
  - ESOPHAGUS
    - HISTOCHEMISTRY, 4484*

- LIPIDS (continued)
  - FATTY ACIDS
    - LIVER, 138
  - FATTY LIVER
    - DIET, 6082*
    - TRANSPORT, 6802
  - GLYCOGENOSIS
    - THERAPY, 3397
  - HEPATITIS, 7093*
  - HEPATITIS, CHRONIC
    - PEROXIDATION, 8058
  - HEPATITIS, INFECTIOUS
    - HYPERLIPOPROTEINEMIA, 5869*
    - PLASMA, 5869*
  - HEPATOCYTES
    - CARBON TETRACHLORIDE, 8021*
    - MEMBRANES, 6846
    - METABOLISM, 7444*
  - HORMONE CONTROL
    - REVIEW, 8019*
  - HYDROCARBONS
    - BINDING, 1033
  - INTESTINAL ABSORPTION
    - NEONATE, 5289*
  - INTESTINE, SMALL
    - CHILD, 5681
    - DIABETES, 5681
    - METABOLISM, 7505
    - SYNTHESIS, 815
  - INTESTINES
    - ABSORPTION, 7302*
    - ENZYMES, 6817*
    - TECHNIQUES, 4694
    - TRANSPORT, 7302*
  - JEJUNUM
    - ABSORPTION, 174*
  - KIDNEYS
    - DIETARY FACTORS, 4653
  - LIPOPROTEINS
    - PROTEIN-LOSING ENTEROPATHIES, 3550
  - LIVER
    - ABSORPTION, 907
    - ALCOHOLISM, 8016*
    - ALCOHOLS, 122*, 3759*, 5399*
    - AMINO ACIDS, 8017*
    - ANTIBIOTICS, 122*
    - BINDING, 1033
    - DIET, 4634*, 8020*
    - DIETARY FACTORS, 1061, 4653, 8015*, 8016*
    - DRUG EFFECTS ON, 3787, 5399*, 8016*
    - ENZYMES, 1061, 2001
    - ESTROGENS, 8008*
    - FATS, 8020*
    - FATTY ACIDS, 1168
    - FEEDING, 2001
    - FETUS, 3785
    - GLYCEROPHOSPHATES, 146
    - GLYCOGEN, 2001
    - HORMONE CONTROL, 8019*
    - METABOLISM, 3788, 5399*, 8303*
    - MICROSOMES, 2037
    - NEOPLASMS, 1168
    - ORGAN CULTURE, 5399*
    - PEROXIDATION, 2037
    - PLASTICIZERS, 2920
    - PROTEINS, 4634*
    - SHUNT, INTESTINAL, 623

- LIPIDS (continued)
  - LIVER (continued)
    - SUCROSE, 8020*
    - SYNTHESIS, 3785, 3787, 8020*
    - THYROID GLAND, 122*
    - TRANSPORT, 910, 2006
    - ULTRASTRUCTURE, 2678*
  - LIVER CIRRHOSIS, 3385, 7093*
    - SIMULATION, 162
  - LIVER DISEASES, 3385, 7093*
    - ALCOHOLISM, 694
    - ENZYMES, 618
    - SERUM, 6433
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 121*
    - ERYTHROCYTES, 5414*
    - PEROXIDATION, 2155
    - SERUM, 5414*
  - LYMPH
    - ALCOHOLS, 7916*
    - DRUG EFFECTS ON, 7916*
  - LYMPHATIC SYSTEM
    - ALCOHOLS, 7916*
    - DRUG EFFECTS ON, 7916*
  - METABOLISM
    - ALCOHOLS, 7805*
    - DRUG EFFECTS ON, 5138*, 6397*, 7805*
    - ENZYMES, 7986*
    - LITHIUM, 2916
    - LIVER, 2916
    - OBESITY, 8303*
    - PHENOBARBITAL, 6397*
    - PORTACAVAL SHUNT, 2944, 3788
  - MICROSOMES
    - ENZYMES, 1994
    - LIVER, 1994
    - METABOLISM, 1994
  - OBESITY
    - SHUNT, INTESTINAL, 623
  - PANCREAS
    - DUODENUM, 218
    - METABOLISM, 3737
  - PANCREATECTOMY
    - ABSORPTION, 174*
  - PARENTERAL ALIMENTATION
    - METABOLISM, 5184
  - PERFUSION
    - DUODENUM, 943
  - PEROXIDATION
    - CARCINOGENS, 2038
    - ENZYMES, 2037
    - LIVER, 2038, 2040
    - PHENOBARBITAL, 2037, 2038
    - VITAMIN E, 2040
  - PLASMA
    - PORTACAVAL SHUNT, 8046
  - SALIVARY GLANDS
    - BIOCHEMISTRY, 2121, 6720
    - DIETARY FACTORS, 6720
  - SERUM
    - PROSTAGLANDINS, 2890*
  - SHUNT, INTESTINAL
    - METABOLISM, 4894
    - OBESITY, 4894
  - SPLEEN
    - DIETARY FACTORS, 4653
  - STEATORRHEA
    - FECES, 2197

- LIPIDS (continued)
  - STOMACH
    - MOTILITY, 940
  - ULCER, PEPTIC
    - SURGERY, 1344*

- LIPODYSTROPHY, INTESTINAL
  - BACTERIA
    - IMMUNITY, 5705*
  - COMPLICATIONS
    - REVIEW, 3271
  - COPPER
    - EXCRETION, 2466*
  - DIAGNOSIS
    - RADIOLOGY, 6315
    - ULTRASTRUCTURE, 3258
  - DISEASES ASSOCIATED WITH, 6313
    - REVIEW, 3271
  - DRUG THERAPY
    - ANTIBIOTICS, 5705*
  - ETIOLOGY
    - BACTERIA, 5705*
    - REVIEW, 3271
  - GENETICS
    - ULTRASTRUCTURE, 1463*
  - IMMUNITY
    - ETIOLOGY, 4137*
  - IMMUNOLOGY
    - MICROORGANISMS, 6312*
  - LIVER CIRRHOSIS
    - COPPER, 2466*
  - LIVER DISEASES
    - CERULOPLASMIN, 2466*
    - COPPER, 2466*
  - SARCOIDOSIS
    - REVIEW, 4136*
  - THERAPY, 6314
  - ULTRASTRUCTURE
    - FAMILIAL FACTORS, 1463*
    - IMMUNOLOGY, 2368

- LIPOGENESIS
  - DIETARY FACTORS
    - FATTY ACIDS, 5412*
  - HELMINTHIASIS, 5436
  - LIVER
    - COENZYMES, 7417*
    - DIETARY FACTORS, 5412*, 7458
    - FATTY ACIDS, 7417*
    - PROTEINS, 7417*
    - VITAMIN A, 6773*
  - VITAMIN A, 6774*

- LIPOPOLYSACCHARIDES
  - LIVER
    - BACTERIA, 2041
    - SALMONELLOSIS, 2041
  - PORTACAVAL SHUNT, 3907

- LIPOPROTEINS
  - BILE
    - ELECTROPHORESIS, 6775*
  - BILIARY TRACT
    - OBSTRUCTION, 1063
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 275
    - SYNTHESIS, 603

- LIPOPROTEINS (continued)
  - CHOLESTASIS, 3385
    - CLEARANCE STUDY, 3516
    - DIAGNOSIS, 274, 1598, 5158*, 6438, 6566*, 7827*
    - HEPARIN, 566
    - PREGNANCY, 1581*
    - REVIEW, 5158*
  - FATTY ACIDS
    - SYNTHESIS, 1059
  - FATTY LIVER
    - BLOOD, 2534
    - SYNTHESIS, 6083*
  - GALLBLADDER DISEASES
    - DIAGNOSIS, 275
  - HEPATITIS
    - DIAGNOSIS, 6438
    - GALACTOSAMINE, 1042, 4669
    - TRIGLYCERIDES, 4669
  - HEPATITIS, INFECTIOUS
    - JAUNDICE, OBSTRUCTIVE, 8369
    - PLASMA, 8368
  - HEPATITIS, TOXIC, 4671
  - HEPATOCYTES, 2867*
    - CHOLESTEROL, 8013*
    - SYNTHESIS, 4654
    - SYPHILIS, 8056
    - ULTRASTRUCTURE, 4654
  - HYPERBILIRUBINEMIA
    - DIAGNOSIS, 6438
  - IMMUNITY
    - HEPATITIS, INFECTIOUS, 8354*
  - INTESTINAL ABSORPTION
    - LYMPH, 7497*
  - INTESTINE, SMALL
    - LYMPH, 7497*
    - SYNTHESIS, 3855, 3856, 7497*
  - INTESTINES
    - MORPHOLOGY, 182
    - PHOSPHOLIPIDS, 1795
    - SECRETION, 3857
    - SUCROSE, 2976
  - JAUNDICE, OBSTRUCTIVE
    - DIAGNOSIS, 6438
    - INFANT, 4278
    - NEONATE, 5159*
    - PLASMA, 2586, 8368
  - LIPIDS
    - PROTEIN-LOSING ENTEROPATHIES, 3550
  - LIVER, 2007
    - BODY COMPOSITION, 8014*
    - CHOLESTEROL, 7397*
    - FATTY ACIDS, 1060
    - GLYCERIN, 1060, 2945
    - MEMBRANES, 5428*
    - PLASMA, 6125
    - REGENERATION, 1022*
    - SERUM, 1022*
    - SYNTHESIS, 6125
  - LIVER CIRRHOSIS, 3385
  - LIVER DISEASES, 3385
    - ENZYMES, 618
    - SYNTHESIS, 603
  - LIVER DISEASES, ALCOHOLIC
    - DEFICIENCY, 3464*
    - ULTRASTRUCTURE, 3464*
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 3786
    - ERYTHROCYTES, 5414*

- LIPOPROTEINS (continued)
  - LIVER INJURY (continued)
    - SERUM, 1160, 5414*
    - SYNTHESIS, 3786
  - METABOLISM, 2727
  - PANCREATITIS
    - LIPASE, 1451
  - PHOSPHOLIPIDS
    - CIRCULATION, 1795
  - PLASMA
    - PORTACAVAL SHUNT, 8046
  - PORTACAVAL SHUNT
    - HYPERCHOLESTEREMIA, 1653
  - SECRETION, 2727
  - SERUM
    - LIVER FUNCTION TESTS, 1022*
  - SYNTHESIS, 2727
    - TRIGLYCERIDES, 3786

- LITHIUM
  - CARBOHYDRATES
    - METABOLISM, 2916
  - LIPIDS
    - METABOLISM, 2916

- LIVER
  - ABSCESS
    - AMEBIASIS, 1715, 1716, 2173*, 6649
    - ANGIOGRAPHY, 2173*
    - BACTERIA, 2449*
    - BACTERIAL INFECTIONS, 2470, 6666, 7757
    - DIAGNOSIS, 2172*, 2173*, 8451*
    - DISEASES ASSOCIATED WITH, 5837
    - DRAINAGE, 1473
    - DRUG THERAPY, 2449*
    - HYPERPLASIA, 1249
    - IMMUNITY, 2648
    - RADIOLOGY, 2172*
    - RESPIRATORY SYSTEM, 5837
    - RUPTURE, 634
    - SCANNING, SCINTILLATION, 2173*, 3045*
    - SURVIVAL, 8451*
    - THERAPY, 551, 6666
    - ULTRASONOGRAPHY, 3045*
  - ABSORPTION
    - BILE ACIDS AND SALTS, 38
    - INSECTICIDES, 2919
    - IRON, 2704*
    - LIPIDS, 907
    - METALS, 2719
    - PHYSICAL FACTORS, 907
    - POLLUTION, 3810
    - SULFOBROMOPHTHALEIN, 2865*
  - ACIDS
    - PHOSPHOLIPIDS, 6808
    - TRIGLYCERIDES, 6808
  - ACYLTRANSFERASES
    - METABOLISM, 8000*
    - SECRETION, 8000*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
    - VITAMIN C, 6765*
  - ADENOSINE TRIPHOSPHATASE
    - DRUG EFFECTS ON, 6127
    - GLYCOSIDES, 4635
    - HORMONE EFFECTS ON, 5408*
    - INSULIN, 3771
    - PHOSPHOLIPIDS, 155

- LIVER (continued)
    - ADENOSINE TRIPHOSPHATASE (continued)
        - VITAMIN D, 142
    - ADENOSINE TRIPHOSPHATE
        - NERVOUS CONTROL, 6106
    - ADENYL CYCLASE
        - FATTY ACIDS, 1058
        - NUCLEOTIDES, 1987
    - ADOLESCENCE
        - ULCER, PEPTIC, 6268
    - AGE FACTORS
        - ULTRASTRUCTURE, 12
    - ALBUMINS
        - CARBON TETRACHLORIDE, 76
        - FETUS, 1967*
        - SYNTHESIS, 76, 1967*, 6541*
    - ALCOHOL OXIDOREDUCTASES, 8055
        - COENZYMES, 7405*
        - SYNTHESIS, 8059
    - ALCOHOLISM
        - VITAMIN B12, 695
    - ALCOHOLS
        - ALDEHYDES, 3760*
        - LIPIDS, 3759*
        - METABOLISM, 1038, 2002, 2906, 4411, 6078*, 7428*, 7429*
        - OXIDATION, 1036, 3760*
        - PHOSPHOHYDROLASE, 4622*
        - SEDATIVES, 2002
    - ALDEHYDES
        - METABOLISM, 7428*
        - OXIDOREDUCTASES, 2025
    - ALDOLASE
        - ISOENZYMES, 8292*
    - ALKALINE PHOSPHATASE
        - TECHNIQUES, 604
    - ALKALOIDS
        - TOXICOLOGY, 2148
    - ALPHA 1 ANTITRYPSIN
        - DEFICIENCY, 7119
    - ALPHA FETOPROTEIN
        - CARBON TETRACHLORIDE, 2154, 3751*
        - FETUS, 1967*
        - HEPATECTOMY, 3751*
        - REGENERATION, 3751*
        - SURGERY, 2154
        - SYNTHESIS, 1967*, 3751*
        - ULTRASTRUCTURE, 6759*
    - AMEBIASIS
        - ABSCESS, 1472, 4461, 5241*, 5247, 6655, 7471
        - COMPLICATIONS, 2662, 4460, 6649
        - DIAGNOSIS, 6660
        - DRUG THERAPY, 1472, 6660
        - EPIDEMIOLOGY, 4460, 6667
        - ETIOLOGY, 4460
        - REVIEW, 4460
        - RUPTURE, 6655
        - SIMULATION, 5497
        - SURVIVAL, 2662
        - THERAPY, 6655
    - AMINO ACIDS, 2009, 3927
        - DIETARY FACTORS, 3766, 3917, 4639
        - ENZYMES, 682
        - METABOLISM, 6761*, 7387*, 7993*, 8048, 8049
        - PROTEINS, 6761*
        - SCHISTOSOMIASIS, 8048, 8049
        - SYNTHESIS, 6777*

- LIVER (continued)
    - AMINO ACIDS (continued)
        - TRANSPORT, 6758*
    - AMINO TRANSFERASES, 6118
        - HYPOTENSION, 612
        - ISCHEMIA, 612
    - AMMONIA
        - METABOLISM, 8298*
    - AMYLOIDOSIS
        - COMPLICATIONS, 3103
        - SCANNING, SCINTILLATION, 3103
        - TRANSPORT, 1475
        - ULTRASTRUCTURE, 1474
    - ANEMIA, SICKLE CELL
        - COMPLICATIONS, 8302*
        - EPIDEMIOLOGY, 8302*
    - ANESTHESIA
        - SURGERY, 8343
    - ANESTHETICS
        - PHENOBARBITAL, 2915
        - SURGERY, 600
        - TOXICOLOGY, 2915
    - ANEURYSM
        - DISEASES ASSOCIATED WITH, 7138*
        - DRUG-INDUCED, 7138*
        - HEPATITIS, 7138*
    - ANGIOGRAPHY, 7529*
        - PROSTAGLANDINS, 6393*
        - TECHNIQUES, 260
    - ANOMALY
        - CIRCULATION, 1484
        - NEOPLASMS, BENIGN, 7219*
        - SCANNING, SCINTILLATION, 2176*
        - ULTRASONOGRAPHY, 7219*
    - ANOMALY, CONGENITAL, 7113*
    - ANTI-ARTHRITIC AGENTS, 7478
    - ANTIBIOTICS
        - DRUG METABOLISM, 1172
        - MORPHOLOGY, 1172
    - ANTIGENS, 4312
        - MORPHOLOGY, 8357*
        - ULTRASTRUCTURE, 8357*
    - ANTIVIRAL AGENTS
        - RADIOISOTOPES, 2921
    - ARTERIES
        - ANOMALY, 1466
        - LIVER CIRRHOSIS, 3470*
        - MORPHOLOGY, 3923, 7293
        - REVIEW, 7293
        - STENOSIS, 1209
        - VASOCONSTRICTOR AGENTS, 1175
        - WOUNDS AND INJURIES, 1469
    - ASCARIASIS, 7895
    - ASPIRIN
        - CHILD, 6442*
        - ULTRASTRUCTURE, 2479*
    - AUSTRALIA ANTIGEN
        - ANALYSIS, 1519*
        - BIOPSY, 1519*, 2523*
        - CARRIER STATE, 661
        - HISTOCHEMISTRY, 7154*
        - MORPHOLOGY, 8357*
        - NEOPLASMS, MALIGNANT, 675
        - PATHOLOGY, 661
        - ULTRASTRUCTURE, 8357*
    - AUTOIMMUNE DISEASES
        - LYMPHOCYTES, 1659
        - SJOGREN'S SYNDROME, 590

IVER (continued)
- AUTORADIOGRAPHY
  - DRUGS, 1983
- BACTERIAL INFECTIONS
  - PATHOLOGY, 4736
  - SYNERGY, 6666
- BARIUM
  - CIRCULATION, 2200
- BILE
  - ADENOSINE TRIPHOSPHATASE, 2909
  - CHENODEOXYCHOLIC ACID, 1576*
  - CHOLIC ACID, 1576*
  - CLEARANCE STUDY, 1576*
  - ENDOTOXINS, 7996*
  - ENZYMES, 2929
  - EXCRETION, 567, 2954
  - METABOLISM, 2929
  - SECRETION, 1990
  - SULFOBROMOPHTHALEIN, 2954
  - SYNTHESIS, 7384*, 7470, 7996*, 8062
  - TRANSPORT, 2027
- BILE ACIDS AND SALTS, 4615*, 5423*
  - CHOLECYSTECTOMY, 7394*
  - CHOLESTEROL, 7400*
  - DIET, 4640
  - EXCRETION, 3774
  - FETUS, 1078
  - INSULIN, 3771
  - METABOLISM, 7831
  - STARVATION, 7394*
  - SYNTHESIS, 7413*, 7424*
  - TRANSPORT, 40, 908, 909
- BILE DUCTS
  - BIOCHEMISTRY, 863
  - MORPHOLOGY, 863, 1988
  - NEOPLASMS, MALIGNANT, 5020*
  - ULTRASTRUCTURE, 862
- BILIARY TRACT
  - MORPHOLOGY, 1212
  - ULTRASONOGRAPHY, 1212
- BILIARY TRACT DISEASES
  - ENZYMES, 1575*
  - SCANNING, SCINTILLATION, 264
- BILIRUBIN
  - ALCOHOLS, 3808
  - DRUG EFFECTS ON, 3509
  - ENZYMES, 683, 5148*, 7999*
  - FEEDING, 1053
  - GLUCURONIDASE, 3776
  - METABOLISM, 3808
  - TRANSPORT, 39
- BIOCHEMISTRY
  - BURNS, 2892
  - VITAMIN B1, 2014
- BIOPSY, 5800*
  - BLEEDING, 5799*
  - COMPLICATIONS, 2459*
  - ENZYMES, 5798*
  - HEMATOBILIA, 2459*
  - HEMATOMA, 3110
  - JAUNDICE, 7846
  - LAPAROSCOPY, 8131
  - OBESITY, 3555
  - SCANNING, SCINTILLATION, 3095
  - TECHNIQUES, 4776, 5553, 5799*
  - ULTRASTRUCTURE, 5553

LIVER (continued)
- BLEEDING
  - COLLAGEN, 7109*
  - EMBOLIZATION, 1455*
  - THERAPY, 1455*, 7109*
- BLOOD
  - ENZYMES, 2933
- CALCIUM
  - GLYCOGENOLYSIS, 2940
- CALCULI
  - DIAGNOSIS, 3401
  - ENDOSCOPY, 6571*
  - THERAPY, 3401
- CARBOHYDRATES
  - ALCOHOLS, 148
  - FETUS, 2910
  - HORMONES, ADRENAL CORTEX, 3784
  - HYPOLIPEMIC AGENTS, 1039
  - METABOLISM, 1039, 2916, 3784
  - PHENOBARBITAL, 2910
  - PROTEINS, 6761*
- CARBON TETRACHLORIDE
  - BACTERIA, 2041
  - ENZYMES, 145
  - EXCRETION, 145
- CARCINOEMBRYONIC ANTIGEN, 4777
  - NEOPLASM METASTASIS, 5549
- CARCINOGENS
  - BIOCHEMISTRY, 2153
  - DRUG EFFECTS ON, 2912
  - ENZYMES, 1478
  - HYPERPLASIA, 2151
  - METABOLISM, 2912, 2918
  - NEOPLASMS, MALIGNANT, 2153
  - PATHOLOGY, 1478
  - PRECANCEROUS CONDITIONS, 2151, 2152, 2153
  - REVIEW, 2043
  - TOXICOLOGY, 1046
  - ULTRASTRUCTURE, 2152
- CARCINOID TUMOR
  - NEOPLASM METASTASIS, 7102*
- CARDIOVASCULAR SYSTEM, 8159
  - BACTERIA, 6540*
  - ENDOTOXINS, 6540*
  - PRESSURE STUDY, 6518*
- CATALASE
  - SYNTHESIS, 8018*
- CATECHOLAMINES
  - DRUG METABOLISM, 2103*
  - OXIDATION, 2103*
  - TOXICITY, 2103*
- CELLS
  - ALKALINE PHOSPHATASE, 7403*
  - ANALYSIS, 7383*
  - ENZYMES, 7403*
  - MORPHOLOGY, 7383*
  - ULTRASTRUCTURE, 2678*, 4490*
- CHELATING AGENTS
  - SYNTHESIS, 3795
- CHENODEOXYCHOLIC ACID
  - DRUG EFFECTS ON, 4614*, 7401*
  - TOXICITY, 4614*
  - ULTRASTRUCTURE, 4614*
- CHILD
  - BILIARY TRACT DISEASES, 746
  - LIVER FUNCTION TESTS, 760
  - ULCER, PEPTIC, 6268

- LIVER (continued)
  - CHOLAGOGUES AND CHOLERETICS
    - DRUG EFFECTS ON, 1016*
  - CHOLANGIOGRAPHY
    - HEALING, 5802*
    - STRESS, 5802*
    - TECHNIQUES, 6546*
  - CHOLANGITIS
    - LIVER FUNCTION TESTS, 760
  - CHOLECYSTITIS
    - DRUG-INDUCED, 1589
    - DRUG THERAPY, 1589
    - ENZYMES, 4378
    - LIVER FUNCTION TESTS, 760
    - PARENTERAL ALIMENTATION, 752
  - CHOLELITHIASIS
    - ENZYMES, 1457*
    - MORPHOLOGY, 1595
  - CHOLESTASIS, 5055
    - ALKALINE PHOSPHATASE, 1047
    - CHILD, 5024*
    - CIRCULATION, 3922
    - DIAGNOSIS, 542*, 548*
    - ENZYMES, 542*, 683
    - MEMBRANES, 2049
    - MORPHOLOGY, 2049
    - NEONATE, 5024*
    - PATHOLOGY, 8316
    - PREGNANCY, 3518
    - SARCOIDOSIS, 1462*
    - SIMULATION, 1047
    - ULTRASTRUCTURE, 8316
  - CHOLESTEROL
    - ACIDS, 6808
    - COENZYMES, 2953
    - DIETARY FACTORS, 8015*
    - DRUG EFFECTS ON, 6127
    - ENZYMES, 6791
    - FATTY ACIDS, 8003*
    - LIPOPROTEINS, 7397*
    - METABOLISM, 5415*, 6119, 6791, 7413*
    - PHOSPHOLIPIDS, 7398*
    - SYNTHESIS, 4618*, 4652, 5413*, 5415*, 5484, 6773*, 6791, 6808, 7397*
  - CHOLIC ACID
    - BINDING, 1057
  - CHYLOMICRONS
    - HYDROLYSIS, 3758
    - NEONATE, 7461
  - CIRCULATION, 4972
    - ADOLESCENCE, 1204
    - ANGIOGRAPHY, 161
    - ARTERIES, 3864*
    - BACTERIAL INFECTIONS, 1426
    - BILE ACIDS AND SALTS, 1483
    - BILIARY TRACT DISEASES, 746
    - CHILD, 1204
    - CHOLECYSTECTOMY, 756
    - CLEARANCE STUDY, 6755*, 7462
    - DRUG EFFECTS ON, 3919
    - ESTROGENS, 4650
    - FETUS, 7184*
    - INDOCYANINE GREEN, 598, 4339*
    - LIVER CIRRHOSIS, 3470*
    - LIVER DISEASES, 598
    - LYMPHATIC SYSTEM, 4723
    - METABOLISM, 8082

- LIVER (continued)
  - CIRCULATION (continued)
    - MORPHOLOGY, 7184*
    - MUSCLES, 3921
    - NERVOUS CONTROL, 3864*, 6757*
    - OBSTRUCTION, 154
    - SURGERY, 4735
    - SYMPATHOMIMETICS, 1171
    - TECHNIQUES, 1158, 3920, 8107*
    - TONICITY, 1204
    - ULTRASTRUCTURE, 2891, 3921
    - VASOPRESSIN, 6756*, 8006*
  - CITRATES
    - METABOLISM, 7450
    - STRESS, 7450
    - SURGERY, 7450
  - CLEARANCE STUDY
    - ALBUMINS, 4972
    - BILIRUBIN, 3793
    - INDOCYANINE GREEN, 3793
    - NEONATE, 3793
    - OBESITY, 3555
    - SULFOBROMOPHTHALEIN, 3793
    - TECHNIQUES, 6755*
  - COENZYMES, 6776*
    - TECHNIQUES, 1993
  - COLITIS, ULCERATIVE
    - HISTOCHEMISTRY, 5075*
  - COLLAGEN
    - METABOLISM, 2872*
  - COMA
    - CIRCULATION, 573, 3792
    - HEPATECTOMY, 3792
    - PATHOLOGY, 573
    - ULTRASTRUCTURE, 3792
  - COMMON BILE DUCT
    - OBSTRUCTION, 2899
    - PATHOLOGY, 2899
  - CONTRACEPTIVES, ORAL
    - NEOPLASMS, 8293*
  - CONTRAST MEDIA, 8070
    - CHROMATOGRAPHY, 7386*
    - CLEARANCE STUDY, 7386*
    - RADIOLOGY, 2201
    - TOLERANCE, 7386*
    - TRANSPORT, 7386*
  - COPPER
    - BINDING, 7434*
    - ULTRASTRUCTURE, 595
    - WILSON'S DISEASE, 595
  - CUSHING'S SYNDROME
    - NEOPLASMS, 8291*
  - CYSTIC FIBROSIS
    - BILE ACIDS AND SALTS, 1483
  - CYSTS, 6429
    - ANGIOGRAPHY, 1249, 7759
    - CHILD, 5031*
    - CIRCULATION, 1484
    - DIAGNOSIS, 2175*, 4747*, 5828, 8132
    - DISEASES ASSOCIATED WITH, 5053
    - DRUG THERAPY, 1460*
    - ECHINOCOCCOSIS, 1724
    - GENETIC FACTORS, 5053
    - NEOPLASMS, 5031*
    - PARASITES AND PARASITIC DISEASES, 5965
    - RUPTURE, 1724
    - SCANNING, SCINTILLATION, 3045*

LIVER (continued)
- CYSTS (continued)
  - SCLEROSIS, 1460*
  - SURGERY, 5032*
  - THERAPY, 5828, 5841
  - ULTRASONOGRAPHY, 3045*, 7123, 8132
- CYTOCHROMES
  - ANALGESICS AND ANTIPYRETICS, 5401*
  - BINDING, 1026
  - BIOCHEMISTRY, 3789
  - CARBON TETRACHLORIDE, 8022*
  - CELLS, 1764
  - COBALT, 1012*
  - DRUG EFFECTS ON, 5401*, 8025*
  - ENZYMES, 1025
  - METABOLISM, 1026
  - NUTRITION DISORDERS, 2053
  - PHENOBARBITAL, 5401*
  - SELENIUM, 2053
  - SOLVENTS, 5401*
- CYTOLOGY
  - MORPHOLOGY, 1*
- DETOXIFICATION
  - DRUG THERAPY, 8317
- DIAGNOSIS
  - TECHNIQUES, 3970
- DOPAMINE
  - ALCOHOLS, 3807
  - ALDEHYDES, 3807
- DRUG EFFECTS ON, 3090, 7456
  - HALLUCINOGENS, 6127
  - HYPOLIPEMIC AGENTS, 7454, 8018*
  - PREVENTION, 1173
- DRUG-INDUCED
  - FIBROSIS, 7139*
- DRUG METABOLISM, 8066
  - AGE FACTORS, 125, 6080*
  - ANALGESICS AND ANTIPYRETICS, 4636, 8029*
  - ANTIHYPERTENSIVE AGENTS, 8029*
  - BILIRUBIN, 1030
  - BIOCHEMISTRY, 1028
  - CHELATING AGENTS, 8033*
  - DIURETICS, 8029*
  - DRUG EFFECTS ON, 4636, 7412*
  - ENZYMES, 599, 1020*, 1043, 1062, 2155, 2959, 3790, 4636, 8065
  - EXCRETION, 5500
  - FUNGICIDES, 1034
  - GLUTATHIONE, 4658
  - HEPATITIS, 7477
  - HORMONE EFFECTS ON, 8007*
  - INSECTICIDES, 1062, 1981
  - MICROSOMES, 2902
  - PORPHYRIA, 586
  - PROTEINS, 3790
  - REVIEW, 599
  - SULFOBROMOPHTHALEIN, 4658
  - TECHNIQUES, 8031*
  - URINARY SYSTEM, 4451
- DRUG TOXICITY
  - ANTIBACTERIALS, 4281
- DYES
  - BILE ACIDS AND SALTS, 5422*
  - BINDING, 1821
- DYSTROPHY
  - DRUG THERAPY, 3930, 8074
  - FAMILIAL FACTORS, 5057
  - THERAPY, 8078

LIVER (continued)
- DYSTROPHY (continued)
  - VITAMIN E, 8078
- ECHINOCOCCOSIS, 5834
  - CYSTS, 553, 5833
  - DIAGNOSIS, 277
  - LAPAROSCOPY, 1723
  - PATHOLOGY, 1725
  - SCANNING, SCINTILLATION, 2212
  - SURGERY, 619
- ELECTRON TRANSPORT
  - IMMUNOLOGY, 865
- ELECTROPHYSIOLOGY
  - ADENOSINE TRIPHOSPHATE, 8041*
  - ANOXIA, 8041*
  - MORPHOLOGY, 14
  - ULTRASTRUCTURE, 1755*
- EMBRYOGENESIS
  - MORPHOLOGY, 5999
- EMBRYOLOGY, 7292, 7461
  - ERYTHROCYTES, 11
  - ULTRASTRUCTURE, 11
- ENDOSCOPY
  - NEOPLASMS, 263
  - TECHNIQUES, 5524
- ENDOTOXINS
  - METABOLISM, 3784
- ENTEROCOLITIS, NECROTIZING
  - VEINS, 1689
- ENZYMES, 119*, 7446, 8052, 8064
  - ALCOHOLISM, 5110*, 6505*
  - ALCOHOLS, 4625*, 7408*, 7409*
  - ANALYSIS, 7404*
  - ANESTHESIA, 8343
  - ANTIBIOTICS, 3415*
  - BIOCHEMISTRY, 6812
  - CARBOHYDRATES, 7409*
  - CELL CULTURE, 1029
  - CELLS, 1764
  - CIRCADIAN RHYTHM, 3797, 6791
  - CIRCULATION, 6104
  - DETERGENTS, 7438*
  - DIETARY FACTORS, 7460
  - DRUG EFFECTS ON, 3732, 4625*, 4631, 4647, 4649, 5429*, 7408*
  - ENDOTOXINS, 6778*
  - FETUS, 133, 7402*
  - HORMONE CONTROL, 6715*
  - HORMONE EFFECTS ON, 6715*
  - NERVOUS CONTROL, 3925, 6106, 6107
  - PANCREATITIS, 3732
  - PLASTICIZERS, 2920
  - SCHISTOSOMIASIS, 8048, 8049
  - SIMULATION, 1162
  - STEROIDS, 6807
  - SYNTHESIS, 5429*
  - TECHNIQUES, 7404*
  - TOXICITY, 3415*
  - UREA, 8009*
  - VITAMIN B1, 2014
- ESTROGENS
  - BINDING, 7481
  - CARBOHYDRATES, 8008*
  - FATTY ACIDS, 8003*
  - GLUCAGON, 8008*
  - INSULIN, 8008*
  - LIPIDS, 8008*

- LIVER (continued)
  - EXCRETION
    - KINETICS, 7385*
    - POLLUTION, 3810
    - SULFOBROMOPHTHALEIN, 2865*, 3820
  - FASCIOLIASIS
    - CYTOLOGY, 3822
  - FATS
    - CELLS, 1971*
    - DIETARY FACTORS, 8015*
  - FATTY ACIDS
    - BINDING, 2931
    - EMBRYOLOGY, 7452
    - ENZYMES, 132, 2032, 2932
    - HYPOLIPEMIC AGENTS, 1039
    - LIPIDS, 138
    - METABOLISM, 132, 1039, 5412*, 7452, 7482
    - OXIDATION, 1996, 7482
    - STARVATION, 1027
    - SYNTHESIS, 2033, 2932, 5412*, 7441*
    - VITAMIN B12, 138
  - FEEDING
    - PENTOSIDES, 2911
    - REGENERATION, 2894
  - FERRITIN
    - SYNTHESIS, 1010*
  - FETUS
    - ALCOHOLS, 6121
    - BILIRUBIN, 3776
    - COPPER, 6805
    - ENZYMES, 6807
    - HEMATOPOIESIS, 1155
    - MORPHOLOGY, 5999
    - ZINC, 6805
  - FIBRINOGEN, 6102
    - ANTINEOPLASTIC AGENTS, 43
  - FIBRINOLYSIS
    - REGENERATION, 8038*
  - FIBROSIS
    - AGE FACTORS, 7139*
    - ALCOHOLS, 7139*
    - ALPHA 1 ANTITRYPSIN, 5005*
    - CARBON TETRACHLORIDE, 1013*
    - COLLAGEN, 1013*
    - ETIOLOGY, 8396*
    - FAMILIAL FACTORS, 6414*
    - HYPERTENSION, PORTAL, 6414*
    - ISOENZYMES, 2198
    - MONOAMINE, 2198
    - MORPHOLOGY, 8396*
    - OBESITY, 3555
    - ULTRASONOGRAPHY, 8330
  - FISSURE
    - SCANNING, SCINTILLATION, 7130
  - FOLIC ACID
    - BINDING, 1810
    - METABOLISM, 7473
  - FRUCTOSE
    - ENZYMES, 2000, 2934
  - GALACTOSAMINE
    - BIOCHEMISTRY, 1998
    - GLUCURONYLTRANSFERASE, 3813
    - PATHOLOGY, 1040
    - ULTRASTRUCTURE, 1040, 1998
  - GALACTOSE
    - ALCOHOLS, 2034
    - EXCRETION, 2034

- LIVER (continued)
  - GALACTOSE (continued)
    - METABOLISM, 1038, 1997
    - OROTIC ACID, 2034
    - REGENERATION, 1997
  - GALLBLADDER
    - SCANNING, SCINTILLATION, 4771
  - GALLBLADDER DISEASES
    - ENZYMES, 1575*
  - GALLSTONES
    - CHENODEOXYCHOLIC ACID, 5921*
    - DRUG EFFECTS ON, 5921*
  - GASES
    - DISEASES ASSOCIATED WITH, 2477
  - GASTRECTOMY
    - FEEDING, 620
  - GASTRIN
    - PEPTIDES, 2936
  - GILBERT'S DISEASE
    - DRUG EFFECTS ON, 3410
    - ENZYMES, 3410
  - GLOBULINS
    - SYNTHESIS, 2004
  - GLUCAGON
    - ADENOSINE TRIPHOSPHATE, 2937
    - SURGERY, 4735
  - GLUCONEOGENESIS, 7387*
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6804
    - AMINO ACIDS, 157
    - ENZYMES, 2000
    - GLUCAGON, 6804
    - LEAD, 6770*
    - UREMIA, 6795
  - GLUCOSE, 8061
    - EXCRETION, 2552
  - GLUCOSE PHOSPHATE DEHYDROGENASE
    - DIET, 6120
  - GLUCURONIDASE
    - NEOPLASMS, 166
  - GLUTAMYLTRANSPEPTIDASE
    - DRUG EFFECTS ON, 4638
    - MARKER STUDY, 4638
  - GLUTATHIONE, 7993*
  - GLYCERIN
    - ALCOHOLS, 2035
  - GLYCEROPHOSPHATES
    - ALCOHOLS, 165
    - COENZYMES, 146
    - FATTY ACIDS, 3780
    - LIPIDS, 146
    - METABOLISM, 146
  - GLYCOGEN
    - ALCOHOLISM, 8067
    - ENZYMES, 4667, 7108*
    - GALACTOSE, 2939
    - GLUCOSE, 2939
    - HORMONE CONTROL, 8005*
    - HYPOTHERMIA, 7457
    - METABOLISM, 169, 7416*, 8005*
    - STRESS, 1919, 7457
  - GLYCOGEN PHOSPHORYLASE
    - CIRCADIAN RHYTHM, 2039
  - GLYCOGENESIS
    - BIOCHEMISTRY, 580
    - METABOLISM, 580
  - GLYCOSAMINOGLYCANS
    - SYNTHESIS, 8030*

LIVER (continued)
- GRANULOMA
  - ANTI-INFLAMMATORY AGENTS, 7142*
  - DRUG-INDUCED, 7142*
  - TUBERCULOSIS, 589
- GROWTH SUBSTANCES
  - PITUITARY GLAND, 2942
- GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
  - GLYCOGENOLYSIS, 2940
- GUANYL CYCLASE
  - ALCOHOLS, 7338*
- HAMARTOMA
  - ANGIOGRAPHY, 3108
  - CHILD, 5029*
  - MORPHOLOGY, 5029*
  - SCANNING, SCINTILLATION, 3108
- HAPTOGLOBINS
  - PROSTAGLANDINS, 2114
- HEMANGIOMA, 2458*
  - ANEMIA, 2457*
  - ANGIOGRAPHY, 1249
  - CHILD, 5010*
  - COMPLICATIONS, 2457*
  - JAUNDICE, OBSTRUCTIVE, 2457*
  - NEONATE, 2457*
- HEMATOBILIA
  - ANEURYSM, 1487
  - EMBOLIZATION, 1455*
  - THERAPY, 1455*
- HEMATOMA
  - ANGIOGRAPHY, 3109
  - DIAGNOSIS, 3109
  - ETIOLOGY, 3110
  - SCANNING, SCINTILLATION, 3110
- HEMATOPOIESIS
  - AGE FACTORS, 6073*
- HEME
  - ALCOHOLS, 2868
  - CONTRACEPTIVES, ORAL, 1071
  - DRUG EFFECTS ON, 2868, 2904
  - METABOLISM, 2904
  - PHENOBARBITAL, 2868
  - SECRETION, 3796
  - SYNTHESIS, 2012, 2868
- HEMORRHAGE
  - ANGIOGRAPHY, 5819*
  - DIAGNOSIS, 5819*
  - SURGERY, 6454*
  - THERAPY, 5819*, 6454*
- HEMOSTASIS
  - TECHNIQUES, 6427
- HEPATECTOMY
  - BILE ACIDS AND SALTS, 7448*
  - CLEARANCE STUDY, 7475
  - HYPERPLASIA, 8035*
  - OXIDATIVE PHOSPHORYLATION, 1021*
  - REGENERATION, 1021*, 1975*, 2895, 3804, 8035*
  - TISSUE CULTURE, 1975*
- HEPATIC VEIN THROMBOSIS
  - INFARCTION, 2475
- HEPATITIS
  - AUSTRALIA ANTIGEN, 6470*
- HEPATITIS, CHRONIC
  - ANTIBODIES, 5103*
  - AUSTRALIA ANTIGEN, 6470*
  - BIOPSY, 2523*
  - CARRIER STATE, 2526
  - LYMPHOCYTES, 681

LIVER (continued)
- HEPATITIS, CHRONIC (continued)
  - MORPHOLOGY, 2526
  - ULTRASTRUCTURE, 681
- HEPATITIS, INFECTIOUS
  - ANTIGENS, 7150*
  - AUSTRALIA ANTIGEN, 625, 6470*, 7150*
  - CLOTTING, 1527
  - IMMUNOLOGY, 625
  - MORPHOLOGY, 2104*
  - PRIMATES, 2104*
- HEPATITIS, TOXIC, 4281
  - NECROSIS, 6786
- HEPATOCYTES, 119*
  - CELLS, 2678*
- HERNIA
  - SCANNING, SCINTILLATION, 1491
- HEXOBARBITAL
  - CYTOCHROMES, 5418*
  - OXIDATION, 5418*
- HILUS
  - SCANNING, SCINTILLATION, 3100
- HORMONE EFFECTS ON
  - ANDROGENS, 7476
  - PEPTIDES, 7995*
  - PITUITARY GLAND, 7995*
  - THYROID GLAND, 8053
- HORMONES
  - METABOLISM, 128
  - OXYGEN, 2042
- HORMONES, ADRENAL CORTEX
  - AGE FACTORS, 7416*
  - DRUG METABOLISM, 2951
- HYDROCARBONS, AROMATIC
  - METABOLISM, 3809
- HYPERLIPOPROTEINEMIA
  - BIOPSY, 5034*
  - ULTRASTRUCTURE, 5034*
- HYPERPLASIA
  - ANGIOGRAPHY, 1249
  - BIOCHEMISTRY, 5411*
  - CONTRACEPTIVES, ORAL, 8297*
  - DIAGNOSIS, 2460*, 5033*
  - DRUG-INDUCED, 171
  - HISTOCHEMISTRY, 5411*
  - HORMONES, 8297*
  - PHENOBARBITAL, 171
  - SURGERY, 5033*
- HYPERTENSION, PORTAL
  - FIBROSIS, 4257*
  - MORPHOLOGY, 7112*
  - PATHOLOGY, 7112*
- HYPERTROPHY
  - ANOMALY, 1492
  - CHILD, 1492, 5017*
  - DIAGNOSIS, 5017*
  - DRUG-INDUCED, 171
  - PHENOBARBITAL, 171
  - PRESSURE STUDY, 1709*
- HYPNOTIC AGENTS
  - DRUG METABOLISM, 2047
  - EXCRETION, 2047
- HYPOCHOLESTEREMIA
  - ENZYMES, 5437
- HYPOCHOLESTEREMIC AGENTS
  - DRUG METABOLISM, 1170
  - TRANSPORT, 1170

LIVER (continued)
- HYPOTHERMIA
  - LIVER FUNCTION TESTS, 6103
  - MORPHOLOGY, 6103
- HYPOXIA
  - HEMATOLOGY, 2019
  - METABOLISM, 2019
- IMMUNOGLOBULINS
  - SCHISTOSOMIASIS, 6646*
- INDOCYANINE GREEN
  - CLEARANCE STUDY, 259, 7432*
- INFANT
  - ALCOHOLS, 6121
  - BILIRUBIN, 7999*
- INFARCTION
  - DIAGNOSIS, 547*
- INFLAMMATION
  - ANTI-INFLAMMATORY AGENTS, 8032*
  - CHOLECYSTITIS, 3503*
  - CHOLELITHIASIS, 3503*
  - COMMON BILE DUCT CALCULI, 3503*
  - MICROSOMES, 8032*
  - TRANQUILIZING AGENTS, 8032*
- INSECTICIDES
  - METABOLISM, 3818
- INTERFERON
  - CYTOCHROMES, 2900
  - ENZYMES, 2900
- ION TRANSPORT
  - HYALURONIDASE, 2718
- IRON, 2599
  - ANEMIA, 1494
  - HEMOCHROMATOSIS, 3377, 5907*
  - HISTOCHEMISTRY, 3377
  - METABOLISM, 1494
  - PROTEINS, 2011
  - REVIEW, 1494
- ISCHEMIA
  - ENZYMES, 8042*
  - NUCLEIC ACIDS, 4660
- ISOLATION, 119*
- JAUNDICE, 3520
  - ENZYMES, 1457*, 7407*
- JAUNDICE, CHRONIC IDIOPATHIC
  - PIGMENTS, 638
- JAUNDICE, OBSTRUCTIVE
  - BIOPSY, 6578*
  - MORPHOLOGY, 583
- KERNICTERUS
  - HEPATITIS, 1564
  - LIVER CIRRHOSIS, 1564
- KINETICS
  - DIETARY FACTORS, 4607
- LACTATES
  - ACIDITY, 1045
- LIPASE
  - HEPATITIS, 7173*
  - HEPATITIS, INFECTIOUS, 7173*
  - LIVER DISEASES, ALCOHOLIC, 7173*
- LIPID STORAGE DISEASE, 7124
- LIPIDS
  - ALCOHOLISM, 8016*
  - ALCOHOLS, 122*, 5399*
  - AMINO ACIDS, 8017*
  - ANTIBIOTICS, 122*
  - BINDING, 1033
  - DIET, 4634*, 8020*
  - DIETARY FACTORS, 1061, 4653, 8015*, 8016*

LIVER (continued)
- LIPIDS (continued)
  - DRUG EFFECTS ON, 3787, 5399*, 8016*
  - ENZYMES, 1061, 2001
  - FATS, 8020*
  - FATTY ACIDS, 1168
  - FEEDING, 2001
  - FETUS, 3785
  - GLYCOGEN, 2001
  - HORMONE CONTROL, 8019*
  - METABOLISM, 2916, 3788, 5399*, 8303*
  - NEOPLASMS, 1168
  - PEROXIDATION, 2037, 2038, 2040
  - PLASTICIZERS, 2920
  - PROTEINS, 4634*
  - SUCROSE, 8020*
  - SYNTHESIS, 3785, 3787, 8020*
  - THYROID GLAND, 122*
  - TRANSPORT, 2006
  - ULTRASTRUCTURE, 2678*
- LIPOGENESIS
  - COENZYMES, 7417*
  - DIETARY FACTORS, 5412*, 7458
  - FATTY ACIDS, 7417*
  - PROTEINS, 7417*
  - VITAMIN A, 6773*
- LIPOPOLYSACCHARIDES
  - BACTERIA, 2041
  - SALMONELLOSIS, 2041
- LIPOPROTEINS, 2007
  - BODY COMPOSITION, 8014*
  - FATTY ACIDS, 1060
  - GLYCERIN, 1060, 2945
  - MEMBRANES, 5428*
  - PLASMA, 6125
  - SYNTHESIS, 6125
- LIVER CIRRHOSIS
  - AUSTRALIA ANTIGEN, 6470*
  - NEOPLASMS, 2559
- LIVER DISEASES
  - NEOPLASMS, 1477
- LIVER DISEASES, ALCOHOLIC
  - PATHOLOGY, 693
- LIVER FUNCTION TESTS
  - NICOTINE, 3034
- LYMPHATIC SYSTEM
  - OBSTRUCTION, 4723
- LYMPHOGRAPHY
  - CONTRAST MEDIA, 5516*
  - TECHNIQUES, 3960
- LYSOSOMES
  - AMINO ACIDS, 3917
  - ENZYMES, 4625*, 7427*
  - INSECTICIDES, 6089*
  - JAUNDICE, CHRONIC IDIOPATHIC, 5060*
  - TRANQUILIZING AGENTS, 7468
  - ULTRASTRUCTURE, 2678*
  - UREMIA, 7453
- MEMBRANES
  - ULTRASTRUCTURE, 2678*
- METABOLISM
  - ALCOHOLS, 7174*
  - ANTINEOPLASTIC AGENTS, 5824*
  - BILIRUBIN, 6094
  - CARBOHYDRATES, 6104
  - CELL CULTURE, 136

LIVER (continued)
  METABOLISM (continued)
    CIRCULATION, 6104
    DRUG EFFECTS ON, 4649
    DYES, 6094
    GALACTOSAMINE, 5403*
    GLUCAGON, 5404*, 8008*
    GLYCOSIDES, 4635
    HORMONE EFFECTS ON, 5408*
    HORMONES, 5409*
    INSECTICIDES, 2919
    INSULIN, 8008*
    NERVOUS CONTROL, 3925
    PREGNANCY, 816
    SULFOBROMOPHTHALEIN, 3820
  METALS
    BIOCHEMISTRY, 1982
    ULTRASTRUCTURE, 1982
  MICROSOMES
    AGE FACTORS, 4778
    ANTI-INFLAMMATORY AGENTS, 8032*
    CHOLIC ACID, 3770
    DRUG METABOLISM, 4636, 8029*
    ENZYMES, 1074, 2908, 2933, 4411, 4778
    HYPNOTIC AGENTS, 2047
    LIPIDS, 1994, 2037
    OXIDATION, 1031
    SYNTHESIS, 3770
    TRANQUILIZING AGENTS, 8032*
  MITOCHONDRIA
    AGE FACTORS, 13
    ALCOHOLS, 147
    AMINO ACIDS, 3917
    CHOLAGOGUES AND CHOLERETICS, 1016*
    CHOLESTASIS, 2691
    DRUG EFFECTS ON, 1016*
    ENZYMES, 1501, 3373*
    METABOLISM, 1016*, 2691
    MORPHOLOGY, 13, 2691
    OXIDATION, 2013
    OXIDATIVE PHOSPHORYLATION, 3732
    SULFOBROMOPHTHALEIN, 4613*
    ULTRASTRUCTURE, 2678*, 2691
    VAGOTOMY, 6105
    VITAMIN D, 6839
  MORPHOLOGY
    AGE FACTORS, 1073
    ALCOHOLS, 7174*
    ANALGESICS AND ANTIPYRETICS, 8339*
    CHOLANGITIS, 4377
    DIETARY FACTORS, 4653
    DRUG EFFECTS ON, 8339*
    DYES, 3091
    HEPATITIS, TOXIC, 7419*
    HYPERTENSION, PORTAL, 6453*
    MICROCIRCULATION, 2690
    NUTRITION DISORDERS, 7907
    OBESITY, 3555
    REVIEW, 5044
  MORPHOMETRY
    AGE FACTORS, 5795*
    ALCOHOLS, 3759*
    CHILD, 5795*
    INFANT, 5795*
  NARCOTICS
    METABOLISM, 1985

LIVER (continued)
  NECROSIS, 3402
    ALPHA FETOPROTEIN, 3372*
    ANDROGENS, 3379
    ANEMIA, APLASTIC, 7111*
    ANESTHETICS, 7778
    BACTERIA, 7465
    BILE ACIDS AND SALTS, 7092*
    CLEARANCE STUDY, 7092*
    DIAGNOSIS, 3435, 7092*
    DISEASES ASSOCIATED WITH, 7111*
    DRUG-INDUCED, 1589, 4673, 7778
    ENZYMES, 3435
    ETIOLOGY, 3379
    ISOENZYMES, 3435
    PREVENTION, 6088*
    SURVIVAL, 3372*
    THERAPY, 576
  NEONATE
    HEMATOPOIESIS, 1155
  NEOPLASM METASTASIS, 4213*, 5048
    ACYLTRANSFERASES, 4254*
    ANGIOGRAPHY, 1453*, 5052
    BIOPSY, 5021*
    CARCINOGENS, 5474*
    CHILD, 5019*
    CIRCULATION, 8045*
    DIAGNOSIS, 266, 554, 1181*, 2472, 4254*
    DISEASES ASSOCIATED WITH, 7667
    DRUG THERAPY, 556, 5019*
    EMBOLIZATION, 8045*
    LAPAROSCOPY, 1181*
    LIVER FUNCTION TESTS, 1476
    RADIONUCLIDES, 6998*, 7658*
    RADIOTHERAPY, 5019*
    SCANNING, SCINTILLATION, 1476, 6998*, 7658*, 7667
    SURGERY, 5052, 5835
    SURVIVAL, 5019*
    TRACE ELEMENTS, 3390
    ULTRASONOGRAPHY, 266, 7125, 7227
    ZINC, 560
  NEOPLASMS, 5016*, 8313
    AFLATOXINS, 7100*
    AGE FACTORS, 4338*
    ALKALINE PHOSPHATASE, 563
    ALPHA FETOPROTEIN, 3391, 6081*, 7089*, 7096*, 7104*
    ANDROGENS, 3379
    ANGIOGRAPHY, 1210, 1249, 5811*, 5836, 7747*
    ANTINEOPLASTIC AGENTS, 7748*
    ANTIOXIDANTS, 7425*
    AUSTRALIA ANTIGEN, 3391, 7151*
    BLEEDING, 7118
    CARCINOGENS, 2029, 2150, 2938, 6801, 7100*, 7425*
    CELL CULTURE, 6081*
    CHILD, 1250, 5013*, 5014*, 5015*, 5037*, 7096*
    CHOLESTEROL, 7097*
    CLASSIFICATION, 8331
    CONTRACEPTIVES, ORAL, 7745*
    DIAGNOSIS, 554, 1250, 2044, 3940*, 3966, 5014*, 5836, 6196, 8132, 8318
    DISEASES ASSOCIATED WITH, 4347
    L-DOPA, 7474

LIVER (continued)
- NEOPLASMS (continued)
  - DOPAMINE, 7474
  - DRUG-INDUCED, 6799, 6800, 7474
  - DRUG METABOLISM, 7746*
  - DRUG THERAPY, 555, 3389, 7099*, 8289*
  - ENDOSCOPY, 5524
  - ENZYMES, 1481
  - EPIDEMIOLOGY, 7101*
  - ETIOLOGY, 1563, 3379
  - FAMILIAL FACTORS, 3391
  - FATTY ACIDS, 1167
  - GLUCONEOGENESIS, 2938
  - GLYCOLYSIS, 2938
  - GLYCOSIDES, 7100*
  - HEPATITIS, CHRONIC, 4331*, 8288*
  - HEPATOCYTES, 7101*
  - HORMONES, ADRENAL CORTEX, 8291*
  - HYDROCARBONS, 7100*
  - HYPERTROPHY, 6406*
  - HYPOCHOLESTEREMIC AGENTS, 159
  - IMMUNITY, 7151*
  - IMMUNOGLOBULINS, 8356*
  - IMMUNOLOGY, 6800
  - IMMUNOTHERAPY, 3391
  - INFANT, 6406*
  - ISCHEMIA, 4660
  - LAPAROSCOPY, 8318
  - LIPIDS, 7097*
  - MORPHOLOGY, 8331
  - NEONATE, 6406*
  - NITROSAMINES, 7100*
  - NUCLEIC ACIDS, 158, 4660
  - PATHOLOGY, 2044, 5015*, 6407*, 6801, 8331
  - PHENOBARBITAL, 7425*
  - PLASMA, 4331*
  - PROGNOSIS, 5037*
  - RADIOLOGY, 5013*
  - RADIOTHERAPY, 7099*
  - RECURRENCE, 7096*
  - REVIEW, 2043, 8331
  - SCANNING, SCINTILLATION, 3100
  - SERUM, 4331*
  - SHUNT, 5811*
  - SIMULATION, 1481, 2150
  - SURGERY, 619, 5037*
  - TECHNIQUES, 6196
  - THERAPY, 4660
  - THYROCALCITONIN, 8291*
  - TOMOMETRY, 3940*
  - TOXINS, 7100*
  - TRANSPLANTATION, 3447
  - ULTRASONOGRAPHY, 1246, 5050, 7227, 8132
  - ULTRASTRUCTURE, 6407*
  - ZINC, 560
- NEOPLASMS, BENIGN
  - ANGIOGRAPHY, 5831
  - CHILD, 5011*
  - CLOTTING, 8326
  - CONTRACEPTIVES, ORAL, 6409*, 7767
  - DIAGNOSIS, 2460*, 5808*
  - DRUG-INDUCED, 7767
  - HEMORRHAGE, 6409*
  - HYPERTROPHY, 7770
  - PATHOLOGY, 8312
  - RADIOTHERAPY, 5813*

LIVER (continued)
- NEOPLASMS, BENIGN (continued)
  - SEX FACTORS, 8312
  - SURGERY, 561, 8326
  - THERAPY, 7767
  - ULTRASONOGRAPHY, 5011*
- NEOPLASMS, MALIGNANT, 5814*
  - AGE FACTORS, 2456*
  - ALCOHOLISM, 7768
  - ALDOLASE, 8292*
  - ALPHA 1 ANTITRYPSIN, 5005*
  - ALPHA FETOPROTEIN, 3392, 3408*, 5012*, 5810*, 5812*, 6403*, 6404*, 6405*, 7762, 7768
  - ANGIOGRAPHY, 3105, 5043, 5052, 5830
  - ANTIBODIES, 3369*
  - ANTIGENS, 2028
  - AUSTRALIA ANTIGEN, 3369*, 3392, 6434, 7762
  - BILE ACIDS AND SALTS, 4751*
  - CHILD, 3482*, 7103*
  - CLOTTING, 8326
  - COMPLICATIONS, 5054
  - CONTRACEPTIVES, ORAL, 7126
  - DIAGNOSIS, 548*, 1181*, 1205, 1459*, 3408*, 5012*, 5049, 5809*, 5810*, 5812*, 5830, 6370, 6404*, 7761, 8292*, 8493
  - DISEASES ASSOCIATED WITH, 5018*, 5053, 5812*, 7768
  - DRUG THERAPY, 557, 3388, 6403*
  - EPIDEMIOLOGY, 7768
  - ETIOLOGY, 3369*, 8396*
  - GEOGRAPHICAL FACTORS, 2456*
  - HORMONES, 5051, 5409*
  - HYPERTENSION, PORTAL, 2564
  - HYPERTROPHY, 7770
  - IMMUNITY, 8414
  - ISOENZYMES, 8292*
  - JAUNDICE, OBSTRUCTIVE, 1458*, 3505*
  - LAPAROSCOPY, 1181*, 7761
  - LIVER CIRRHOSIS, 7768
  - LIVER FUNCTION TESTS, 1205
  - METABOLISM, 5409*
  - MORPHOLOGY, 2456*, 8396*
  - MYELOMA, 8333
  - NERVOUS SYSTEM, 2564
  - OBSTRUCTION, 3505*
  - ORGANELLES, 4322*
  - PROGNOSIS, 4263, 5043, 6403*, 6408*, 7098*
  - PROGONSIS, 7103*
  - REVIEW, 4263, 5018*
  - RUPTURE, 1480
  - SCANNING, SCINTILLATION, 3045*, 5809*
  - SEX FACTORS, 2456*
  - SURGERY, 5043, 5052, 6403*, 6408*, 7098*, 8326
  - SURVIVAL, 7098*
  - THERAPY, 6408*, 7098*
  - ULTRASONOGRAPHY, 3045*
  - ULTRASTRUCTURE, 2564, 4322*
  - VIRUS DISEASES, 7248
- NERVOUS CONTROL
  - ULTRASTRUCTURE, 1755*
- NERVOUS SYSTEM

LIVER (continued)

- NERVOUS SYSTEM (continued)
  - EMBRYOLOGY, 140
  - PATHOLOGY, 676
- NICOTINE
  - METABOLISM, 3817
  - PRIMATES, 3817
- NITROGEN
  - METABOLISM, 7460
- NITROSAMINES
  - DRUG EFFECTS ON, 1032
  - METABOLISM, 1032, 2918
  - MITOSIS, 168
  - PATHOLOGY, 168
- NUCLEIC ACIDS
  - AGE FACTORS, 1073
  - AMINO ACIDS, 2946
  - CIRCADIAN RHYTHM, 3797
  - DIETARY FACTORS, 2009
  - DRUG EFFECTS ON, 6127, 8047
  - ENZYMES, 3801
  - METABOLISM, 1075, 2946
  - REGENERATION, 1075, 3801
  - SYNTHESIS, 1073, 1075
  - VITAMIN D, 6839
- NUCLEOTIDASE
  - FATTY ACIDS, 1058
- NUCLEOTIDES
  - BLOOD PLATELETS, 1164
  - DRUG EFFECTS ON, 1015*
  - ENZYMES, 1043
  - METABOLISM, 1015*
- NUTRITION DISORDERS
  - ENZYMES, 1162
  - PREGNANCY, 816
  - SIMULATION, 1162
- OBESITY
  - COMPLICATIONS, 2455*
  - METABOLISM, 622
  - SHUNT, INTESTINAL, 622, 2316*
  - SURGERY, 2316*, 2455*
  - TRIGLYCERIDES, 2316*
- ORGAN CULTURE, 1464
  - LIPIDS, 5399*
  - OXYGEN, 2689
  - TECHNIQUES, 3916
  - ULTRASTRUCTURE, 2689
- OROTIC ACID
  - METABOLISM, 1038
- OSMOTIC PRESSURE
  - DRUG EFFECTS ON, 1173
  - WATER, ELECTROLYTE BALANCE, 135
- OXIDATION
  - ALCOHOLS, 7410*
  - ALDEHYDES, 3760*
  - FATTY ACIDS, 3760*
- OXIDATIVE PHOSPHORYLATION
  - DRUG EFFECTS ON, 3732
  - VITAMIN D, 142
- OXIDOREDUCTASES
  - ALCOHOLS, 4623*
  - CARBON TETRACHLORIDE, 7406*
  - DRUG EFFECTS ON, 4623*
  - KINETICS, 5435
  - NERVOUS CONTROL, 6106
- OXYGEN
  - GALACTOSE, 3782
  - HORMONE CONTROL, 7995*
  - HYPOXIA, 3750*

LIVER (continued)

- OXYGEN (continued)
  - KINETICS, 2042
  - NERVOUS CONTROL, 6757*
  - PEPTIDES, 7995*
  - PITUITARY GLAND, 7995*
- PANCREAS
  - NEOPLASMS, 4213*
- PANCREATIC DISEASES
  - SCANNING, SCINTILLATION, 287
- PATHOLOGY
  - AUSTRALIA ANTIGEN, 3443, 6475*
  - CELLS, 1541
  - CHILD, 1250
  - CHOLECYSTITIS, 3503*
  - CHOLELITHIASIS, 3503*
  - COMMON BILE DUCT CALCULI, 3503*
  - DIAGNOSIS, 1250
  - DIOXINS, 1984
  - LEUKEMIA, 5036*
  - REVIEW, 1541
  - TECHNIQUES, 2199
- PENTAGASTRIN
  - METABOLISM, 2773*
- PERFUSION, 6102
  - AMINO ACIDS, 6761*
  - ANTISPASMODICS, 2947
  - BLOOD, 1163
  - CALCIUM, 15
  - DRUG METABOLISM, 8031*
  - FIBRINOLYSIS, 1174
  - HYPOTHERMIA, 6103
  - LIVER FUNCTION TESTS, 6103
  - MEMBRANES, 15
  - METABOLISM, 4731
  - MORPHOLOGY, 6103
  - TECHNIQUES, 137, 3916, 6068*
  - ULTRASTRUCTURE, 15
- PEROXISOMES
  - DRUG EFFECTS ON, 7454
  - HYPOLIPEMIA, 7454
  - HYPOLIPEMIC AGENTS, 7454
- PHENOBARBITAL
  - DRUG METABOLISM, 5418*
  - ENZYMES, 1043
  - PENTOSIDES, 2911
- PHOSPHOLIPIDS
  - ALCOHOLS, 149
  - AMINO ACIDS, 2935
  - CARBON TETRACHLORIDE, 1064
  - DIETARY FACTORS, 2935
  - DRUG EFFECTS ON, 6127
  - METABOLISM, 1064
  - TECHNIQUES, 6850*
- PORPHYRIA
  - CHILD, 5059
  - DIAGNOSIS, 5059
  - DRUG THERAPY, 8311
  - PATHOLOGY, 5820*
  - REVIEW, 5820*
- PORPHYRINS
  - ALCOHOLS, 2868
  - CARBOXYLASES, 2949
  - CONTRACEPTIVES, ORAL, 1071
  - DRUG EFFECTS ON, 2868
  - DRUG-INDUCED, 2948
  - METABOLISM, 7435*
  - PHENOBARBITAL, 2868
  - STEROIDS, 7435*

LIVER (continued)
  PORPHYRINS (continued)
    SYNTHESIS, 2868
  PORTACAVAL SHUNT
    REGENERATION, 3904
    ULTRASOUND, 1553*
  PRECANCEROUS CONDITIONS
    HEPATOCYTES, 2149
    TECHNIQUES, 558
  PROSTAGLANDINS
    SYNTHESIS, 6794
  PROTEINS
    AGE FACTORS, 5405*
    ALCOHOLISM, 7442*
    ALCOHOLS, 3761*, 7439*
    ANESTHESIA, 8343
    BINDING, 1033, 2931, 3798, 7422*
    CIRCADIAN RHYTHM, 3797
    DEFICIENCY, 3917
    DIETARY FACTORS, 2009
    DRUG EFFECTS ON, 1015*, 6127
    DRUGS, 3798
    GROWTH FACTORS, 5406*
    IMMUNITY, 1024
    METABOLISM, 1015*, 3761*
    METALS, 5407*
    NEONATE, 5406*
    REGENERATION, 2894
    SURGERY, 8343
    SYNTHESIS, 2010, 2012, 5405*, 5406*, 6541*, 7387*, 7442*, 8010*
    VITAMIN D, 6839
  PROTOZOAL DISEASES
    ABSCESS, 5247
  PSEUDOTUMORS
    BACTERIAL INFECTIONS, 1509*
  RADIOLOGY
    ASCITES, 3043*
    CYSTS, 2175*
    REVIEW, 261
    TECHNIQUES, 3972
  RADIONUCLIDES
    CHROMATOGRAPHY, 7386*
    CLEARANCE STUDY, 7386*
    TOLERANCE, 7386*
    TRANSPORT, 7386*
  RADIOPROTECTIVE AGENTS
    BILE, 1786
  REFLUX
    BILE ACIDS AND SALTS, 1991
  REGENERATION
    AGE FACTORS, 6073*
    BIOCHEMISTRY, 7447
    CHALONES, 3924
    CHOLELITHIASIS, 4382
    CIRCULATION, 4609*, 7462
    ENZYMES, 5438, 6767, 8038*
    ESSENTIAL OILS, 8037
    FATS, 7462
    GENETICS, 6810
    GLUCAGON, 2883*
    HEPATOCYTES, 6110
    HORMONE EFFECTS ON, 2883*
    INSULIN, 2883*
    LIPOPROTEINS, 1022*
    LIVER FUNCTION TESTS, 1022*
    MITOSIS, 3924
    MORPHOLOGY, 8080

LIVER (continued)
  REGENERATION (continued)
    NUCLEIC ACIDS, 6109, 6810, 7423*
    RETICULOENDOTHELIAL SYSTEM, 2895
    SIMULATION, 1022*
    SURGERY, 2157
    VAGOTOMY, 3752*
    VITAMINS, 8079
  RESPIRATORY SYSTEM
    FISTULA, 5837
    NEOPLASM METASTASIS, 8329
  RETICULOENDOTHELIAL SYSTEM
    ALBUMINS, 3914
    METABOLISM, 139
    RADIOISOTOPES, 3914
    REGENERATION, 139
  REYE'S SYNDROME
    ULTRASTRUCTURE, 1499, 8301*
  RIBOSOMES
    PROTEINS, 6768*
  ROTOR'S SYNDROME
    TRANSPORT, 1508
  RUPTURE
    DISEASES ASSOCIATED WITH, 6421*
  SALMONELLOSIS
    ENDOTOXINS, 8039*
  SCANNING, SCINTILLATION, 5554, 5838, 6853*
    ABSCESS, 1244
    ANTIBIOTICS, 5809*
    CYSTS, 2175*
    DIAGNOSIS, 1244, 1279
    FATS, 3970
    NEOPLASM METASTASIS, 2209, 5549
    NEOPLASMS, 1244, 6196
    RADIONUCLIDES, 3944*, 3945*, 5801*, 7421*
    REVIEW, 6517*, 8332
    TECHNIQUES, 3045*, 3965, 5809*, 6517*
    ULTRASOUND, 3970
  SCHISTOSOMIASIS
    COLLAGEN, 3823
    DRUG METABOLISM, 2958, 4674
    FIBROSIS, 5972
    HYPERTENSION, 1709*
    PATHOLOGY, 1727
    PRESSURE STUDY, 1709*
  SECRETION
    BILIRUBIN, 6094
    DYES, 6094
    FEEDING, 605
    PHYSICAL FACTORS, 2022
  SEDATIVES
    DIETARY FACTORS, 2036
    METABOLISM, 2036
  SEROTONIN
    VEINS, 2116
  SERUM
    GROWTH SUBSTANCES, 1169
    LIPOPROTEINS, 1022*
  SHUNT
    DISEASES ASSOCIATED WITH, 7128
    HYPERPLASIA, 8035*
    REGENERATION, 8035*
  SHUNT, INTESTINAL
    CHOLESTEROL, 5484
    LIPIDS, 623
    METABOLISM, 404

LIVER (continued)
- SHUNT, INTESTINAL (continued)
  - MORPHOLOGY, 4106*
  - OBESITY, 4106*
- SIDEROSIS
  - ALCOHOLISM, 8389*
- SIMULATION
  - NEOPLASMS, 2043
- SODIUM, 864
- STEROIDS
  - AGE FACTORS, 125
  - ANDROGENS, 129, 2950
  - CELL CULTURE, 1068
  - ENDOTOXINS, 6123
  - ENZYMES, 2030
  - ESTROGENS, 2950
  - FLUOROCARBONS, 1072
  - METABOLISM, 1067, 1072, 2950, 2952
  - MICROSOMES, 1980
  - OXIDOREDUCTASES, 1651
- STRESS
  - HYPOTHERMIA, 7457
  - PRESSURE STUDY, 7943
- SULFOBROMOPHTHALEIN
  - ADENOSINE TRIPHOSPHATE, 1051
  - CHOLERESIS, 1051
  - HERBICIDES, 1986
  - METABOLISM, 2865*
  - TRACER STUDY, 2865*
  - TRANSPORT, 906, 2607
- SURGERY
  - COMPLICATIONS, 2455*, 8328
  - FIBROSIS, 2455*
  - HEMORRHAGE, 8321
  - HEMOSTASIS, 6423, 6427
  - HYPERTENSION, PORTAL, 6398*
  - INFANT, 7880
  - NUTRITION, 5780
  - REVIEW, 8328
  - TECHNIQUES, 6427, 8321, 8328
- SYMPATHOMIMETICS
  - METABOLISM, 2907
- THIOCYANATES
  - GLUCURONYLTRANSFERASE, 3813
- THROMBOSIS
  - BACTERIA, 7465
  - NECROSIS, 7465
- TISSUE CULTURE
  - ALBUMINS, 134
  - FIBRINOGEN, 134
  - TECHNIQUES, 4373
- TISSUE EXTRACTS
  - SIMULATION, 3031
  - TOXICITY, 3031
- TOMOGRAPHY, 4746*, 5801*, 6853*
  - COMPUTERS, 6192, 8124*
  - CONTRAST MEDIA, 7741*
  - TECHNIQUES, 7741*
- TOXICITY
  - ANDROGENS, 7476
  - ASPIRIN, 2479*, 6442*
  - CYTOCHROMES, 8022*
  - RARE EARTHS, 5826*
  - TANNIC ACID, 7451
- TOXINS, 5073
  - POLYSACCHARIDES, 6782*
- TRANQUILIZING AGENTS
  - ENZYMES, 2008
  - MICROSOMES, 7414*

LIVER (continued)
- TRANSFERRIN
  - IRON, 7994*
  - SYNTHESIS, 7994*
- TRANSPLANTATION, 2889*, 3402, 3533, 4272, 8050
  - ANTI-INFLAMMATORY AGENTS, 3035
  - ANTIGENS, 3035
  - BILE, 3909
  - BILE DUCTS, 4656
  - BILIARY TRACT, 5803*
  - CIRCULATION, 6108, 6432
  - CLEARANCE STUDY, 2055
  - CLOTTING, 2056
  - COMA, 1482
  - COMPLICATIONS, 2887*, 4656, 4657, 5803*, 8306*
  - DRAINAGE, 3912, 7117*, 8307*
  - ENZYMES, 3910
  - GENETIC FACTORS, 336
  - HETEROTOPIA, 592
  - LIVER CIRRHOSIS, 4663
  - PATHOLOGY, 1461*, 3910, 3911
  - PHAGOCYTOSIS, 2055
  - PROGNOSIS, 8306*
  - PROTEINS, 167
  - REVIEW, 1461*, 7116*
  - SIMULATION, 167, 2056, 2057, 2158
  - SURVIVAL, 3035, 3805, 3908, 5803*, 5804*, 7116*, 8306*, 8307*
  - TECHNIQUES, 2057, 2158, 3913, 6108, 7117*, 8306*, 8307*
  - THERAPY, 3391
- TRANSPORT
  - AMINO ACIDS, 7387*
  - BILE, 910
  - BILE ACIDS AND SALTS, 41, 42, 609
  - BILIRUBIN, 609
  - DRUG EFFECTS ON, 3816
  - DRUG THERAPY, 1159
  - DRUGS, 42
  - DYES, 5422*
  - FOLIC ACID, 1810
  - LIPIDS, 910
  - POTASSIUM, 5408*
  - SODIUM, 5408*
  - SULFOBROMOPHTHALEIN, 41
- TRIGLYCERIDES
  - DIETARY FACTORS, 8015*
  - GLUCOSE, 2005
  - INSULIN, 2005
  - METABOLISM, 1066, 1972*, 2005
- ULCER
  - PERFORATION, 368
- ULCER, PEPTIC
  - PATHOLOGY, 4091
- ULTRASONOGRAPHY, 5801*, 6193, 6394*
  - CYSTS, 2175*
  - REVIEW, 8132
  - TECHNIQUES, 3045*, 3969
- ULTRASOUND, 4746*
- ULTRASTRUCTURE
  - AGE FACTORS, 7382*
  - AUSTRALIA ANTIGEN, 3443
  - CHOLELITHIASIS, 4662
  - FETUS, 7461
  - HYPERTENSION, PORTAL, 6453*
  - HYPOTHERMIA, 7457
  - NEONATE, 7461

- LIVER (continued)
  - ULTRASTRUCTURE (continued)
    - SCHISTOSOMIASIS, 6646*
    - STRESS, 7457
  - UREA
    - BILIARY TRACT DISEASES, 730
    - PROTEINS, 8009*
  - UREMIA
    - MITOCHONDRIA, 1049
    - SIMULATION, 1049
  - URIC ACID
    - ALCOHOLS, 6079*
    - DRUG EFFECTS ON, 6079*
    - SYNTHESIS, 6079*
  - VEINS
    - HYPOPLASIA, 7464
    - MORPHOLOGY, 1465, 3923
    - NECROSIS, 689
    - NEOPLASMS, 584
    - OBSTRUCTION, 584, 5040*
  - VITAMIN A
    - DEFICIENCY, 6078*
  - VITAMIN B12
    - BINDING, 130
    - METABOLISM, 2015
  - VITAMINS
    - METABOLISM, 4351
  - WATER, ELECTROLYTE BALANCE
    - CIRCULATION, 4706*
  - WOUNDS AND INJURIES
    - ARTERIOGRAPHY, 4773
    - ASPIRIN, 2479*
    - COMPLICATIONS, 4273
    - COPPER, 2480*
    - DIAGNOSIS, 7530*
    - EPIDEMIOLOGY, 591
    - HEALING, 2893
    - HEMATOBILIA, 4268
    - HEMORRHAGE, 5819*, 6454*
    - LIVER FUNCTION TESTS, 6455
    - OCCUPATIONAL FACTORS, 2480*
    - PRESSURE STUDY, 7943
    - PROGNOSIS, 4273
    - REVIEW, 6455
    - SCANNING, SCINTILLATION, 1215, 7530*
    - SIMULATION, 2893
    - SURGERY, 4273, 6454*
    - THERAPY, 4273, 6454*
  - ZINC, 8134
    - BINDING, 7434*
    - ENDOTOXINS, 2957

- LIVER CIRRHOSIS
  - ABDOMEN
    - PAIN, 8405
  - ABSORPTION
    - SALT, 8044*
    - WATER, 8044*
  - ACID-BASE BALANCE
    - THERAPY, 4335*
  - ACIDS
    - THERAPY, 4253*
  - ADRENERGIC RECEPTOR BLOCKADERS
    - RENIN, 2553
  - AFLATOXINS
    - ETIOLOGY, 1567

- LIVER CIRRHOSIS (continued)
  - ALBUMINS
    - CLEARANCE STUDY, 2531*
    - REVIEW, 2546
  - ALCOHOLISM, 4328, 5895*
    - ETIOLOGY, 703, 7802*, 8408
    - IMMUNOLOGY, 7802*
    - LIVER INJURY, 4319*
    - PROGNOSIS, 5895*, 7802*
    - SEX FACTORS, 7802*
  - ALCOHOLS, 7191
    - EXCRETION, 714
    - HEMORRHAGE, 5117
    - STATISTICAL STUDY, 6601
  - ALKALINE PHOSPHATASE
    - ISOENZYMES, 679, 3098
  - ALPHA 1 ANTITRYPSIN, 5005*
    - DEFICIENCY, 336, 8412
  - ALPHA FETOPROTEIN, 3392, 3485
    - RADIOIMMUNOASSAY, 7089*
  - AMINO ACIDS
    - DEFICIENCY, 6522*
    - METABOLISM, 8327
    - SERUM, 2548
  - AMINO TRANSFERASES
    - HEPATOMEGALY, 3467*
  - AMMONIA
    - METABOLISM, 8141
  - ANEMIA, SICKLE CELL
    - COMPLICATIONS, 8302*
  - ANGIOGRAPHY
    - CHILD, 7086*
    - DIAGNOSIS, 4749*
  - ANTIBODIES, 4781, 5884, 5905*
    - ALBUMINS, 7090*
    - AUTOIMMUNE DISEASES, 4252*
    - BACTERIA, 3475*
    - DIAGNOSIS, 7165*
  - ANTICONVULSANTS
    - DRUG METABOLISM, 7811*
  - ANTIGENS, 3438, 4303, 4311*, 4312, 4313
  - ASCITES
    - ACID-BASE BALANCE, 4335*
    - BACTERIAL INFECTIONS, 5127*
    - DIURESIS, 2554, 4346
    - DIURETICS, 3481*
    - DRUG THERAPY, 5903*
    - EDEMA, 5903*
    - ENDOTOXINS, 6530*
    - ESTROGENS, 2551
    - PERITONITIS, 6507*
    - POTASSIUM, 2558
    - PROTEINS, 3487
    - REVIEW, 7819
    - SODIUM, 3481*
    - SURVIVAL, 5127*, 8394
    - THERAPY, 3481*, 3487, 6531*, 7179*
  - ASPIRIN
    - BLEEDING, 2563
  - AUSTRALIA ANTIGEN, 3392, 3438, 4313
    - BIOPSY, 7152*
    - CHILD, 6499*
    - IMMUNITY, 7151*
    - IMMUNOGLOBULINS, 3476*, 4309*
    - IMMUNOLOGY, 3476*, 4310*
    - LIVER, 6470*
    - SERUM, 6470*

LIVER CIRRHOSIS (continued)
- AUTOIMMUNE DISEASES
  - TOXICITY, 2528
- BACTERIAL INFECTIONS
  - SURVIVAL, 1694, 5127*
- BILE ACIDS AND SALTS
  - CIRCULATION, 6523*
  - DIAGNOSIS, 3380
  - LIVER FUNCTION TESTS, 2549
  - METABOLISM, 2577*, 6090*
  - RADIOIMMUNOASSAY, 2549, 6521*
  - SECRETION, 2550, 8398*
  - TECHNIQUES, 3380
- BILE DUCTS
  - REVIEW, 4374
- BILIRUBIN
  - ETIOLOGY, 3425*
  - KINETICS, 707
  - METABOLISM, 7801, 8399*
- BIOCHEMISTRY
  - DIAGNOSIS, 722, 8411
- BIOPSY
  - DIAGNOSIS, 8407
  - ENZYMES, 5798*
  - RADIOLOGY, 2540*
- BLEEDING
  - PORTACAVAL SHUNT, 1566
  - SURGERY, 1566
  - SURVIVAL, 1566
  - ULCER, 3483*
  - VARICES, 3483*
- BLOOD
  - BACTERIA, 4337*
  - ENDOTOXINS, 4337*
- BLOOD PLATELETS, 6400*
  - DEFICIENCY, 3472*
  - ENZYMES, 7814*
  - MONOAMINE OXIDASE, 7814*
- CARBOHYDRATES
  - ENZYMES, 2603
- CELLS
  - ELECTROLYTES, 4345
  - HISTOCHEMISTRY, 4291*
  - POTASSIUM, 4345
  - SODIUM, 4345
- CHENODEOXYCHOLIC ACID
  - DRUG THERAPY, 1555*
  - LIVER FUNCTION TESTS, 2549
  - RADIOIMMUNOASSAY, 2549
- CHILD
  - AMINO ACIDS, 8327
  - CEREBROSPINAL FLUID, 4344
  - DIAGNOSIS, 702
  - MAGNESIUM, 4344
  - PARASITES AND PARASITIC DISEASES, 702
  - SCANNING, SCINTILLATION, 7094*
- CHOLELITHIASIS
  - EPIDEMIOLOGY, 2573*
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6523*
  - DIAGNOSIS, 7194
  - HYPERCHOLESTEREMIA, 4336*
  - HYPERPROTEINEMIA, 4336*
- CHOLESTEROL
  - SERUM, 7097*
- CHOLIC ACID
  - LIVER FUNCTION TESTS, 2549

LIVER CIRRHOSIS (continued)
- CHOLIC ACID (continued)
  - RADIOIMMUNOASSAY, 2549, 4341
  - TOLERANCE TEST, 4341
- CIRCULATION
  - CHILD, 708
  - FETUS, 7184*
  - HEMATOLOGY, 708
  - HYPERBILIRUBINEMIA, 3470*
  - HYPERTENSION, PORTAL, 8402*
  - INDOCYANINE GREEN, 4339*
  - MORPHOLOGY, 7184*, 7187*
  - SCANNING, SCINTILLATION, 5118*
  - SHUNT, 2543*
- CLASSIFICATION
  - REVIEW, 7817
- CLEARANCE STUDY
  - SULFOBROMOPHTHALEIN, 3094
- COLLAGEN, 704
  - ENZYMES, 8296*
  - SYNTHESIS, 2871*
- COLOSTOMY
  - BLEEDING, 1565
- COMPLEMENT
  - IMMUNOLOGY, 3484
- COMPLICATIONS, 3387, 5126
  - ASCITES, 5125*, 6537*
  - CRYOGLOBULINEMIA, 6497*
  - DRUG THERAPY, 5896*
  - ENDOCRINE SYSTEM, 5896*
  - GASTRITIS, 4809*
  - GENETIC FACTORS, 4324*
  - HYPOXIA, 5892
  - KIDNEYS, 4809*
  - LIVER COMA, 8415
  - PLEURAL EFFUSION, 6537*
- CONNECTIVE TISSUE
  - MORPHOLOGY, 2538*
- COPPER
  - HEPATOCYTES, 2539*
- DIABETES
  - ETIOLOGY, 703
- DIAGNOSIS, 248, 8139
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6508*
  - BIOCHEMISTRY, 8141
  - CLEARANCE STUDY, 3094
  - ENZYMES, 4316, 4778
  - GLUCAGON, 6508*
  - GLUCOSE, 6508*
  - GLYCOPROTEINS, 6502
  - HYPERTENSION, PORTAL, 8392
  - LAPAROSCOPY, 8392
  - MORPHOLOGY, 7817
  - PATHOLOGY, 7193
  - REVIEW, 7817
  - UREA, 4316
- DISEASES ASSOCIATED WITH
  - CRYOGLOBULINEMIA, 6461*
  - DIABETES, 7816
  - EPIDEMIOLOGY, 2559
  - HEPATITIS, 7818
  - NEOPLASMS, 4347
  - RESPIRATORY SYSTEM, 7183*
  - ULCER, PEPTIC, 8418
- DIURETICS
  - METABOLISM, 6527*
- DRUG-INDUCED
  - AGE FACTORS, 7139*

- LIVER, CIRRHOSIS (continued)
  - DRUG-INDUCED (continued)
    - ALCOHOLS, 7139*
    - ANALGESICS AND ANTIPYRETICS, 6440*
    - CARBON TETRACHLORIDE, 4664
    - CLEARANCE STUDY, 4664
    - DRUG METABOLISM, 4664
    - PHENOBARBITAL, 4664
  - DRUG METABOLISM, 5088*
    - DRUG EFFECTS ON, 6411*
    - KINETICS, 8310
    - LIVER FUNCTION TESTS, 7746*
  - DRUG THERAPY, 2536*, 7820, 7821
    - ALKALINE PHOSPHATASE, 8387
    - ANALYSIS, 2557
    - ANTI-INFLAMMATORY AGENTS, 2556
    - BLOOD, 8387
    - L-DOPA, 2561
    - TOXICITY, 2556
  - DYES
    - SCANNING, SCINTILLATION, 2213
  - EDEMA
    - ALCOHOLISM, 1556*
    - DRUG THERAPY, 5903*
    - HYPERTENSION, PORTAL, 1556*
    - MORPHOLOGY, 1556*
    - VARICES, 1556*
  - ELECTROLYTES
    - HORMONE EFFECTS ON, 4345
  - ENDOSCOPY, 263
  - ENDOTOXINS
    - ANTIBIOTICS, 712
  - ENZYMES, 3385, 7814*, 7822
    - HEPATOMEGALY, 3467*
  - EPIDEMIOLOGY
    - CHILD, 1560
    - GEOGRAPHICAL FACTORS, 699
    - REVIEW, 1560
  - EROSIONS
    - DRUG-INDUCED, 1497
  - ERYTHROCYTES
    - CARBOHYDRATES, 7812*
    - PROTEINS, 7812*
  - ESOPHAGUS
    - BLEEDING, 3483*
    - HEMORRHAGE, 3483*
    - VARICES, 7185*
  - ESTROGENS, 3489, 5135
    - METABOLISM, 2551
  - ETIOLOGY, 7191, 8396*
    - ALCOHOLISM, 3465, 3466
    - FOOD, 1567
    - IMMUNOLOGY, 1563, 7802*
    - REVIEW, 7817
  - FATTY ACIDS, 3385
  - FATTY LIVER
    - REVIEW, 577
  - FIBRINOGEN
    - KINETICS, 7813*
  - FIBRINOLYSIS
    - NICOTINIC ACIDS, 710
  - GASTRIN, 5128*
    - CELLS, 8418
    - CIRCADIAN RHYTHM, 7178*
  - GASTRITIS
    - ENDOTOXINS, 4809*
  - GASTROINTESTINAL SYSTEM
    - BLEEDING, 5902*
    - EDEMA, 1556*

- LIVER, CIRRHOSIS (continued)
  - GASTROINTESTINAL SYSTEM (continued)
    - HEMORRHAGE, 7186*
    - VARICES, 5902*
  - GENETIC FACTORS
    - ANTIGENS, 3453*
  - GLOBULINS
    - IMMUNOLOGY, 3484
  - GLUCONEOGENESIS
    - LIVER FUNCTION TESTS, 6466*
  - GLUCOSE TOLERANCE TEST, 2552
  - GLUTAMYLTRANSPEPTIDASE, 271
  - GLYCOPROTEINS, 6525*
    - SERUM, 7263
  - HEMATOLOGY
    - SURGERY, 701
  - HEME
    - METABOLISM, 8400*
  - HEMOCHROMATOSIS
    - FAMILIAL FACTORS, 7815*
    - HEPATOCYTES, 5906*
    - PATHOLOGY, 5906*
    - REVIEW, 8397*
  - HEMOLYSIS
    - BILIRUBIN, 545*
    - ELECTROLYTES, 545*
    - MEMBRANES, 545*
  - HEMORRHAGE
    - BLOOD PLATELETS, 719
    - ENDOSCOPY, 2562
    - GASTROINTESTINAL SYSTEM, 3488
    - KERNICTERUS, 717
    - SURVIVAL, 8394
    - THERAPY, 717, 8395
  - HEMOSIDEROSIS
    - INFANT, 5042*
  - HEMOSTASIS, 3471*
  - HEPATITIS, 3466
    - ANTIGENS, 1520*
    - ETIOLOGY, 8408
  - HEPATITIS, CHRONIC
    - AUSTRALIA ANTIGEN, 6499*
    - CHILD, 6499*
    - FIBROSIS, 8288*
    - IMMUNOGLOBULINS, 711
  - HEPATITIS, INFECTIOUS
    - COMPLICATIONS, 8376
  - HEPATOCYTES
    - FERRITIN, 5906*
    - IMMUNITY, 5882*
    - IRON, 5906*
    - MORPHOLOGY, 2538*, 5882*
    - ULTRASTRUCTURE, 2469, 7181*
  - HISTAMINE
    - PLASMA, 5130*
  - HISTOCHEMISTRY, 5075*
  - HORMONES
    - SERUM, 3478*
  - HORMONES, ADRENAL CORTEX
    - PLASMA, 2554
    - SECRETION, 2553
  - HORMONES, GASTROINTESTINAL
    - PEPTIDES, 713
  - HUMORAL FACTORS
    - DIAGNOSIS, 7087*
  - HYALIN SUBSTANCE
    - ULTRASTRUCTURE, 2541*
  - HYPERTENSION, PORTAL, 5136
    - ANGIOGRAPHY, 5129*

LIVER CIRRHOSIS (continued)
    HYPERTENSION, PORTAL (continued)
        BLOOD PLATELETS, 718
        CIRCULATION, 5118*
        HEME, 8400*
        SURGERY, 6535*
    HYPOPROTEINEMIA
        PLASMA, 2531*
    ILEOSTOMY
        BLEEDING, 1565
    IMMUNITY, 8414
        PLASMA, 8433*
    IMMUNOGLOBULINS, 5120*
        HEPATOMEGALY, 3467*
        SERUM, 4321*
        SYNTHESIS, 4350
    IMMUNOLOGY, 3051*, 3438, 3468*, 3475*,
      4313, 8383*
        REVIEW, 5022*, 7817
    INDOCYANINE GREEN
        DIAGNOSIS, 1531
        TECHNIQUES, 1531
    INTESTINE, SMALL
        BACTERIA, 6520*
    JAUNDICE
        SURVIVAL, 8394
    JEJUNUM
        BACTERIA, 6520*
    KERNICTERUS
        NERVOUS SYSTEM, 7107*
    KIDNEY DISEASES
        DRUG THERAPY, 698*
    KIDNEYS, 5410*
        ENDOTOXINS, 4809*
    LIPIDS, 3385, 7093*
        SERUM, 7097*
        SIMULATION, 162
    LIPODYSTROPHY, INTESTINAL
        COPPER, 2466*
    LIPOPROTEINS, 3385
    LIVER
        ARTERIES, 3470*
        CIRCULATION, 3470*
        KERNICTERUS, 1564
        NEOPLASMS, MALIGNANT, 7768
        TRANSPLANTATION, 4663
    LIVER COMA
        ETIOLOGY, 5123*
        SURVIVAL, 8319
        THERAPY, 5134
    LIVER DISEASES, ALCOHOLIC, 7175
        BIOCHEMISTRY, 4320*
        BIOPSY, 8407
        CARCINOEMBRYONIC ANTIGEN, 5113*
        COMPLEMENT, 5867*
        COMPLICATIONS, 4324*, 5896*
        DIAGNOSIS, 6508*, 8392, 8407
        HEMORRHAGE, 8395
        HORMONES, 6509*
        IMMUNOGLOBULINS, 4321*, 7804*
        IMMUNOLOGY, 5867*, 6511*
        PROGNOSIS, 8393
        PROLACTIN, 5124*
        REVIEW, 7807*
        SURVIVAL, 8394
        ULTRASTRUCTURE, 4322*
    LIVER FUNCTION TESTS, 4342, 6521*,
      7822
        AMMONIA, 4343

LIVER CIRRHOSIS (continued)
    LIVER FUNCTION TESTS (continued)
        DYES, 3093
        KERNICTERUS, 1552*
        PORTACAVAL SHUNT, 1552*
        PROGNOSIS, 1552*
        RETICULOENDOTHELIAL SYSTEM, 3093
        SCANNING, SCINTILLATION, 4245*
    LYMPHOCYES
        LYMPHOCYTES, 5882*
    LYMPHOCYTES, 1542*
        IMMUNITY, 4334*
        IMMUNOLOGY, 6496*
    LYSOZYMES
        IMMUNOLOGY, 3484
    MICROSOMES
        BREATH TEST, 3376
        DRUG METABOLISM, 4664
        KINETICS, 2547
    MITOCHONDRIA
        ANTIBODIES, 4332*, 4333*
        CYTOCHROMES, 7189*
        KINETICS, 2547
        ULTRASTRUCTURE, 8282*
    MONOAMINE OXIDASE, 7814*
    MORPHOLOGY, 3468*, 6539, 8396*
        SIMULATION, 2538*
    MUSCLES
        ANTIBODIES, 4332*
    NEONATE
        ANTIBODIES, 5102*
        AUSTRALIA ANTIGEN, 5102*
        FAMILIAL FACTORS, 7149*
        IMMUNOGLOBULINS, 5102*
        TRANSMISSION, 7149*
    NEOPLASMS
        AGE FACTORS, 4338*, 4347
        AUSTRALIA ANTIGEN, 4347
        DIAGNOSIS, 7097*
        EPIDEMIOLOGY, 1479, 2559
        LIVER, 2559
        SEX FACTORS, 4347
    NEOPLASMS, MALIGNANT
        DISEASES ASSOCIATED WITH, 5812*
    NERVOUS SYSTEM
        DISEASES ASSOCIATED WITH, 4329*
    NUCLEIC ACIDS
        BINDING, 3942*
        ENZYMES, 272
    OCCUPATIONAL FACTORS
        SURVIVAL, 6375
    OXALATES
        URINE, 4258*
    OXIDATION
        AMMONIA, 5121*
        DRUG EFFECTS ON, 5121*
        PHENOLS, 5121*
    OXYGEN
        THERAPY, 692
    PAIN
        DIAGNOSIS, 8405
    PANCREAS
        PANCREOZYMIN, 8401*
        SECRETIN, 8401*
    PATHOLOGY, 5894
        REVIEW, 5022*, 5901*
    PEPTIDES
        SYNTHESIS, 8012*

LIVER CIRRHOSIS (continued)
- PERITONITIS
  - ANTIBIOTICS, 6507*
  - DRUG THERAPY, 6507*
- PEROXIDES, 7093*
- PHOSPHOLIPIDS, 3385
- PLASMA
  - CHEMICAL COMPOSITION, 4331*
  - ENDOTOXINS, 6530*
- PORPHYRINS
  - DIAGNOSIS, 3477*
- PORTACAVAL SHUNT, 3486
  - BILE ACIDS AND SALTS, 5133
  - HYPERTENSION, PORTAL, 4340*
  - LIVER COMA, 5134
  - PROGNOSIS, 8404
  - SURVIVAL, 4339*
- POTASSIUM
  - HORMONE EFFECTS ON, 4345
- PREGNANCY
  - REVIEW, 5908*
- PRESSURE STUDY
  - SHUNT, 2543*
- PROGNOSIS
  - GENETIC FACTORS, 3453*
  - SEX FACTORS, 7802*
- PROLACTIN
  - ASCITES, 5124*
  - CIRCADIAN RHYTHM, 6526*
- PROTEINS
  - ENZYMES, 6469*
  - ETIOLOGY, 6524*
- RADIOLOGY
  - COPPER, 2540*
- REGENERATION
  - NUCLEIC ACIDS, 3800
- RENIN, 3489
  - PLASMA, 2554, 5122*
  - SODIUM, 5122*
- RESPIRATORY SYSTEM
  - EPIDEMIOLOGY, 2555
- SALMONELLOSIS, 5884
- SCANNING, SCINTILLATION
  - DIAGNOSIS, 4749*
  - REVIEW, 6517*
- SCLERODERMA
  - AUTOIMMUNE DISEASES, 2544*
  - THYROID GLAND, 2544*
- SECRETION, 6112
- SEROTONIN
  - CHILD, 706
  - METABOLISM, 705
  - URINE, 706
- SERUM
  - ALBUMINS, 3480*
  - BILE ACIDS AND SALTS, 2549, 6521*
  - CHEMICAL COMPOSITION, 4331*
  - CHENODEOXYCHOLIC ACID, 2549
  - CHOLIC ACID, 2549
  - FIBRINOGEN, 3473*
  - GASTRIN, 8418
  - ZINC, 3480*
- SHUNT
  - CIRCULATION, 5909
  - COMPLICATIONS, 2560
  - KERNICTERUS, 5904*
- SHUNT, INTESTINAL
  - COMPLICATIONS, 4876*

LIVER CIRRHOSIS (continued)
- SIMULATION
  - SURGERY, 6075*
- SODIUM
  - DEFICIENCY, 6532*
  - HORMONE EFFECTS ON, 4345
  - HORMONES, ADRENAL CORTEX, 715
- STEROIDS
  - METABOLISM, 6527*
- STOMACH
  - ACID SECRETION, 5128*
  - ION TRANSPORT, 1551*
  - MORPHOLOGY, 5128*
- STRESS
  - BLEEDING, 2563
- SULFOBROMOPHTHALEIN
  - BINDING, 4659
- SURGERY, 3486
  - PROGNOSIS, 6075*
- THERAPY, 3486, 7193, 8377, 8409
  - CHOLINE, 3098
  - TRANSPLANTATION, 336
- THYROID GLAND, 6503
  - AUTOIMMUNE DISEASES, 2544*
  - BINDING, 3478*
  - HORMONES, 3478*
  - IODINE, 700
  - PROTEINS, 3478*
- TOXICITY
  - EPIDEMIOLOGY, 2556
- TRIGLYCERIDES, 3385
  - SERUM, 5111*
- ULCER
  - BLEEDING, 2563
  - HISTAMINE, 5130*
  - STOMACH, 5130*
- ULCER, PEPTIC
  - ETIOLOGY, 703
- ULTRASONOGRAPHY
  - DIAGNOSIS, 4749*
- ULTRASTRUCTURE
  - CHROMOSOMES, 4330*
  - MICROBODIES, 4330*
- URINARY SYSTEM
  - COMPLICATIONS, 2543*
- URINE
  - AFLATOXINS, 1567
- VARICES
  - BLEEDING, 2563, 7185*
- VEINS
  - EMBOLIZATION, 8402*
- VIRUSES
  - PARTICLES, 1539
- VITAMIN B1, 7190
- VITAMIN D
  - DEFICIENCY, 3386
  - METABOLISM, 3363*
- VITAMINS
  - METABOLISM, 4351
- WILSON'S DISEASE
  - DISEASES ASSOCIATED WITH, 7769
  - REVIEW, 8397*

LIVER CIRRHOSIS, OBSTRUCTIVE
- ABSORPTION
  - VITAMIN D, 3479*
- ANTIBODIES
  - RADIOIMMUNOASSAY, 5101*

LIVER CIRRHOSIS, OBSTRUCTIVE (continued)
- BILE ACIDS AND SALTS
    - DIAGNOSIS, 3380
    - TECHNIQUES, 3380
- BILE DUCTS
    - ATRESIA, 3482*
- CHOLANGITIS
    - DIAGNOSIS, 5131
    - THERAPY, 5132
- COMPLICATIONS, 3479*
    - ARTHRITIS, 6528*
- COPPER
    - DRUG EFFECTS ON, 6536*
    - HEPATITIS, CHRONIC, 1489
    - METABOLISM, 3469*
    - MORPHOLOGY, 1488
- DIAGNOSIS, 6519*
    - ANTIBODIES, 4317, 7798*
- DISEASES ASSOCIATED WITH
    - ARTHRITIS, 6528*
- DRUG THERAPY, 3469*
- HEPATITIS, CHRONIC
    - ANTIBODIES, 5101*
    - DISEASES ASSOCIATED WITH, 677*
    - LYMPHOCYTES, 1569
- HISTOCHEMISTRY, 5075*
- LIVER FUNCTION TESTS
    - BILIARY TRACT DISEASES, 1559
    - LIVER DISEASES, 1559
- LYMPHOCYTES
    - IMMUNOLOGY, 688
- NEOPLASMS, MALIGNANT
    - CHILD, 3482*
- PANCREAS
    - NEOPLASMS, MALIGNANT, 564
- PATHOLOGY
    - ANTIBODIES, 5100*
- PIGMENTATION, 2545*
- REVIEW, 1557, 1558
- SURVIVAL, 6519*
- VITAMIN C
    - DEFICIENCY, 5008*
- VITAMIN D
    - DEFICIENCY, 3386
    - METABOLISM, 2542*

LIVER CIRRHOSIS, POSTNECROTIC
- HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 3444
- PATHOLOGY, 8413

LIVER COMA
- AMMONIA
    - METABOLISM, 8141
- BLOOD PLATELETS, 6413*
    - AMINES, 6510*
    - NOREPINEPHRINE, 6510*
- CHOLIC ACID
    - CLEARANCE STUDY, 3364*
- COMPLICATIONS
    - KIDNEY DISEASES, 3416*
- DOPAMINE
    - METABOLISM, 5123*
- DRUG-INDUCED
    - ANALGESICS AND ANTIPYRETICS, 3416*
    - COMPLICATIONS, 3416*
- DRUG THERAPY
    - ANTIBIOTICS, 5119*

LIVER COMA (continued)
- ETIOLOGY, 3416*
    - AMMONIA, 8416
    - THERAPY, 4348
- FATTY ACIDS
    - AMMONIA, 571
    - CHROMATOGRAPHY, 7751*
- HEMODIALYSIS, 4665
    - REVIEW, 1048
    - TECHNIQUES, 1048
- HEMORRHAGE
    - PREVENTION, 8417
- HEPATITIS, CHRONIC
    - SURVIVAL, 8319
- HYPERTENSION, PORTAL, 4349, 4352
- HYPOTENSION
    - ETIOLOGY, 5027*
- KINETICS
    - CHOLIC ACID, 3364*
- LIVER CIRRHOSIS
    - COMPLICATIONS, 8415
    - ETIOLOGY, 5123*
    - PORTACAVAL SHUNT, 5134
    - SURVIVAL, 8319
    - THERAPY, 5134
- NERVOUS SYSTEM
    - AMINO ACIDS, 4665
    - DOPAMINE, 4665
    - METABOLISM, 1161
    - NOREPINEPHRINE, 4665
    - SEROTONIN, 4665
- NOREPINEPHRINE
    - METABOLISM, 5123*
- PLASMA
    - AMINO ACIDS, 3768
- PORTACAVAL SHUNT
    - DRUG EFFECTS ON, 2897
    - SLEEP, 6779*
- PREVENTION, 8377
- PROGNOSIS
    - LIVER FUNCTION TESTS, 3365*
- SEROTONIN, 572
- SURVIVAL
    - AGE FACTORS, 6458*
- THERAPY, 8416
    - CHROMATOGRAPHY, 5028*
    - DISACCHARIDES, 5119*
    - HEMODIALYSIS, 5028*, 5816*
    - PERFUSION, 2452*, 4666, 5028*
    - SURVIVAL, 6458*
    - TISSUE CULTURE, 5028*
    - TRANSFUSION, 3768
- TRANSFUSION
    - HYPOTHERMIA, 8322
    - THERAPY, 8322
- URINE
    - DOPAMINE, 5123*
    - NOREPINEPHRINE, 5123*

LIVER DISEASES
- ABSORPTION
    - LIVER FUNCTION TESTS, 678
- ACID SECRETION
    - CHILD, 621
- ACIDS
    - THERAPY, 4253*
- ACYLTRANSFERASES, 5797*

LIVER DISEASES (continued)
- ALCOHOLS
  - LIVER FUNCTION TESTS, 602
  - METABOLISM, 602
- ALKALINE PHOSPHATASE
  - DIAGNOSIS, 3099
  - ISOENZYMES, 3099, 4249*
- ALPHA 1 ANTITRYPSIN, 3361*, 5005*
  - DEFICIENCY, 6402*, 8287*
  - GENETICS, 8287*
- ALPHA FETOPROTEIN, 3392, 5095
  - LYMPHOCYTES, 629
  - PROGNOSIS, 2454*
- AMEBIASIS
  - ECHINOCOCCOSIS, 820
- AMINO ACIDS
  - METABOLISM, 575
- AMINO PEPTIDASES, 1239
- AMYLASES
  - SALIVARY GLANDS, 5107
  - SERUM, 4247*
- ANALGESICS AND ANTIPYRETICS
  - BREATH TEST, 2467
  - SALIVA, 2467
  - URINE, 2467
- ANESTHESIA
  - TECHNIQUES, 600
- ANGIOGRAPHY
  - CHILD, 7086*
  - CHOLANGIOGRAPHY, 2202
  - DIAGNOSIS, 4749*
- ANTIBIOTICS
  - BINDING, 8320
  - KERNICTERUS, 716
  - METABOLISM, 5396*, 5397*
- ANTIBODIES, 4781
  - ALBUMINS, 7090*
  - DIAGNOSIS, 7165*
  - MITOCHONDRIA, 7177*
- ANTIGENS, 3438, 4303, 4311*
- ARTERIES
  - GASES, 6418*
- AUSTRALIA ANTIGEN, 2506, 3392, 3438, 5081*, 5095
  - ANTIBODIES, 3371*
  - BIOPSY, 7152*
  - CELLS, 3439
  - EPIDEMIOLOGY, 2496*
  - IMMUNITY, 3441
  - IMMUNOLOGY, 686, 3452*, 5084*
  - SERUM, 3439, 6470*
  - TECHNIQUES, 3426*
  - THERAPY, 4296*
- BACTERIA
  - ANTIBODIES, 1470
- BILE
  - BILE ACIDS AND SALTS, 7280
  - IMMUNOGLOBULINS, 5047
- BILE ACIDS AND SALTS
  - ASSAY, 7743*
  - CHROMATOGRAPHY, 7391*
  - CLEARANCE STUDY, 7092*
  - DEFICIENCY, 1625
  - DIAGNOSIS, 1456*, 3380, 7743*
  - METABOLISM, 6428
  - SERUM, 606
  - TECHNIQUES, 3380, 4751*, 7393*
- BILE DUCTS
  - IMMUNOLOGY, 627

LIVER DISEASES (continued)
- BILIARY TRACT DISEASES
  - CHOLANGITIS, 276
- BILIRUBIN
  - CLEARANCE STUDY, 3961
  - METABOLISM, 5089*
- BIOCHEMISTRY
  - ENZYMES, 544*
  - MORPHOLOGY, 544*
- BIOPSY
  - BIOCHEMISTRY, 256
  - RADIOLOGY, 256
- BLEEDING
  - CLOTTING, 614
  - STRESS, 3483*
  - TECHNIQUES, 614
- BLOOD
  - CHEMICAL COMPOSITION, 6418*
  - CLOTTING, 552, 3395
  - PHOSPHOLIPIDS, 4250*
- BLOOD PLATELETS, 6400*
- CARBOHYDRATES
  - METABOLISM, 7793, 8335
- CELLS
  - ANTIGENS, 3439
  - DYES, 4291*
  - HISTOCHEMISTRY, 4291*
- CERULOPLASMIN, 3375*
- CHILD
  - ANTIBODIES, 5102*
  - AUSTRALIA ANTIGEN, 5102*
  - BIOPSY, 1471
  - DIAGNOSIS, 3959, 5929, 6431
  - IMMUNOGLOBULINS, 5102*
  - MONOSACCHARIDES, 6425
  - PANCREATIC DISEASES, 2463*
  - SCANNING, SCINTILLATION, 7094*
  - SHWACHMAN-DIAMOND SYNDROME, 2463*
  - THERMOGRAPHY, 4770
- CHOLANGIOGRAPHY
  - DIAGNOSIS, 1572*
  - TECHNIQUES, 267, 6546*
- CHOLINESTERASES
  - DIAGNOSIS, 270
- CLEARANCE STUDY
  - SULFOBROMOPHTHALEIN, 3094
- COLLAGEN
  - ANALYSIS, 2468
  - ENZYMES, 8296*
- COMPLEMENT
  - SERUM, 1207
- COMPLICATIONS, 3387
  - CARDIOVASCULAR SYSTEM, 4265
  - CRYOGLOBULINEMIA, 6497*
  - HYPOXIA, 5892
  - KIDNEYS, 6416*
- COMPUTERS
  - DIAGNOSIS, 596
  - LIVER FUNCTION TESTS, 4245*
- COPPER
  - OCCUPATIONAL FACTORS, 2480*
- DIAGNOSIS, 6556
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6508*
  - ALKALINE PHOSPHATASE, 5514*
  - AMINO TRANSFERASES, 8145
  - ANGIOGRAPHY, 3966, 7529*
  - BILE ACIDS AND SALTS, 7092*, 7528*
  - BIOCHEMISTRY, 8141

LIVER DISEASES (continued)
- DIAGNOSIS (continued)
  - BIOPSY, 5800*
  - CLEARANCE STUDY, 3094, 3961, 7092*
  - COMPUTERS, 6192
  - CONTRAST MEDIA, 7741*
  - GLUCAGON, 6508*
  - GLUCOSE, 6508*
  - IMMUNOGLOBULINS, 3956
  - IMMUNOLOGY, 3958
  - PHOSPHOLIPIDS, 6850*
  - REVIEW, 1243, 2476
  - SCANNING, SCINTILLATION, 3966
  - SURGERY, 5045
  - TOMOGRAPHY, 6192, 7741*
  - ULTRASONOGRAPHY, 3971, 6575*, 7823*
  - URINE, 6431
- DISEASES ASSOCIATED WITH
  - CARDIOVASCULAR SYSTEM, 4265
  - CRYOGLOBULINEMIA, 6461*
  - KIDNEY DISEASES, 5058
- DIURETICS
  - METABOLISM, 7091*
- DRUG DEPENDENCE
  - NARCOTICS, 7764
- DRUG METABOLISM
  - ANALGESICS AND ANTIPYRETICS, 601, 7084*
  - ANESTHETICS, LOCAL, 601
  - ENZYMES, 8034*
  - INDOCYANINE GREEN, 1468
  - MARKER STUDY, 1468
  - REVIEW, 8283*
- DRUG THERAPY, 2536*, 3454*, 8308
  - COMPLICATIONS, 7122
  - KINETICS, 7752*
- EDEMA
  - SIMULATION, 4668
  - THERAPY, 4668
- ENDOTOXINS
  - REVIEW, 5815*
- ENZYMES, 3385
  - CHILD, 621
  - DEFICIENCY, 3381
- EPIDEMIOLOGY
  - GEOGRAPHICAL FACTORS, 699
- ERYTHROCYTES
  - MEMBRANES, 613
  - METABOLISM, 7758
  - PHOSPHOLIPIDS, 630
- ESOPHAGITIS
  - MANOMETRY, 1261*
- ETIOLOGY
  - ALPHA 1 ANTITRYPSIN, 5046
  - ANDROGENS, 3379
  - ENDOTOXINS, 5815*
  - IMMUNOLOGY, 6498*
- FAILURE
  - REVIEW, 6412*
  - THERAPY, 6412*
- FATS
  - METABOLISM, 7793
- FIBRIN
  - CLOTTING, 616
- FIBRINOGEN
  - CLOTTING, 616
  - METABOLISM, 7744*

LIVER DISEASES (continued)
- GASTROINTESTINAL SYSTEM
  - MOTILITY, 2645
- GENETIC FACTORS
  - ANTIGENS, 3453*
- GENETICS
  - REVIEW, 543*
- GLUCONEOGENESIS
  - LIVER FUNCTION TESTS, 6466*
- GLUCURONIDASE
  - LIVER FUNCTION TESTS, 6395*
- GLYCOPROTEINS, 6525*
  - SERUM, 2941
- H2 RECEPTOR ANTAGONISTS
  - BLEEDING, 2471
- HEMATOLOGY
  - FIBRIN, 709
  - FIBRINOGEN, 709
- HEMORRHAGE
  - BLOOD PLATELETS, 3395
- HEMOSTASIS
  - PROTHROMBIN, 7110*
- HEPATITIS
  - TRANSFUSION, 2514
- HEPATITIS, CHRONIC
  - THALASSEMIA, 1544*
  - TRANSFUSION, 1544*
- HEPATITIS, INFECTIOUS
  - ANTIGENS, 656
  - EPIDEMIOLOGY, 656
- HEPATITIS, SERUM
  - HEMODIALYSIS, 666
- HEPATOCYTES
  - ANTIGENS, 5861*
  - AUSTRALIA ANTIGEN, 5861*
  - IMMUNITY, 5882*
  - MORPHOLOGY, 5882*
- HISTOCHEMISTRY, 5075*
- HYPERBILIRUBINEMIA
  - DRUG METABOLISM, 5023*
- IMMUNOGLOBULINS, 6401*, 6430, 6498*
- IMMUNOLOGY, 3438
  - DIAGNOSIS, 7087*
  - REVIEW, 4299*
- INFANT
  - ALPHA 1 ANTITRYPSIN, 8287*
  - AMINO TRANSFERASES, 4750*
  - ENZYMES, 4750*
  - NUCLEOTIDASE, 4750*
  - SCANNING, SCINTILLATION, 7094*
- INFECTION
  - WOUNDS AND INJURIES, 2645
- INFLAMMATION
  - ANTIBODIES, 3371*
  - IMMUNOGLOBULINS, 3383
- INFLAMMATORY BOWEL DISEASES
  - BILE ACIDS AND SALTS, 6348*
- ISOENZYMES
  - DIAGNOSIS, 5074*
- KERNICTERUS
  - AMMONIA, 7182*
  - DOPAMINE, 7182*
- KIDNEY DISEASES
  - SURGERY, 1490
  - THERAPY, 6416*
- LAPAROTOMY
  - ANALYSIS, 5534
  - TECHNIQUES, 5534

LIVER DISEASES (continued)
- LEUKOCYTES
  - VITAMIN C, 633
- LIPIDS, 3385, 7093*
  - ALCOHOLISM, 694
  - ENZYMES, 618
- LIPODYSTROPHY, INTESTINAL
  - CERULOPLASMIN, 2466*
  - COPPER, 2466*
- LIPOPROTEINS, 3385
  - ENZYMES, 618
  - SYNTHESIS, 603
- LIVER
  - CIRCULATION, 598
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - LIVER FUNCTION TESTS, 1559
- LIVER FUNCTION TESTS
  - CHOLINESTERASES, 3382
  - CLOTTING, 1183*
  - OXIDOREDUCTASES, 640
  - TECHNIQUES, 1183*
- LYMPH
  - THERAPY, 5829
  - TOXINS, 5829
- LYMPHOCYTES
  - CHILD, 627
  - IMMUNITY, 4334*
  - IMMUNOLOGY, 627, 628, 6496*
  - MORPHOLOGY, 5882*
- LYMPHOGRAPHY
  - CONTRAST MEDIA, 5516*
- LYSOZYMES
  - PATHOLOGY, 6426
- MAGNESIUM
  - METABOLISM, 7793
- MICROSOMES
  - ANTICONVULSANTS, 1570
  - BREATH TEST, 3376
- MONOSACCHARIDES
  - EXCRETION, 6425
- MUSCULOSKELETAL SYSTEM
  - ANTIBODIES, 631
- NEONATE
  - NUCLEOTIDASE, 4750*
- NEOPLASMS
  - ANGIOGRAPHY, 7086*
  - BIOPSY, 3104
  - CHILD, 7086*
  - DIAGNOSIS, 3104
  - EPIDEMIOLOGY, 1477
  - LAPAROSCOPY, 3104
  - LIVER, 1477
  - SURGERY, 3104
- NERVOUS SYSTEM
  - AMMONIA, 1568
- NUCLEIC ACIDS
  - ANTIBODIES, 687
  - BINDING, 687, 3942*
- OBSTRUCTION
  - ALKALINE PHOSPHATASE, 4249*
  - VITAMIN B6, 2448*
- OCCUPATIONAL FACTORS, 1206
- PAIN
  - THERAPY, 585
- PANCREAS
  - AMYLASES, 3370*
- PATHOLOGY
  - REVIEW, 5022*

LIVER DISEASES (continued)
- PEPTIDASE
  - DIAGNOSIS, 4251*
- PERFUSION
  - PROGNOSIS, 2454*
  - REVIEW, 6412*
  - TECHNIQUES, 4260*
  - THERAPY, 2051
- PERITONITIS
  - MORPHOLOGY, 5840
- PEROXIDES, 7093*
- PHOSPHOLIPIDS, 3385
- PLASMA
  - BILE ACIDS AND SALTS, 4670
  - CHENODEOXYCHOLIC ACID, 4670
  - CHOLIC ACID, 4670
- PREGNANCY
  - REVIEW, 5796*
- PROGNOSIS
  - BILE ACIDS AND SALTS, 7528*
  - GENETIC FACTORS, 3453*
  - LIVER FUNCTION TESTS, 3382
- PROTEINS
  - BINDING, 8283*
  - DRUG METABOLISM, 8283*
  - METABOLISM, 7793
- PROTHROMBIN
  - TECHNIQUES, 615
- RADIOISOTOPES
  - DIAGNOSIS, 5839
- RADIOLOGY
  - REVIEW, 261
  - TECHNIQUES, 3972
- REVIEW, 2501
- SALIVARY GLANDS
  - AMYLASES, 3370*
- SCANNING, SCINTILLATION, 1214
  - DIAGNOSIS, 1244, 1454*, 4749*
- SCHISTOSOMIASIS
  - HELMINTHIASIS, 820
- SEDATIVES
  - DRUG METABOLISM, 8325
- SERUM
  - ALPHA FETOPROTEIN, 2454*
  - AMYLASES, 3370*
  - ANTIGENS, 3439
  - BILE ACIDS AND SALTS, 7528*, 7743*
  - IMMUNOGLOBULINS, 5047
  - LIPIDS, 6433
- SHUNT
  - HYPOXIA, 2474
- SHUNT, INTESTINAL
  - COMPLICATIONS, 4876*
- SIMULATION
  - TECHNIQUES, 2050
- SPLEEN
  - ANTIGENS, 1011*
- STATISTICAL STUDY
  - DIAGNOSIS, 5009*
- STEROIDS
  - CHILD, 691
  - HYPERBILIRUBINEMIA, 5844
  - IMMUNOGLOBULINS, 691
  - THERAPY, 5844
- SULFOBROMOPHTHALEIN
  - BINDING, 4659
- SURGERY
  - JAUNDICE, 5161*
  - PROGNOSIS, 8284*

LIVER DISEASES (continued)
- SURGERY (continued)
  - REVIEW, 8284*
- THERAPY
  - REVIEW, 2476
- TOMOGRAPHY
  - COMPUTERS, 5515*
  - DIAGNOSIS, 5515*, 7531*
- TRANSFUSION, 582
- TRANSPLANTATION, 1493
  - KIDNEYS, 5176*
  - SURVIVAL, 2453*
- TRIGLYCERIDES
  - ALCOHOLS, 578
  - CARBOHYDRATES, 578
- ULTRASONOGRAPHY, 2208
  - DIAGNOSIS, 1245, 4749*
  - TECHNIQUES, 5535
- URINARY SYSTEM
  - REVIEW, 2461*
- URINE
  - ISOENZYMES, 6431
- VEINS
  - GASES, 6418*
- VIRUSES
  - ANTIBODIES, 1470
- VITAMIN B6
  - METABOLISM, 2448*
- VITAMIN C
  - DEFICIENCY, 5008*
- VITAMIN D
  - DEFICIENCY, 3386
  - METABOLISM, 3363*
- VITAMINS
  - DEFICIENCY, 3374*

LIVER DISEASES, ALCOHOLIC
- ACIDS
  - THERAPY, 4253*
- ACYLTRANSFERASES
  - DEFICIENCY, 3464*
- ALBUMINS
  - CLEARANCE STUDY, 2531*
- ALCOHOLISM
  - HEPATITIS, NONVIRAL, 4325*
  - REVIEW, 7809
- ALCOHOLS
  - METABOLISM, 5109*
- ALPHA FETOPROTEIN, 3392
- ANEMIA, HEMOLYTIC
  - ERYTHROCYTES, 8390*
- ANGIOGRAPHY
  - HEMODYNAMICS, 1547
- ANTIGENS, 4311*
  - IMMUNITY, 2535
- ASCITES
  - ABSORPTION, 1562
  - DRUG THERAPY, 6506*
  - INDOCYANINE GREEN, 1561
  - SHUNT, 7180*
- AUSTRALIA ANTIGEN, 3392
- BACTERIAL INFECTIONS
  - PREVENTION, 5115
- BILE ACIDS AND SALTS
  - DIAGNOSIS, 4751*
  - SECRETION, 8398*
- BIOCHEMISTRY
  - REVIEW, 4320*
  - STATISTICAL STUDY, 1548

LIVER DISEASES, ALCOHOLIC (continued)
- BIOPSY
  - DIAGNOSIS, 8407
  - ENZYMES, 5798*
  - DIAGNOSIS, 8407
- BLEEDING
  - PORTACAVAL SHUNT, 2533
- BLOOD
  - ALCOHOLS, 5899
- CARCINOEMBRYONIC ANTIGEN
  - SERUM, 5113*
- CIRCULATION
  - SHUNT, 2543*
- CLASSIFICATION, 4326
- COLLAGEN
  - SYNTHESIS, 7742*
- COMPLICATIONS
  - CARDIOVASCULAR SYSTEM, 4265
  - DRUG THERAPY, 5896*
  - ENDOCRINE SYSTEM, 5896*
  - GENETIC FACTORS, 4324*
- COPPER
  - HEPATOCYTES, 2539*
- DIAGNOSIS, 4326
  - HYPERTENSION, PORTAL, 8392
  - LAPAROSCOPY, 8392
  - SEX FACTORS, 3458*
- DIETARY FACTORS
  - STATISTICAL STUDY, 1548
- DISEASES ASSOCIATED WITH
  - ANTIGENS, 5114*
  - CARDIOVASCULAR SYSTEM, 4265
  - REVIEW, 5114*
- DRINKING, 5899
- DRUG DEPENDENCE
  - DISEASES ASSOCIATED WITH, 8285*
- ENZYMES, 3460*
- EPIDEMIOLOGY
  - GEOGRAPHICAL FACTORS, 699
- ETIOLOGY
  - ALDEHYDES, 7428*
  - IMMUNOLOGY, 7802*
  - REVIEW, 7807*
- FATTY LIVER
  - BIOCHEMISTRY, 4320*
  - DIAGNOSIS, 7804*
  - DRUG EFFECTS ON, 2873*
  - IMMUNOGLOBULINS, 7804*
  - REVIEW, 7807*
- FIBRINOLYSIS
  - HEPARIN, 3462*
- FOOD
  - STATISTICAL STUDY, 1548
- GLUTAMYLTRANSPEPTIDASE, 271
- HEPATITIS, 6516, 7176
  - ALCOHOLISM, 2532*
  - DIAGNOSIS, 7804*
  - ETIOLOGY, 7807*
  - HORMONES, ADRENAL CORTEX, 7808*
  - HYALIN SUBSTANCE, 3463*
  - IMMUNOGLOBULINS, 7804*
  - IMMUNOLOGY, 6511*
  - NECROSIS, 3463*
  - REVIEW, 7807*
  - SEQUELAE, 2532*
  - SURVIVAL, 2532*
- HEPATITIS, NONVIRAL
  - BIOPSY, 4325*

LIVER DISEASES, ALCOHOLIC (continued)
- HEPATOCYTES
  - PEROXISOMES, 4248*
- HORMONES, ADRENAL CORTEX
  - DRUG THERAPY, 1549
- HYALIN SUBSTANCE
  - ULTRASTRUCTURE, 6512*, 6513*
- HYPERTENSION, PORTAL
  - SIMULATION, 3806
- HYPOPROTEINEMIA
  - PLASMA, 2531*
- IMMUNOGLOBULINS, 6401*
  - DIAGNOSIS, 4327
  - SERUM, 4321*
- IMMUNOLOGY, 3051*, 3461*
- INDOCYANINE GREEN
  - DIAGNOSIS, 1531
  - TECHNIQUES, 1531
- IRON
  - DIET, 2530*
- LIPOPROTEINS
  - DEFICIENCY, 3464*
  - ULTRASTRUCTURE, 3464*
- LIVER
  - LIPASE, 7173*
  - PATHOLOGY, 693
- LIVER CIRRHOSIS, 7175
  - BIOCHEMISTRY, 4320*
  - BIOPSY, 8407
  - CARCINOEMBRYONIC ANTIGEN, 5113*
  - COMPLEMENT, 5867*
  - COMPLICATIONS, 4324*, 5896*
  - DIAGNOSIS, 6508*, 8392, 8407
  - HEMORRHAGE, 8395
  - HORMONES, 6509*
  - IMMUNOGLOBULINS, 4321*, 7804*
  - IMMUNOLOGY, 5867*, 6511*
  - PROGNOSIS, 8393
  - PROLACTIN, 5124*
  - REVIEW, 7807*
  - SURVIVAL, 8394
  - ULTRASTRUCTURE. 4322*
- LIVER FUNCTION TESTS, 4323*
- LYMPHOCYTES, 1542*
  - IMMUNOLOGY, 688, 6496*
- MICROSOMES
  - BREATH TEST, 3376
- MORPHOLOGY
  - PATHOLOGY, 4318*
- NECROSIS
  - ETIOLOGY, 7807*
- NEOPLASMS, MALIGNANT
  - SEX FACTORS, 3458*
- NUCLEIC ACIDS
  - BINDING, 3942*
- ORGANELLES
  - ULTRASTRUCTURE, 4322*
- PRESSURE STUDY
  - SHUNT, 2543*
- PROGNOSIS
  - REVIEW, 5895*
  - SEX FACTORS, 3458*, 5895*, 7802*
- PROTEINS
  - SECRETION, 7806*
  - SYNTHESIS, 7806*
- PSYCHOLOGICAL FACTORS
  - PATHOLOGY, 3459*
  - THERAPY, 3459*

LIVER DISEASES, ALCOHOLIC (continued)
- RENIN
  - DRUG THERAPY, 1549
- REVIEW, 2510
- SEX FACTORS
  - EPIDEMIOLOGY, 3458*
  - REVIEW, 7807*
- SULFHYDRYL COMPOUNDS, 6077*
- THYMUS GLAND
  - DRUG EFFECTS ON, 1550
  - EXTRACTS, 1550
- TRIGLYCERIDES
  - SERUM, 5111*
- VEINS
  - NECROSIS, 689
- VITAMIN B1, 7190
  - ALCOHOLISM, 5112*
- VITAMIN B2
  - ALCOHOLISM, 5112*
- VITAMIN B6
  - ALCOHOLISM, 5112*
  - METABOLISM, 2448*
- VITAMIN C
  - DEFICIENCY, 5008*
- VITAMIN D
  - DEFICIENCY, 3386
  - METABOLISM, 3363*, 5900
- VITAMINS
  - METABOLISM, 4351
- WOUNDS AND INJURIES
  - BIOCHEMISTRY, 4320*

LIVER FUNCTION TESTS
- AMYLOIDOSIS
  - DYES, 3093
- ANESTHESIA
  - SURGERY, 1510*
- ANTIBIOTICS, 1172
- AUSTRALIA ANTIGEN
  - DRUG DEPENDENCE, 2500
- BILE ACIDS AND SALTS
  - FEEDING, 608
- CARBOXYLASES
  - PARKINSON'S DISEASE, 1498
- CHOLECYSTITIS
  - BIOCHEMISTRY, 8450
- CHOLESTASIS
  - DIAGNOSIS, 6566*
  - INFANT, 4274*
  - PREGNANCY, 6565*
  - SULFOBROMOPHTHALEIN, 4274*
- CHOLIC ACID
  - METABOLISM, 3364*
- CLEARANCE STUDY, 257
  - GALACTOSE, 3365*
- COMPUTERS
  - SCANNING, SCINTILLATION, 3964
- CONTRACEPTIVES
  - SULFOBROMOPHTHALEIN, 597
- CONTRACEPTIVES, ORAL, 7426*
  - SULFOBROMOPHTHALEIN, 597
- L-DOPA
  - PARKINSON'S DISEASE, 1498
- DRUG EFFECTS ON
  - ANALGESICS AND ANTIPYRETICS, 8339*
- ENTERECTOMY, 6783*
- GLUCONEOGENESIS
  - HEPATITIS, CHRONIC, 6466*
  - HEPATITIS, INFECTIOUS, 6466*

LIVER FUNCTION TESTS (continued)
  GLUCONEOGENESIS (continued)
    LIVER CIRRHOSIS, 6466*
    LIVER DISEASES, 6466*
  GLUCURONIDASE
    LIVER DISEASES, 6395*
  HEPATITIS
    HEPATITIS, CHRONIC, 679
  HEPATITIS, CHRONIC, 6501*
    SCANNING, SCINTILLATION, 4245*
    THALASSEMIA, 1544*
  HEPATITIS, INFECTIOUS
    CHILD, 8370
    GLUCOSE, 4294*
  HEPATITIS, TOXIC
    DIAGNOSIS, 6439*
  HORMONE EFFECTS ON, 5003*
  HYPERBILIRUBINEMIA
    SCANNING, SCINTILLATION, 4245*
  HYPERTENSION, 6417*
  HYPERTENSION, PORTAL
    AMMONIA, 4343
  INDOCYANINE GREEN, 3974
    CLEARANCE STUDY, 1023
  INTESTINE, SMALL
    SHUNT, INTESTINAL, 4732
  JAUNDICE, 3926
    PREGNANCY, 1512*
  LIVER
    CHILD, 760
    CHOLANGITIS, 760
    CHOLECYSTITIS, 760
    HYPOTHERMIA, 6103
    NEOPLASM METASTASIS, 1476
    NEOPLASMS, MALIGNANT, 1205
    PERFUSION, 6103
    REGENERATION, 1022*
    WOUNDS AND INJURIES, 6455
  LIVER CIRRHOSIS, 4342, 6521*, 7822
    AMMONIA, 4343
    BILE ACIDS AND SALTS, 2549
    CHENODEOXYCHOLIC ACID, 2549
    CHOLIC ACID, 2549
    DRUG METABOLISM, 7746*
    DYES, 3093
    KERNICTERUS, 1552*
    PORTACAVAL SHUNT, 1552*
    PROGNOSIS, 1552*
    RETICULOENDOTHELIAL SYSTEM, 3093
    SCANNING, SCINTILLATION, 4245*
  LIVER CIRRHOSIS, OBSTRUCTIVE
    BILIARY TRACT DISEASES, 1559
    LIVER DISEASES, 1559
  LIVER COMA
    PROGNOSIS, 3365*
  LIVER DISEASES
    ABSORPTION, 678
    ALCOHOLS, 602
    CHOLINESTERASES, 3382
    CLOTTING, 1183*
    COMPUTERS, 4245*
    OXIDOREDUCTASES, 640
    PROGNOSIS, 3382
    TECHNIQUES, 1183*
  LIVER DISEASES, ALCOHOLIC, 4323*
  LIVER INJURY, 7144, 6455
  NEOPLASM METASTASIS
    DRUG METABOLISM, 7746*

LIVER FUNCTION TESTS (continued)
  NICOTINE
    LIVER, 3034
  OBESITY
    SHUNT, INTESTINAL, 6293*
  PATHOLOGY
    SURGERY, 610
  PORPHYRIA, 7822
  PORTACAVAL SHUNT
    ULTRASOUND, 1553*
  RADIOISOTOPES
    IODINE, 3096
  RADIONUCLIDES
    HEPATITIS, INFECTIOUS, 1512*
    JAUNDICE, 1512*
  REVIEW, 8057
  SERUM
    LIPOPROTEINS, 1022*
  SHUNT, INTESTINAL, 6783*
    OBESITY, 4106*, 4895, 7625
  SULFOBROMOPHTHALEIN, 3959
    ABSORPTION, 1774*
    BILE ACIDS AND SALTS, 2955
    COMPLICATIONS, 5823*
    FLUORIDES, 2956
    SCANNING, SCINTILLATION, 4245*
  TECHNIQUES, 3955, 5395*
  TOXICITY
    MARKER STUDY, 6395*
  ULCER
    H2 RECEPTOR ANTAGONISTS, 4832*
  URINARY SYSTEM
    DISEASES ASSOCIATED WITH, 2461*
  UROGENITAL SYSTEM
    SURGERY, 1510*
  WILSON'S DISEASE
    AMINO ACIDS, 8314

LIVER INJURY
  ALCOHOLISM, 5848*
    ALDEHYDES, 7428*
    BIOPSY, 4319*
    ENZYMES, 3460*
    HEPATITIS, NONVIRAL, 4319*
    LIVER CIRRHOSIS, 4319*
    SULFHYDRYL COMPOUNDS, 6077*
  ALCOHOLS, 5850
    SIMULATION, 3806
  ALPHA FETOPROTEIN, 4280
    DRUG-INDUCED, 3030
    GALACTOSAMINE, 3030
    NECROSIS, 3030
    REGENERATION, 3030
  ANALGESICS AND ANTIPYRETICS, 5846*, 5847*
    AMINO ACIDS, 6449*
    PREVENTION, 6449*
    THERAPY, 6449*
  ANDROGENS, 7476
  ANESTHETICS
    CELL CULTURE, 120*
    CYTOLOGY, 123*
  ANOXIA
    CYTOLOGY, 123*
  ANTIBIOTICS, 3415*
    METABOLISM, 5396*, 5397*, 8076
  AUSTRALIA ANTIGEN
    CARRIER STATE, 6475*

LIVER INJURY (continued)

- BILE ACIDS AND SALTS
  - SELENIUM, 3928
- BLOOD
  - CELLS, 3366*
  - ELECTROLYTES, 3366*
- BLOOD PLATELETS, 6413*
- CARBON TETRACHLORIDE, 8076
  - ALPHA FETOPROTEIN, 6114, 8345
  - COLLAGEN, 8023*
  - CONNECTIVE TISSUE, 5402*
  - DRUG EFFECTS ON, 2914
  - HEMATOPOIESIS, 7480
  - LIPIDS, 121*
  - LIPOPROTEINS, 3786
  - LYSOSOMES, 7468
  - NUCLEIC ACIDS, 6115
  - PREVENTION, 6087*
  - SELENIUM, 3928
  - TRANQUILIZING AGENTS, 7468
  - ZINC, 6087*
- CATHARTICS, 7140*
- CELIAC DISEASE
  - COMPLICATIONS, 6308*
- CHENODEOXYCHOLIC ACID
  - SEX FACTORS, 3769
- CHILD
  - DIAGNOSIS, 8323
  - SCANNING, SCINTILLATION, 8324
- CHOLANGIOGRAPHY
  - COMPLICATIONS, 5071*
- CIRCADIAN RHYTHM
  - HEPATOCYTES, 4610*
  - MITOSIS, 4610*
- CIRCULATION
  - THERAPY, 6113
- COENZYMES, 6798
- COLLAGEN
  - ENZYMES, 8296*
  - METABOLISM, 8023*
- COMPLEMENT
  - SERUM, 1207
- COMPLICATIONS, 4264
  - HEMORRHAGE, 3367*
  - KIDNEY DISEASES, 3416*
- CONTRAST MEDIA, 3090, 5071*
- DIAGNOSIS
  - AMINO ACIDS, 7171*
  - PLASMA, 7171*
  - SCANNING, SCINTILLATION, 7530*
- DIOXINS, 1035
- DISEASES ASSOCIATED WITH, 3535
- DRUG-INDUCED, 5069*, 5827*, 5848*, 5849
  - ALCOHOLS, 1511
  - ALKALOIDS, 6450*
  - ANALGESICS AND ANTIPYRETICS, 3416*, 6440*, 6441*, 6449*
  - ANESTHETICS, 7778
  - ANTI-INFLAMMATORY AGENTS, 7142*
  - BIOCHEMISTRY, 7136*
  - CARBON TETRACHLORIDE, 5416*
  - CHOLESTASIS, 1511
  - COLLAGEN, 8023*
  - COMPLICATIONS, 3416*
  - GALACTOSAMINE, 8028*
  - GLYCOSIDES, 1504
  - GROWTH SUBSTANCES, 1169
  - HEPATITIS, 1511

LIVER INJURY (continued)

- DRUG-INDUCED (continued)
  - HORMONE EFFECTS ON, 1511
  - LEUKEMIA, 2464*
  - PREVENTION, 8028*
  - REVIEW, 1511, 7137*, 7141*
  - SEDATIVES, 8346
  - THERAPY, 7141*
  - TOXINS, 7137*
  - TRANQUILIZING AGENTS, 6126
  - TUBERCULOSIS, 7780
  - ULTRASTRUCTURE, 4279*
- DRUG METABOLISM, 617
  - ENZYMES, 2155, 8034*
- DRUG THERAPY, 8074
- ENZYMES
  - CARBON TETRACHLORIDE, 1080, 1081
  - DEFICIENCY, 5416*
  - DRUG EFFECTS ON, 1081
  - DRUG METABOLISM, 1081
  - HISTOCHEMISTRY, 640
  - LYSOSOMES, 1080
  - PORPHYRINS, 1080, 1081
  - STRESS, 6836*
- ERYTHROCYTES
  - LIPIDS, 5414*
  - LIPOPROTEINS, 5414*
- ETIOLOGY, 3416*
  - ANDROGENS, 6451*
  - HORMONES, 6451*
- FATTY LIVER
  - AGE FACTORS, 8281*
- FUNGI
  - TOXICITY, 7143
- GALACTOSAMINE, 4280
  - PREVENTION, 3027, 3028, 3029
- GASTRECTOMY, 3152
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 3367*
- GLUCOSE PHOSPHATE DEHYDROGENASE, 6120
  - HISTOCHEMISTRY, 640
- GLYCOSAMINOGLYCANS
  - SYNTHESIS, 8030*
- HEMATOBILIA
  - DIAGNOSIS, 7132
  - THERAPY, 7132
- HEMORRHAGE
  - ANGIOGRAPHY, 5819*
  - DIAGNOSIS, 5819*
  - HEPATOCYTES, 4632*
  - SHOCK, 4632*
  - THERAPY, 5819*
- HEPATITIS
  - DRUG THERAPY, 8374
  - IMMUNOLOGY, 1517*
  - TOXICITY, 1517*
- HEPATITIS, CHRONIC
  - HYALURONIDASE, 684
  - IMMUNOLOGY, 1517*
  - TOXICITY, 1517*
- HEPATITIS, INFECTIOUS
  - COMPLICATIONS, 3416*
  - GLUCAGON, 2883*
  - HORMONE EFFECTS ON, 2883*
  - IMMUNOLOGY, 5085*
  - INSULIN, 2883*
- HEPATOCYTES
  - BIOCHEMISTRY, 4632*
  - TRANSPLANTATION, 5434*

LIVER INJURY (continued)
- HEPATOCYTES (continued)
  - ULTRASTRUCTURE, 4632*
- HISTOLOGY, 8281*
- HORMONE EFFECTS ON
  - GLUCAGON, 2883*
  - INSULIN, 2883*
- HORMONES
  - ANDROGENS, 6451*
  - DIURETICS, 2869*
- HYDROCARBONS
  - MORPHOLOGY, 6811
  - OCCUPATIONAL FACTORS, 8342
- HYDROCARBONS, CHLORINATED
  - METABOLISM, 2922
  - OXIDOREDUCTASES, 2922
- HYDROCARBONS, HALOGENATED, 2923
- HYPERTENSION, 5898*, 6417*
- HYPERTENSION, PORTAL
  - CARCINOGENS, 6453*
- HYPOTENSION
  - ETIOLOGY, 5027*
- IRON, 6448*
- ISCHEMIA
  - NECROSIS, 6088*
- JAUNDICE
  - ETIOLOGY, 5237
- KIDNEYS
  - BILE ACIDS AND SALTS, 2776
- LIPIDS
  - PEROXIDATION, 2155
- LIPOPROTEINS
  - SERUM, 1160
  - SYNTHESIS, 3786
- LIVER FUNCTION TESTS, 7144, 6455
- LYSOSOMES
  - STRESS, 6836*
- MICROSOMES
  - ENZYMES, 6793
- NARCOTICS
  - HORMONES, 2869*
- NECROSIS
  - CARBON TETRACHLORIDE, 5402*
- NITROSAMINES
  - DRUG THERAPY, 1165
  - LEAD, 1165
- OXIDOREDUCTASES
  - DRUG-INDUCED, 7406*
- PERFUSION
  - SURVIVAL, 6113
- PROTEINS
  - ISCHEMIA, 124*
  - SYNTHESIS, 124*
- SALMONELLOSIS
  - ZINC, 8040*
- SERUM
  - ALPHA FETOPROTEIN, 3030
  - ENZYMES, 5414*
  - LIPIDS, 5414*
  - LIPOPROTEINS, 5414*
- SHUNT, INTESTINAL
  - AMINO ACIDS, 7637*
  - COMPLICATIONS, 4876*, 6293*, 6783*, 7637*
  - ETIOLOGY, 6783*
- SIMULATION, 8060
- STRESS
  - CLEARANCE STUDY, 5038*
- TANNIC ACID, 7451

LIVER INJURY (continued)
- THERAPY
  - CHROMATOGRAPHY, 5028*
  - HEMODIALYSIS, 5028*, 5816*
  - OXYGEN, 8075
  - PERFUSION, 5028*, 6113
  - REVIEW, 8347
  - TISSUE CULTURE, 5028*
  - TRANSPLANTATION, 5434*
- TOXINS
  - TRIGLYCERIDES, 6792
- TRANSPLANTATION
  - SURVIVAL, 5434*
- TRIGLYCERIDES
  - CARBON TETRACHLORIDE, 641
  - METALS, 641
- ULTRASTRUCTURE, 2689
- UREMIA
  - DISEASES ASSOCIATED WITH, 6452*
- VITAMIN A, 7779
- VITAMIN B1
  - THERAPY, 8295*
- VITAMINS
  - COENZYMES, 8295*
  - THERAPY, 8295*
- WOUNDS AND INJURIES
  - CLEARANCE STUDY, 5038*
- ZINC
  - PREVENTION, 6087*

LUNG
- SEE RESPIRATORY SYSTEM

LYMPH
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 2054
  - BILIRUBIN, 2054
- CIRCULATION, 5492
- EPITHELIUM
  - TRACER STUDY, 7514*
  - TRANSPORT, 7514*
- FATS
  - ABSORPTION, 3017
  - DIGESTION, 3017
- ILEUM
  - SECRETION, 7498*
- INTESTINAL ABSORPTION
  - LIPOPROTEINS, 7497*
- INTESTINE, SMALL
  - LIPOPROTEINS, 7497*
  - SECRETION, 7498*
- INTESTINES
  - TRANSPORT, 3603*
- LIPIDS
  - ALCOHOLS, 7916*
  - DRUG EFFECTS ON, 7916*
- LIVER DISEASES
  - THERAPY, 5829
  - TOXINS, 5829
- PANCREATITIS
  - DRAINAGE, 7990
- SALIVARY GLANDS
  - NEOPLASM METASTASIS, 6615
- STOMACH
  - DRAINAGE, 7365
- TRANSPORT
  - ALKALINE PHOSPHATASE, 5933*
  - TRACER STUDY, 7514*

LYMPH (continued)
- TRIGLYCERIDES
  - ABSORPTION, 3017
  - DIGESTION, 3017

LYMPHANGIECTASIS
- ASCITES
  - STEATORRHEA, 4105*
- DIAGNOSIS, 4105*
- DRUG THERAPY
  - TRIGLYCERIDES, 4105*
- INTESTINE, SMALL, 8214
  - HYPOPLASIA, 6946
  - PROTEIN-LOSING ENTEROPATHIES, 6946
- INTESTINES
  - CHILD, 3241
  - DIET, 3241
  - IMMUNOLOGY, 3241
- PROTEIN-LOSING ENTEROPATHIES
  - INTESTINES, 1387

LYMPHATIC SYSTEM
- ASCITES
  - ABSORPTION, 1562
- CIRCULATION
  - DISEASE, 5493
  - IMMUNOLOGY, 5493
- COLON
  - IMMUNOLOGY, 1122
- FATTY ACIDS, 7926
- GASTROINTESTINAL SYSTEM
  - NEOPLASMS, 1278
- HYPERPLASIA
  - DIAGNOSIS, 1330
  - STOMACH, 1330
- INTESTINE, SMALL
  - DISEASE, 8215
  - FATTY ACIDS, 7926
  - TRIGLYCERIDES, 7926
- INTESTINES
  - INTUSSUSCEPTION, 480
  - ULTRASTRUCTURE, 2698*
- LIPIDS
  - ALCOHOLS, 7916*
  - DRUG EFFECTS ON, 7916*
- LIVER
  - CIRCULATION, 4723
  - OBSTRUCTION, 4723
- NEOPLASMS
  - GASTROINTESTINAL SYSTEM, 1665
- NEOPLASMS, BENIGN
  - HYPERPLASIA, 1666
- NEOPLASMS, MALIGNANT
  - CHILD, 774
  - GASTROINTESTINAL SYSTEM, 1667
  - MALABSORPTION SYNDROMES, 7639
  - RADIOLOGY, 1667
- OBSTRUCTION
  - MALABSORPTION SYNDROMES, 7643
- RECTUM
  - POLYPS, 1666
- SCHISTOSOMIASIS
  - HYPERTENSION, PORTAL, 841
- STOMACH, 7365
- TRIGLYCERIDES, 7926

LYMPHOCYTES
- AUTOIMMUNE DISEASES
  - TOXICITY, 2528

LYMPHOCYTES (continued)
- CELIAC DISEASE
  - CHILD, 1645*, 2166*
  - DIAGNOSIS, 7900
  - IMMUNOLOGY, 4921, 4922
- CHILD
  - INTESTINE, SMALL, 1645*, 2166*
  - JEJUNUM, 2166*
- COLITIS, ULCERATIVE, 5984
  - ANTIBODIES, 4210
  - IMMUNITY, 1732*, 3321*
  - INFLAMMATION, 4468*
- CROHN'S DISEASE
  - ANTIBODIES, 4210
  - COLITIS, ULCERATIVE, 3580*, 4468*
  - DIAGNOSIS, 7900
  - IMMUNITY, 1732*, 3321*
- DIARRHEA
  - CHILD, 2166*
- ENTERITIS, REGIONAL, 5984
- GASTROINTESTINAL SYSTEM
  - REVIEW, 1658
- GIARDIASIS
  - CHILD, 1645*, 2166*
- HEPATITIS
  - TOXICITY, 1517*, 2520
- HEPATITIS, CHRONIC, 1542*
  - ENZYMES, 2529
  - IMMUNOLOGY, 688, 6496*
  - LIVER, 681
  - MARKER STUDY, 4315
  - MORPHOLOGY, 5882*
  - PHYTOHEMAGGLUTININ, 4292
  - SERUM, 4292
  - TECHNIQUES, 2520
  - TOXICITY, 1517*, 2520
- HEPATITIS, INFECTIOUS
  - PHYTOHEMAGGLUTININ, 4292
  - SERUM, 4292
- INFLAMMATORY BOWEL DISEASES, 5984
  - ANTIBODIES, 4210
  - DIAGNOSIS, 7900
  - IMMUNITY, 1732*, 3321*
  - TRANSMISSION, 4210
- INTESTINE, LARGE
  - IMMUNITY, 3016
- INTESTINE, SMALL
  - IMMUNOLOGY, 3015
  - PARASITES AND PARASITIC DISEASES, 4739
- LACTOSE INTOLERANCE
  - CHILD, 2166*
- LIVER
  - AUTOIMMUNE DISEASES, 1659
- LIVER CIRRHOSIS, 1542*
  - IMMUNITY, 4334*
  - IMMUNOLOGY, 6496*
  - MORPHOLOGY, 5882*
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - HEPATITIS, CHRONIC, 1569
  - IMMUNOLOGY, 688
- LIVER DISEASES
  - ALPHA FETOPROTEIN, 629
  - CHILD, 627
  - IMMUNITY, 4334*
  - IMMUNOLOGY, 627, 628, 6496*
  - MORPHOLOGY, 5882*
- LIVER DISEASES, ALCOHOLIC, 1542*
  - IMMUNOLOGY, 688, 6496*

- LYMPHOCYTES (continued)
  - TRICHINOSIS
    - INTESTINE, SMALL, 4464

- LYMPHOGRAPHY
  - LIVER
    - CONTRAST MEDIA, 5516*
    - TECHNIQUES, 3960
  - LIVER DISEASES
    - CONTRAST MEDIA, 5516*

- LYMPHOMA
  - ABDOMEN
    - DIAGNOSIS, 5544
  - ALPHA-CHAIN DISEASE
    - DIAGNOSIS, 6977*
    - ENVIRONMENTAL FACTORS, 1351*
    - EPIDEMIOLOGY, 1351*
  - GASTROINTESTINAL SYSTEM
    - REVIEW, 7869
  - INTESTINE, SMALL
    - ALPHA-CHAIN DISEASE, 6977*
    - IMMUNOGLOBULINS, 4104*
    - MALABSORPTION SYNDROMES, 6309*, 6977*, 7643
    - PERFORATION, 5679
  - MALABSORPTION SYNDROMES
    - BACTERIA, 6309*
    - DISEASES ASSOCIATED WITH, 7643
    - REVIEW, 7643
  - RADIOTHERAPY
    - COMPLICATIONS, 6225*
  - SEZARY SYNDROME
    - GASTROINTESTINAL SYSTEM, 6606
  - STOMACH
    - DIAGNOSIS, 5590*
    - ENDOSCOPY, 4041*
    - NEOPLASMS, 5590*
    - PROGNOSIS, 5591*
    - RADIOLOGY, 5590*

- LYSOSOMES
  - ANTRUM
    - BILE, 1917
    - ULCER, 1917
  - BILE
    - ULCER, 1917
  - ENZYMES
    - ALCOHOLS, 4625*
    - DRUG EFFECTS ON, 4625*
  - GALLBLADDER
    - INFLAMMATION, 1578*
  - HEPATITIS, TOXIC
    - DETERGENTS, 3764*
    - TRANQUILIZING AGENTS, 7468
  - ILEUM
    - TRANSPORT, 6023
  - INTESTINE, SMALL
    - TRANSPORT, 6023
  - INTESTINES
    - EMBRYOLOGY, 172*
    - REVIEW, 172*
    - SHOCK, 3872*
  - LIVER
    - AMINO ACIDS, 3917
    - ENZYMES, 4625*, 7427*
    - INSECTICIDES, 6089*
    - JAUNDICE, CHRONIC IDIOPATHIC, 5060*

- LYSOSOMES (continued)
  - LIVER (continued)
    - TRANQUILIZING AGENTS, 7468
    - ULTRASTRUCTURE, 2678*
    - UREMIA, 7453
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 7468
    - ENZYMES, 1080
    - STRESS, 6836*

- LYSOZYMES
  - BILIARY TRACT DISEASES
    - PATHOLOGY, 6426
  - COLITIS, ULCERATIVE, 7062*
    - DIAGNOSIS, 4203*, 7718*
    - SERUM, 1745, 3076, 3077
  - CROHN'S DISEASE, 7062*
    - DIAGNOSIS, 1731*, 4203*, 7718*
    - SERUM, 1731*, 1745, 3076, 3077
  - INFLAMMATORY BOWEL DISEASES
    - SERUM, 3076, 3077, 5548
  - INTESTINES
    - WOUNDS AND INJURIES, 6296
  - LIVER CIRRHOSIS
    - IMMUNOLOGY, 3484
  - LIVER DISEASES
    - PATHOLOGY, 6426
  - STOMACH
    - ACID SECRETION, 3710

- MACROGLOBULINEMIA
  - JEJUNUM
    - NEOPLASMS, 2623

- MAGNESIUM
  - ABSORPTION
    - FATS, 6003*
  - ALCOHOLISM
    - DEFICIENCY, 6610
    - MUSCLES, 6610
  - CALCIUM
    - ENZYMES, 995
  - DEFICIENCY
    - ETIOLOGY, 8498
  - GASTROENTERITIS
    - SERUM, 7243
  - GASTROINTESTINAL DISEASES
    - DEFICIENCY, 8498
  - GASTROINTESTINAL SYSTEM
    - SURGERY, 8496
  - INTESTINE, SMALL
    - DEFICIENCY, 2336
    - SURGERY, 2336
  - ION TRANSPORT
    - CECUM, 5495
    - COLON, 5495
    - DEFICIENCY, 5495
  - JEJUNUM
    - FATS, 6003*
  - LIVER CIRRHOSIS
    - CHILD, 4344
  - LIVER DISEASES
    - METABOLISM, 7793
  - MICROSOMES
    - ADENOSINE TRIPHOSPHATASE, 61
  - MOTILITY
    - ADENOSINE TRIPHOSPHATASE, 61
  - OBESITY
    - DEFICIENCY, 2336

MAGNESIUM (continued)
- PANCREAS
  - SECRETION, 113

MALABSORPTION SYNDROMES
- ABSORPTION
  - TRIGLYCERIDES, 6162
- ALBUMINS
  - DISEASES ASSOCIATED WITH, 7648
- ALPHA-CHAIN DISEASE, 6977*
  - DIAGNOSIS, 6977*
  - ENTEROPATHY, 6310*
- BACTERIAL INFECTIONS, 7642
- BILE ACIDS AND SALTS, 4911*
  - CHILD, 7756
  - DIAGNOSIS, 3249*
  - DIARRHEA, 4910*
  - DUODENUM, 3249*
  - METABOLISM, 7756
  - STEATORRHEA, 3249*
- BILIARY TRACT DISEASES
  - LACTOSE, 6318
- CARBOHYDRATES
  - ENTEROCOLITIS, NECROTIZING, 1384
- CHILD
  - REVIEW, 6992, 7654
  - XYLOSE, 4003
- CLASSIFICATION
  - REVIEW, 7655
- COENZYMES
  - REVIEW, 6987
- COLOSTOMY
  - PATHOLOGY, 3262
  - THERAPY, 3262
- DIAGNOSIS
  - BILE ACIDS AND SALTS, 7756
  - REVIEW, 2349, 7650
- DIARRHEA, 7642
  - BILE ACIDS AND SALTS, 3250*
  - DIETARY FACTORS, 4423
- DISACCHARIDASES
  - DEFICIENCY, 8136
- DISACCHARIDES
  - BREATH TEST, 8136
  - DIAGNOSIS, 8136
- DISEASES ASSOCIATED WITH
  - CHOLERA, 7644
  - DIABETES, 7644
  - GASTROENTERITIS, 7644
  - LYMPHOMA, 7643
  - NEOPLASMS, MALIGNANT, 7644
  - REVIEW, 1379, 2349
  - SPRUE, TROPICAL, 7644
  - TUBERCULOSIS, 7643
- DRUG THERAPY
  - NEOPLASMS, MALIGNANT, 4911*
- DRUGS
  - ABSORPTION, 4138
- ENTEROCOLITIS, 3545
- ETIOLOGY
  - BACTERIAL INFECTIONS, 3256*
  - GIARDIASIS, 3256*
- FATS
  - BILE ACIDS AND SALTS, 3249*
  - BREATH TEST, 5510*
  - DETERGENTS, 4915
  - DIAGNOSIS, 3248*, 5510*
  - OXALATES, 5704*
  - THERAPY, 4915

MALABSORPTION SYNDROMES (continued)
- FOLIC ACID
  - AGE FACTORS, 2361
  - DEFICIENCY, 4923
  - REVIEW, 6987
- GASTRECTOMY
  - VITAMIN B12, 3270
- GASTRIN
  - CELLS, 4912
- GASTRITIS
  - IMMUNODEFICIENCY DISEASES, 2245
  - VITAMIN B12, 2245
- GASTROINTESTINAL DISEASES
  - LACTOSE, 6318
- GIARDIASIS
  - FATS, 5242*
  - INTESTINES, 438
  - ULTRASTRUCTURE, 2660*
  - VITAMIN B12, 7892*
- GLUTEN
  - INTEGUMENTARY SYSTEM, 1386
- HELMINTHIASIS
  - ANEMIA, 827
  - INTESTINES, 827
- HYPERSENSITIVITY
  - DISEASES ASSOCIATED WITH, 2347*
  - IMMUNOGLOBULINS, 2347*
- ILEITIS
  - JEJUNUM, 6941*
- ILEOSTOMY
  - PATHOLOGY, 3262
  - THERAPY, 3262
- IMMUNOGLOBULINS, 8226*
  - METABOLISM, 2350
  - REVIEW, 2350
- IMMUNOLOGY
  - REVIEW, 7652
- INFLAMMATION
  - MUSCLES, 3256*
- INTESTINE, SMALL
  - ANOMALY, 4868*
  - BACTERIA, 399, 7653
  - BIOPSY, 4904*
  - GIARDIASIS, 2659*
  - LYMPHOMA, 6309*, 6977*, 7643
  - MOTILITY, 3256*
  - OBSTRUCTION, 7643
  - SCLEROSIS, 5674
  - SURGERY, 2321, 3867*
  - TUBERCULOSIS, 7643
  - VILLI, 8226*
- INTESTINES
  - CELLS, 7656
  - CHILD, 3261
  - GIARDIASIS, 1718
  - MORPHOLOGY, 7656
- JAUNDICE
  - LACTOSE, 3406*
- JEJUNUM
  - BACTERIA, 4113
  - GIARDIASIS, 4113
  - ILEITIS, 6940*
- LACTASE
  - DEFICIENCY, 5210
- LACTOSE, 4002, 6980*
  - BONES, 5702*
  - EPIDEMIOLOGY, 7645
  - ETHNIC FACTORS, 1388, 7645
  - GENETIC FACTORS, 7646

- MALABSORPTION SYNDROMES (continued)
  - LACTOSE (continued)
    - GENETICS FACTORS, 5701*
    - GEOGRAPHICAL FACTORS, 7646
    - REVIEW, 2363, 7646, 7647
    - SOCIOECONOMIC FACTORS, 7645
    - TOLERANCE TEST, 4000
  - LACTOSE INTOLERANCE
    - DIAGNOSIS, 4000
  - LYMPHATIC SYSTEM
    - NEOPLASMS, MALIGNANT, 7639
    - OBSTRUCTION, 7643
  - LYMPHOMA
    - BACTERIA, 6309*
    - REVIEW, 7643
  - MENETRIER'S DISEASE
    - CALCIUM, 3181
    - FOLIC ACID, 6902
    - PROTEINS, 3181
  - MESENTERY
    - SURGERY, 3264
  - MILK, 6317
    - ETIOLOGY, 6981*
    - IMMUNOLOGY, 6319
    - INTOLERANCE, 4908*
    - PROTEINS, 6319
    - REVIEW, 2363
  - MYCOSES
    - PROTEIN-LOSING ENTEROPATHIES, 770
  - NEONATE
    - LACTOSE, 3406*
    - REVIEW, 8457
  - NEOPLASMS, MALIGNANT
    - THERAPY, 4911*
  - NUCLEIC ACIDS
    - SYNTHESIS, 4923
  - NUTRITION DISORDERS, 3260
  - OBESITY
    - SURGERY, 2365, 2981
  - OXALATES
    - EXCRETION, 6586*
    - URINE, 4258*
  - PANCREATIC DISEASES
    - VITAMIN B12, 871*
  - PANCREATITIS, CHRONIC
    - COMPLICATIONS, 8279
  - PATHOLOGY
    - REVIEW, 7651
  - PLASMA
    - TRIGLYCERIDES, 3248*
  - PROTEINS
    - COLITIS, 5716*
    - DIARRHEA, 5716*
    - DISEASES ASSOCIATED WITH, 7648
    - ETIOLOGY, 6981*
    - INFANT, 5716*
    - INTOLERANCE, 4908*
  - RADIOLOGY
    - COLON, 4001
  - REVIEW, 7656
  - SERUM
    - CALCIUM, 6316
  - SHUNT, INTESTINAL
    - COMPLICATIONS, 7630
  - STOMACH
    - SURGERY, 7638*
  - SUCROSE
    - DIARRHEA, 5706
    - EPIDEMIOLOGY, 5706

- MALABSORPTION SYNDROMES (continued)
  - SUCROSE (continued)
    - REVIEW, 7649
  - SURGERY
    - THERAPY, 3867*
  - THERAPY, 7866
    - DIET, 3259
  - ULTRASTRUCTURE, 4912
  - URINE
    - OXALATES, 6320
  - VILLOPATHY
    - DIAGNOSIS, 3263
    - DIETARY FACTORS, 3263
  - VITAMIN B12, 7640
    - BACTERIA, 2367
    - BACTERIAL INFECTIONS, 4924
    - CHILD, 6985
    - STASIS SYNDROME, 2367
  - XYLOSE
    - SOCIOECONOMIC FACTORS, 4135

- MALACOPLAKIA
  - CHILD
    - BILE DUCTS, 4371*
  - CHOLECYSTECTOMY
    - SURVIVAL, 4371*

- MALIGNANT
  - SEE NEOPLASMS, MALIGNANT

- MALLORY-WEISS SYNDROME
  - ALCOHOLISM, 7563
  - BLEEDING
    - DIAGNOSIS, 2185
  - DIAGNOSIS, 6864*, 8149
    - GASTROSCOPY, 5580
    - TECHNIQUES, 5580
  - DISEASES ASSOCIATED WITH
    - CARDIOVASCULAR SYSTEM, 8149
    - GASTROINTESTINAL SYSTEM, 8149
    - RESPIRATORY SYSTEM, 8149
  - DRUG THERAPY
    - DIAGNOSIS, 1329
  - ENDOSCOPY, 7563
    - COMPLICATIONS, 1256
  - ETIOLOGY, 6864*
  - HEMORRHAGE, 7563
  - PROGNOSIS, 6864*, 8149
  - THERAPY, 6864*, 8149
  - VOMITING, 7563

- MALNUTRITION
  - SEE NUTRITION DISORDERS

- MANOMETRY
  - ANORECTUM
    - CHILD, 7698
    - NEONATE, 7698
  - ANUS
    - DISEASE, 252
    - PARAPLEGIA, 5930*
    - SPHINCTER, 5930*
    - TECHNIQUES, 5930*
  - BILE DUCTS
    - CHOLANGIOGRAPHY, 7198*
    - PRESSURE STUDY, 5519*
    - SURGERY, 7198*
    - TECHNIQUES, 7198*

MANOMETRY (continued)
- BILIARY TRACT
  - RADIOLOGY, 4748*
- CALCULI
  - SURGERY, 7198*
- CHILD
  - REVIEW, 6953
- CHOLANGIOGRAPHY, 6188
  - SURGERY, 6185
- COMMON BILE DUCT CALCULI
  - SURGERY, 7198*
- CYSTS
  - SURGERY, 7198*
- ESOPHAGEAL DISEASES
  - SPASM, 5567*
- ESOPHAGEAL REFLUX, 5565*
  - ESOPHAGITIS, 7554*
  - PREGNANCY, 5563*
  - RADIOLOGY, 299
- ESOPHAGITIS
  - LIVER DISEASES, 1261*
- ESOPHAGUS
  - ESOPHAGEAL REFLUX, 7554*
  - ESOPHAGITIS, 7554*
  - INFANT, 2223*
  - MOTILITY, 6701, 6702
  - PERISTALSIS, 5308*
  - REFLUX, 1260*, 2223*, 4523*, 4550*
  - SPHINCTER, 1830*, 4523*, 4537, 5569, 7554*
  - TECHNIQUES, 2184, 4537, 5308*, 6701, 6702
- HEARTBURN
  - PREGNANCY, 5563*
- HIATAL HERNIA
  - PRESSURE STUDY, 5569
  - SURGERY, 5581
- HIRSCHSPRUNG'S DISEASE
  - DIAGNOSIS, 7698
- PANCREATIC DUCT
  - PRESSURE STUDY, 5519*
  - REFLUX, 7199*
- PANCREATITIS
  - REFLUX, 7075*
- PANCREATITIS, CHRONIC
  - REFLUX, 7075*
- RECTUM
  - CHILD, 7698
  - DISEASE, 252
  - NEONATE, 7698
- REFLUX
  - POSTURAL FACTORS, 1263*
- SCLEROSIS
  - PRESSURE STUDY, 5569
- STOMACH
  - CERULEIN, 3632*
  - CHOLECYSTOKININ, 3632*
  - PANCREOZYMIN, 3632*
  - REFLUX, 1260*

MARASMUS
- ALBUMINS
  - GROWTH DISORDERS, 5951
- DISEASES ASSOCIATED WITH, 5203
- EPIDEMIOLOGY, 7245
- GEOGRAPHICAL FACTORS
  - REVIEW, 1691
- GLUCOSE
  - METABOLISM, 4146

MARASMUS (continued)
- HORMONES, 4146
- INFECTION
  - ALBUMINS, 5951
  - GROWTH DISORDERS, 5951
- NUTRITION DISORDERS
  - HORMONES, 7245
  - PROTEINS, 7245
- PROTEINS
  - METABOLISM, 4146
- SERUM
  - CALCIUM, 6316

MECKEL'S DIVERTICULUM
- COMPLICATIONS
  - OBSTRUCTION, 4870*
- CROHN'S DISEASE
  - CHOLELITHIASIS, 2325
  - DISEASES ASSOCIATED WITH, 2325
  - EPIDEMIOLOGY, 2325
- HEMORRHAGE
  - SURGERY, 8221
- INTESTINE, SMALL
  - HEALING, 8224
  - SURGERY, 2321, 8224
- OBSTRUCTION
  - RADIOLOGY, 4870*
- SURGERY
  - COMPLICATIONS, 1365

MECONIUM
- CHEMICAL COMPOSITION
  - NEONATE, 1638
- CYSTIC FIBROSIS
  - DIAGNOSIS, 7127
  - INTESTINAL OBSTRUCTION, 2413*

MEDIASTINUM
- NEOPLASMS, MALIGNANT, 6888

MEGACOLON
- SEE ALSO HIRSCHSPRUNG'S DISEASE
- CELIAC DISEASE
  - DISEASES ASSOCIATED WITH, 2346*
- COLITIS
  - SHIGELLOSIS, 6605
- COLITIS, ULCERATIVE
  - COMPLICATIONS, 4966*
  - INFANT, 517
  - SURGERY, 4959*
- COLONIC DISEASES, 3274*
- CONSTIPATION
  - CHILD, 3536
- DRUG THERAPY
  - SURGERY, 495
- ENDOSCOPY
  - COMPLICATIONS, 5751
- GIARDIASIS
  - COMPLICATIONS, 8506
- INFANT
  - DIAGNOSIS, 3231
  - PATHOLOGY, 3231
  - SURGERY, 3231
- INTESTINE, LARGE
  - MOTILITY, 937
- RADIOLOGY, 3274*
- SPRUE
  - DISEASES ASSOCIATED WITH, 2346*

MEGACOLON (continued)
- SURGERY
  - COMPLICATIONS, 3274*
  - PROGNOSIS, 3274*
- THERAPY
  - SURGERY, 4966*

MEGAESOPHAGUS
- SEE ACHALASIA

MELENA
- DISEASES ASSOCIATED WITH
  - CARDIOVASCULAR SYSTEM, 4452
- REYE'S SYNDROME
  - THERAPY, 2462*

MENETRIER'S DISEASE
- DIAGNOSIS
  - PATHOLOGY, 4046*
- MALABSORPTION SYNDROMES
  - CALCIUM, 3181
  - FOLIC ACID, 6902
  - PROTEINS, 3181
- MITOSIS, 4495
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 1251
  - PANCREAS, 1251
  - SURGERY, 1300
- PATHOLOGY, 3182
  - REVIEW, 4046*
- PSEUDOTUMORS, 4828
- RADIOLOGY, 3182
- SERUM
  - GASTRIN, 3532
- THERAPY, 6239

MERCAPTANS
- SEE SULFHYDRYL COMPOUNDS

MESENTERY
- DYSPLASIA
  - ANGIOGRAPHY, 7657*
- HEMANGIOMA
  - RUPTURE, 430
- HEMORRHAGE
  - ANGIOGRAPHY, 7657*
  - DYSPLASIA, 7657*
- HYPERTENSION, PORTAL
  - ANGIOGRAPHY, 721
- INTESTINE, SMALL
  - CYSTS, 6305
  - MOTILITY, 2753
  - TRANSPLANTATION, 3889
- NEOPLASMS
  - COLON, 2628
- PANCREATITIS
  - ANEURYSM, 4244
  - SIMULATION, 3733
- PRIMATES
  - VASOPRESSIN, 2118
- PROTEIN-LOSING ENTEROPATHIES
  - ASCITES, 436*
- SURGERY
  - MALABSORPTION SYNDROMES, 3264
- VASOPRESSIN
  - CIRCULATION, 2118

METALS
- ABSORPTION
  - GASTROINTESTINAL SYSTEM, 879
  - TOXICOLOGY, 879
- AMYLOIDOSIS
  - TRANSPORT, 1475
- AUSTRALIA ANTIGEN
  - ULTRASTRUCTURE, 4302
- BLOOD
  - AUSTRALIA ANTIGEN, 4302
- DUODENUM
  - CADMIUM, 7507
- FATTY LIVER
  - ANDROGENS, 6787
  - HORMONE EFFECTS ON, 6787
- INTESTINE, SMALL
  - CADMIUM, 7507
- LIVER
  - ABSORPTION, 2719
  - BIOCHEMISTRY, 1982
  - PROTEINS, 5407*
  - ULTRASTRUCTURE, 1982
- LIVER INJURY
  - TRIGLYCERIDES, 641
- NUTRITION DISORDERS
  - GENETICS, 7252
  - METABOLISM, 7252
- PROTEINS
  - BINDING, 5407*
- RADIONUCLIDES
  - BODY COMPOSITION, 5547

METAPLASIA
- INTESTINE, LARGE
  - CYTOLOGY, 5592*
- INTESTINE, SMALL
  - CYTOLOGY, 5592*
  - REVIEW, 5685
- INTESTINES, 3148
  - DIAGNOSIS, 5621
- NEOPLASMS, MALIGNANT
  - STOMACH, 5621
- STOMACH
  - NEOPLASMS, 4740*

METASTASIS
- SEE NEOPLASM METASTASIS

MICELLES
- BILE
  - SECRETION, 2866*
- BILE ACIDS AND SALTS, 7445*
  - CHOLESTEROL, 3772
  - KINETICS, 3772
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 5421*
- CHOLESTEROL
  - KINETICS, 3772
- VITAMIN A
  - SOLUBILITY, 898

MICROBODIES
- LIVER CIRRHOSIS
  - ULTRASTRUCTURE, 4330*
- NEOPLASMS
  - HYPOCHOLESTEREMIC AGENTS, 159

- MICROCIRCULATION
  - INTESTINE, LARGE
    - COLITIS, ULCERATIVE, 3318*
    - CROHN'S DISEASE, 3318*
    - SURGERY, 3318*
  - LIVER
    - MORPHOLOGY, 2690
  - PANCREATITIS
    - SIMULATION, 3733

- MICROORGANISMS
  - AMINO ACIDS
    - METABOLISM, 3834*
  - BILE ACIDS AND SALTS
    - ABSORPTION, 6693*
    - FECES, 3755*
    - INTESTINES, 3013
    - LACTOSE, 2876*
    - METABOLISM, 2876*, 3013
    - TRANSPORT, 6693*
  - CECUM
    - AMINO ACIDS, 3834*
    - BILE ACIDS AND SALTS, 4714*
    - DISTENTION, 4714*
  - COLITIS, ULCERATIVE
    - PATHOLOGY, 1436
    - PREVENTION, 1436
  - HEPATITIS
    - ENTEROCOLITIS, 3033
    - NECROSIS, 3033
  - INTESTINE, LARGE
    - AMINO ACIDS, 3834*
  - INTESTINE, SMALL
    - AMINO ACIDS, 3834*
  - JEJUNUM, 4114
  - LIPODYSTROPHY, INTESTINAL
    - IMMUNOLOGY, 6312*
  - PANCREAS
    - ABSCESS, 3332

- MICROSOMES
  - ALCOHOLISM
    - ENZYMES, 4411
  - CALCIUM
    - SECRETION, 1800
  - CHOLERESIS
    - TRANQUILIZING AGENTS, 7414*
  - CIRCADIAN RHYTHM
    - STEROIDS, 1980
  - CYTOCHROMES
    - BINDING, 1026
    - SELENIUM, 2053
  - DRUG METABOLISM
    - DISEASE, 2902
    - ENZYMES, 2902
    - INSECTICIDES, 1981
    - LIVER, 2902
    - STEROIDS, 1980
  - ENZYMES
    - DRUGS, 2908
    - LIVER, 2908
  - INFLAMMATION
    - LIVER, 8032*
  - LIPIDS
    - ENZYMES, 1994
    - LIVER, 1994
    - METABOLISM, 1994

- MICROSOMES (continued)
  - LIVER
    - AGE FACTORS, 4778
    - ANTI-INFLAMMATORY AGENTS, 8032*
    - CHOLIC ACID, 3770
    - DRUG METABOLISM, 4636, 8029*
    - ENZYMES, 1074, 2933, 4411, 4778
    - HYPNOTIC AGENTS, 2047
    - LIPIDS, 2037
    - OXIDATION, 1031
    - STEROIDS, 1980
    - SYNTHESIS, 3770
    - TRANQUILIZING AGENTS, 8032*
  - LIVER CIRRHOSIS
    - BREATH TEST, 3376
    - DRUG METABOLISM, 4664
    - KINETICS, 2547
  - LIVER DISEASES
    - ANTICONVULSANTS, 1570
    - BREATH TEST, 3376
  - LIVER DISEASES, ALCOHOLIC
    - BREATH TEST, 3376
  - LIVER INJURY
    - ENZYMES, 6793
  - MAGNESIUM
    - ADENOSINE TRIPHOSPHATASE, 61
  - TRANQUILIZING AGENTS
    - LIVER, 7414*

- MILK
  - ALCOHOLISM
    - LACTOSE INTOLERANCE, 1385
  - CELIAC DISEASE, 6317
  - ENTEROCOLITIS
    - HYPERSENSITIVITY, 2327
  - GASTROENTERITIS, 6317
  - IMMUNOLOGY
    - REVIEW, 3254*
  - INTESTINAL OBSTRUCTION
    - NEONATE, 6954
  - LACTOSE INTOLERANCE, 6317
    - ADOLESCENCE, 440
    - BREATH TEST, 4145
    - HYPERSENSITIVITY, 6984
    - INFANT, 4907*
  - MALABSORPTION SYNDROMES, 6317
    - ETIOLOGY, 6981*
    - IMMUNOLOGY, 6319
    - INTOLERANCE, 4908*
    - PROTEINS, 6319
    - REVIEW, 2363
  - METABOLISM
    - HORMONE CONTROL, 6714*
    - HORMONES, GASTROINTESTINAL, 6714*
  - NEONATE
    - HORMONES, GASTROINTESTINAL, 6714*
    - METABOLISM, 6714*
  - PARASITES AND PARASITIC DISEASES
    - TRANSMISSION, 4458*
  - TRYPSIN INHIBITORS
    - SERUM, 217
  - TUBERCULOSIS
    - ACID SECRETION, 6626
    - YEAST, 6626
  - ZINC, 5292*

- MINERALS
  - BINDING
    - BILE ACIDS AND SALTS, 2604

MINERALS (continued)
- BINDING (continued)
  - HYDROGEN IONS, 2604
  - PEPSIN, 2604
- GASTRECTOMY
  - VITAMIN D, 6254
- LACTOSE INTOLERANCE
  - BONES, 6988
- NUTRITION DISORDERS
  - GENETICS, 7252
  - METABOLISM, 7252

MITOCHONDRIA
- ABSORPTION, 5479*
- ALCOHOLISM
  - ULTRASTRUCTURE, 8282*
- ALCOHOLS
  - ENZYMES, 147
  - LIVER, 147
  - MONOAMINE OXIDASE, 147
- ANEMIA
  - ULTRASTRUCTURE, 8282*
- CHOLAGOGUES AND CHOLERETICS
  - DRUG EFFECTS ON, 1016*
- CHOLELITHIASIS
  - HEPATOCYTES, 3514
- FATTY LIVER
  - ULTRASTRUCTURE, 6504*
- HEPATITIS, CHRONIC
  - ANTIBODIES, 4332*, 4333*
- HEPATOCYTES
  - AGE FACTORS, 7418*
  - CHOLELITHIASIS, 7836
  - DIETARY FACTORS, 6789
  - DRUG-INDUCED, 6122
  - MORPHOLOGY, 6789
  - OXIDATIVE PHOSPHORYLATION, 4637
- HYPERLIPEMIA
  - ULTRASTRUCTURE, 8282*
- INTESTINE, SMALL
  - CALCIUM, 2701*
  - VITAMIN D, 6839
- LIVER
  - AGE FACTORS, 13
  - AMINO ACIDS, 3917
  - CHOLAGOGUES AND CHOLERETICS, 1016*
  - CHOLESTASIS, 2691
  - DRUG EFFECTS ON, 1016*
  - ENZYMES, 1501, 3373*
  - METABOLISM, 1016*, 2691
  - MORPHOLOGY, 13, 2691
  - OXIDATIVE PHOSPHORYLATION, 3732
  - SULFOBROMOPHTHALEIN, 4613*
  - ULTRASTRUCTURE, 2678*, 2691
  - UREMIA, 1049
  - VAGOTOMY, 6105
  - VITAMIN D, 6839
- LIVER CIRRHOSIS
  - ANTIBODIES, 4332*, 4333*
  - CYTOCHROMES, 7189*
  - KINETICS, 2547
  - ULTRASTRUCTURE, 8282*
- LIVER DISEASES
  - ANTIBODIES, 7177*
- METABOLISM
  - CHOLAGOGUES AND CHOLERETICS, 1016*
  - DRUG EFFECTS ON, 1016*

MITOCHONDRIA (continued)
- NEOPLASMS, MALIGNANT
  - ULTRASTRUCTURE, 8282*
- OXIDATION
  - LIVER, 2013
  - METABOLISM, 2013
  - VITAMIN B2, 2013
- OXIDATIVE PHOSPHORYLATION
  - ASPIRIN, 1879*
- PORPHYRIA
  - ULTRASTRUCTURE, 8282*
- SHUNT
  - NERVOUS SYSTEM, 5479*
- STOMACH
  - DRUG EFFECTS ON, 7981
  - OXIDATIVE PHOSPHORYLATION, 1879*
- SULFOBROMOPHTHALEIN
  - ION TRANSPORT, 6007*
  - MEMBRANES, 6007*
- TRANSPORT
  - SULFOBROMOPHTHALEIN, 1077

MITOSIS
- ANTRUM
  - CELLS, 1753*
- COLON
  - FEEDING, 2986*
  - STARVATION, 2986*
  - SURGERY, 1748*
- DUODENUM
  - IRRADIATION, 5467*
  - RADIATION EFFECTS ON, 5467*
- GASTRIN
  - CELLS, 1753*
- GASTRITIS, 4576
  - CELLS, 6722*
- GASTRITIS, ATROPHIC, 4495
- ILEUM
  - FEEDING, 2986*
  - STARVATION, 2986*
  - SURGERY, 1749*
- INTESTINE, SMALL
  - AGE FACTORS, 5455
  - CELLS, 4708*
  - DRUG EFFECTS ON, 7500*
  - ENTERECTOMY, 4708*
  - IRRADIATION, 5467*
  - ISCHEMIA, 2100*
  - KINETICS, 7500*
  - RADIATION EFFECTS ON, 5467*
  - SURGERY, 1748*, 1749*
- INTESTINES
  - CELLS, 3094
  - ENVIRONMENTAL FACTORS, 2067
  - RADIATION EFFECTS ON, 2067
  - TEMPERATURE, 2067
- ISCHEMIA
  - CELLS, 2100*
- JEJUNUM
  - FEEDING, 2986*
  - IRRADIATION, 868
  - STARVATION, 2986*
- LIVER
  - NITROSAMINES, 168
  - REGENERATION, 3924
- LIVER INJURY
  - CIRCADIAN RHYTHM, 4610*
- MENETRIER'S DISEASE, 4495

MITOSIS (continued)
- STOMACH, 4495, 4576
  - ADRENALECTOMY, 3008
  - DRUG EFFECTS ON, 3008
  - EPITHELIUM, 1102*, 3008
  - HORMONES, ADRENAL CORTEX, 3008
  - NEOPLASMS, 6876*
  - ULCER, PEPTIC, 4576
- STOMACH DISEASES
  - CELLS, 6722*
- UROGASTRONE
  - THYMIDINE, 1900
- ZOLLINGER-ELLISON SYNDROME, 4495

MONOAMINE OXIDASE
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6086*
  - CYTOCHROMES, 6086*
  - LIPIDS, 6086*
  - PEROXIDATION, 6086*
- LIVER
  - FIBROSIS, 2198
- LIVER CIRRHOSIS, 7814*
  - BLOOD PLATELETS, 7814*
- MITOCHONDRIA
  - ALCOHOLS, 147
- STOMACH
  - ULCER, 7974
- ULCER
  - DRUG EFFECTS ON, 7974

MONOSACCHARIDES
- ABSORPTION, 5340
- ALCOHOLS
  - ABSORPTION, 173*
- BILIARY TRACT DISEASES
  - EXCRETION, 6425
- CHILD
  - BILIARY TRACT DISEASES, 6425
  - LIVER DISEASES, 6425
- DUMPING SYNDROME
  - ABSORPTION, 4058
- LIVER DISEASES
  - EXCRETION, 6425
- TRANSPORT
  - ELECTROPHYSIOLOGY, 1813
  - INTESTINE, SMALL, 1813

MOTILIN
- CARBOHYDRATES
  - METABOLISM, 4858
- DRUG METABOLISM
  - PLASMA, 2984*
- DUODENUM, 2761, 4693
  - ELECTROPHYSIOLOGY, 944, 2760
  - MUSCLES, 2759, 2760
  - PERISTALSIS, 2759
  - ULCER, 4858
- ESOPHAGUS
  - SPHINCTER, 1830*, 1831*, 2735*, 4522*
- HORMONE EFFECTS ON
  - SECRETIN, 6746*
- HYPOGLYCEMIA, 4858
- INTESTINE, SMALL, 4693
  - MOTILITY, 7324
- JEJUNUM, 4693
- KINETICS
  - PLASMA, 2984*

MOTILIN (continued)
- PLASMA
  - HORMONE EFFECTS ON, 6746*
- REVIEW, 5343
- SERUM
  - GASTRIN, 1898, 7347*
- STOMACH, 2761
  - ACID SECRETION, 7347*
  - AMINO ACIDS, 952*
  - CIRCULATION, 1898, 7347*
  - ELECTROPHYSIOLOGY, 944
  - MOTILITY, 66
  - SECRETION, 1898
  - SYNTHESIS, 1143
- VAGOTOMY, 4858

MOTILITY
- ABSORPTION
  - AMINO ACIDS, 3011
- AFFERENT LOOP SYNDROME
  - INTESTINES, 5322*
  - STOMACH, 5322*
- ANTRUM
  - ELECTROPHYSIOLOGY, 4541
  - NERVOUS CONTROL, 8120
- ANUS
  - PARAPLEGIA, 5930*
  - SPHINCTER, 5930*
- BILE
  - STOMACH, 1076
- BILE ACIDS AND SALTS
  - INTESTINES, 1467
  - METABOLISM, 1467
- BILE DUCTS
  - CHOLECYSTOGRAPHY, 70
- BRADYKININ
  - HORMONES, 2758
  - ILEUM, 2758
  - SEX FACTORS, 2758
- BREATH TEST
  - HYDROGEN, 4743*, 7326
- CECUM
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7947
  - DIET, 6140
  - DRUG EFFECTS ON, 7947
  - HELMINTHIASIS, 1827*
- COLECTOMY, 2966*
- COLITIS, ULCERATIVE
  - COLON, 514
- COLON
  - ANALGESICS AND ANTIPYRETICS, 923
  - CATECHOLAMINES, 7950
  - DISTENTION, 4543
  - DIVERTICULUM, 5720*
  - DRUG EFFECTS ON, 923, 1858, 2742*, 4543, 7950
  - DRUGS, 938
  - ELECTROPHYSIOLOGY, 923, 935, 5190
  - EPINEPHRINE, 7950
  - FIBERS, 1389*
  - HORMONES, GASTROINTESTINAL, 938
  - HYPERACTIVITY, 4927*
  - HYPERTENSION, 7327
  - MUSCLES, 923
  - NEOPLASMS, 2385
  - NEOPLASMS, MALIGNANT, 2378, 6324*
  - NERVOUS CONTROL, 935, 2742*, 5318*
  - PEPTIDES, 4534

- MOTILITY (continued)
  - COLON (continued)
    - PRESSURE STUDY, 4543, 4927*
    - SURGERY, 2966*
  - COMMON BILE DUCT
    - CHOLECYSTOGRAPHY, 70
  - CONSTIPATION
    - PRESSURE STUDY, 5720*
  - DIARRHEA
    - ETIOLOGY, 5196
  - DUMPING SYNDROME
    - HUMORAL FACTORS, 2754
    - HYPERGLYCEMIA, 2754
  - DUODENUM
    - ACID-BASE BALANCE, 59
    - ALKALOIDS, 7941
    - AMINO ACIDS, 3653
    - ANTIEMETICS, 2740*
    - ASPIRIN, 2730*
    - CATECHOLAMINES, 7950
    - CHOLECYSTOKININ, 5314*
    - DRUG EFFECTS ON, 2730*, 2740*, 2761, 3209, 5314*, 7941, 7950
    - ELECTROPHYSIOLOGY, 920, 4541, 7938*
    - EPINEPHRINE, 7950
    - FEEDING, 1148
    - HORMONES, 922
    - MORPHOLOGY, 7938*
    - NERVOUS CONTROL, 57, 5313*, 6698*
    - PARASYMPATHOLYTICS, 922
    - PROTEINS, 3653
    - REVIEW, 57
    - VAGOTOMY, 1148, 5324*
  - ESOPHAGEAL REFLUX
    - ESOPHAGITIS, 7554*
    - SURGERY, 1265*
  - ESOPHAGUS, 4122
    - AMINES, 6707
    - ANTIEMETICS, 2224*
    - ATRESIA, 4790*
    - BICARBONATES, 50
    - CALCIUM, 4449
    - CHOLECYSTOKININ, 4519*
    - DISTENTION, 298, 4517*
    - DOPAMINE, 4520*
    - DRUG EFFECTS ON, 2733*, 3625*, 4520*, 5309*, 6707, 6708
    - DUODENUM, 4687
    - ELECTROPHYSIOLOGY, 53, 6703, 6705
    - ESOPHAGEAL REFLUX, 7554*
    - ESOPHAGITIS, 7554*
    - FEEDING, 50
    - FISTULA, 4790*
    - GASTRECTOMY, 4539
    - GASTRIN, 4031, 6709, 7936*
    - H2 RECEPTOR ANTAGONISTS, 928, 2733*, 3625*
    - HORMONE EFFECTS ON, 4524*, 6709, 7936*
    - HORMONES, GASTROINTESTINAL, 927, 4524*
    - MANOMETRY, 6701, 6702
    - MORPHOLOGY, 302
    - MUSCLES, 6705, 6706, 7937*
    - NERVOUS CONTROL, 931, 1839, 4516*, 4519*, 6706, 6707, 7937*
    - PARASYMPATHOLYTICS, 52

- MOTILITY (continued)
  - ESOPHAGUS (continued)
    - PRESSURE STUDY, 4514*, 4519*, 4524*
    - PROSTAGLANDINS, 927
    - RADIOLOGY, 6869
    - REFLUX, 6708
    - REVIEW, 926, 4029
    - SCLERODERMA, 2236
    - SOMATOSTATIN, 7936*
    - SPHINCTER, 50, 927, 2731*, 2733*, 4449, 5309*
    - SURGERY, 925
    - TEMPERATURE, 4515*, 4516*, 6704
    - VAGOTOMY, 7574*
    - ZOLLINGER-ELLISON SYNDROME, 4449
  - ESOPHAGUS, ARTIFICIAL
    - COLON, 4028
  - FEEDING
    - VAGOTOMY, 1148
  - GALLBLADDER
    - ANTRUM, 3729
    - CERULEIN, 69
    - CHILD, 3510
    - CHOLANGIOGRAPHY, 3640
    - CHOLECYSTOKININ, 1083
    - DRUGS, 3510
    - ETHNIC FACTORS, 5912*
    - HORMONE EFFECTS ON, 7375*
    - PATHOLOGY, 731
    - PEPTIDES, 1083
    - REVIEW, 2020
    - SOMATOSTATIN, 7375*
  - GASTROINTESTINAL DISEASES, 4533
    - ELECTROPHYSIOLOGY, 1187
    - RADIOLOGY, 1187
  - GASTROINTESTINAL SYSTEM
    - ACIDS, 5333
    - AGE FACTORS, 1834
    - ANEMIA, 5220
    - ASPIRIN, 2730*
    - BREATH TEST, 7326
    - CALCIUM, 5306*
    - CHILD, 8109
    - DIARRHEA, 5196
    - DRUG EFFECTS ON, 2730*, 3646, 5323*
    - ELECTROPHYSIOLOGY, 3641, 5190, 5334, 6700
    - GASTRIN, 819
    - HORMONES, 819
    - INFANT, 8109
    - LIVER DISEASES, 2645
    - MARKER STUDY, 917, 1834
    - NERVOUS CONTROL, 6700, 7942
    - PEPTIDES, 4534
    - RADIOLOGY, 1177*
    - RADIOTELEMETRY, 7935*
    - SECRETIN, 819
    - SURGERY, 2764
    - TECHNIQUES, 5334, 7935*
    - WOUNDS AND INJURIES, 2645
  - GLUCAGON, 4535
  - HELMINTHIASIS
    - INTESTINE, SMALL, 1827*
    - INTESTINES, 5251
  - HORMONES, GASTROINTESTINAL
    - INTESTINES, 1826*
    - JEJUNUM, 1826*

- MOTILITY (continued)
  - HYPERTENSION, PORTAL
    - VEINS, 2885*
  - ILEUM
    - ADENOSINE TRIPHOSPHATASE, 61
    - ANDROGENS, 7952
    - ANTI-INFLAMMATORY AGENTS, 5316*
    - BILE, 6093
    - BRADYKININ, 936
    - CHOLERA, 2657
    - DOPAMINE, 62
    - DRUG EFFECTS ON, 62, 5316*, 7939*, 7948
    - DYES, 2982*
    - ENKEPHALINS, 4529*, 7325
    - ESTROGENS, 7952
    - HORMONE EFFECTS ON, 7952
    - PEPTIDES, 4534
    - PROSTAGLANDINS, 4529*, 5316*, 7939*
    - PURINES, 7946
    - RADIOLOGY, 2729*
    - SOLVENTS, 7948
    - SURGERY, 4865*
    - SYMPATHOMIMETICS, 62
    - TRANQUILIZING AGENTS, 7948
    - TRANSPORT, 6710
  - INTESTINAL ABSORPTION
    - GLUCOSE, 6694*
    - WATER, 6694*
  - INTESTINE, LARGE
    - ADRENERGIC RECEPTOR AGONISTS, 2739*
    - ADRENERGIC RECEPTOR BLOCKADERS, 2739*
    - DIETARY FACTORS, 2736*
    - DRUG EFFECTS ON, 1397, 7949, 7951
    - MEGACOLON, 937
    - MUSCLES, 7949, 7951
    - NUCLEOSIDES, 46*
    - NUCLEOTIDES, 46*
    - POTASSIUM, 7949
    - PROSTAGLANDINS, 2739*
    - VASODILATOR AGENTS, 7949, 7951
  - INTESTINE, SMALL
    - ABSORPTION, 7297*
    - ACIDS, 1855
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 56
    - ALKALOIDS, 7941
    - ANDROGENS, 7952
    - BILE, 6093
    - BREATH TEST, 4743*
    - CHOLECYSTOKININ, 2129, 4528*, 5314*
    - CIRCULATION, 3863*
    - COMPUTERS, 55, 932
    - DIARRHEA, 4424
    - DIET, 6140
    - DRUG EFFECTS ON, 56, 924, 4542, 5307*, 5314*, 7939*, 7941, 7948
    - DUMPING SYNDROME, 2754, 3655
    - DYES, 2982*
    - ELECTRICAL CONTROL, 55, 2752
    - ELECTROPHYSIOLOGY, 4525*, 4526*, 4528*, 5190, 7938*
    - ENKEPHALINS, 4529*
    - ENTEROTOXINS, 1850
    - EPITHELIUM, 4486*

- MOTILITY (continued)
  - INTESTINE, SMALL (continued)
    - ESCHERICHIA COLI, 1850
    - ESTROGENS, 7952
    - GASTRECTOMY, 4743*
    - HORMONE EFFECTS ON, 7324, 7952
    - MALABSORPTION SYNDROMES, 3256*
    - MEMBRANES, 48*
    - MESENTERY, 2753
    - MORPHOLOGY, 7938*
    - MOTILIN, 7324
    - NARCOTICS, 5307*
    - NERVOUS CONTROL, 2*, 921, 4525*, 4526*, 4542, 5313*
    - PEPTIDES, 3652
    - PHYSICAL FACTORS, 921
    - PRESSURE STUDY, 4542
    - PROSTAGLANDINS, 924, 4529*, 7939*
    - PURINES, 7946
    - SOLVENTS, 7948
    - SURGERY, 2764, 3657, 6218
    - TEMPERATURE, 7944
    - TRANQUILIZING AGENTS, 7948
    - ULTRASTRUCTURE, 4486*
    - VILLI, 2738*
  - INTESTINES, 3639
    - ANALGESICS AND ANTIPYRETICS, 6552*
    - ANESTHESIA, 6552*
    - BILE ACIDS AND SALTS, 3799
    - CALCIUM, 5306*
    - CHOLECYSTECTOMY, 6552*
    - CHOLECYSTOKININ, 2751
    - DIETARY FACTORS, 2736*
    - DRUG EFFECTS ON, 1363, 2742*, 5323*
    - ESOPHAGUS, ARTIFICIAL, 295
    - FIBERS, 2376
    - GNOTOBIOTICS, 1848
    - HORMONES EFFECTS ON, 2751
    - MARKER STUDY, 2768
    - NERVOUS CONTROL, 2742*
    - PEPTIDES, 3652
    - PSEUDO-OBSTRUCTION, 2340, 6290*
    - STEROLS, 3799
    - SURGERY, 3657
    - TECHNIQUES, 1822*
    - TRICHINOSIS, 5486
  - IRRITABLE COLON
    - ELECTROPHYSIOLOGY, 3281*
    - ETIOLOGY, 3281*
    - PRESSURE STUDY, 5720*
  - JEJUNUM
    - ABSORPTION, 859
    - CHOLECYSTOKININ, 5314*
    - DRUG EFFECTS ON, 5314*
    - ELECTROPHYSIOLOGY, 4129*, 7323
    - PRESSURE STUDY, 4129*
    - RADIOLOGY, 2729*
    - SURGERY, 934
    - TECHNIQUES, 933
    - TRANSPORT, 6710
  - MAGNESIUM
    - ADENOSINE TRIPHOSPHATASE, 61
  - MUSCLES
    - ELECTROLYTES, 1859
  - ODDI'S SPHINCTER
    - ADRENERGIC RECEPTOR AGONISTS, 6848
    - DRUG EFFECTS ON, 6848
    - DRUGS, 65

MOTILITY (continued)

- ODDI'S SPHINCTER (continued)
  - ELECTROPHYSIOLOGY, 65
  - PRESSURE STUDY, 7335
  - VAGOTOMY, 6848
- PARASITES AND PARASITIC DISEASES
  - INTESTINE, SMALL, 1827*
- PENTAGASTRIN
  - ULCER, 2310
- PROSTAGLANDINS
  - BRADYKININ, 936
- PSEUDO-OBSTRUCTION
  - DUODENUM, 2340
  - ESOPHAGUS, 4881*
- PYLORUS
  - CHOLECYSTOKININ, 67
  - ELECTROPHYSIOLOGY, 4541
  - GLUCAGON, 67
  - NERVOUS CONTROL, 8120
  - SECRETIN, 67
  - STENOSIS, 349
- RECTUM
  - DRUG EFFECTS ON, 7955
  - DRUGS, 939
  - HYPERACTIVITY, 4927*
  - MANGANESE, 7954
  - NERVOUS CONTROL, 7955
  - PARASYMPATHOMIMETICS, 7955
- SIGMOID
  - HYPERACTIVITY, 4927*
  - PRESSURE STUDY, 4927*
- SPHINCTER
  - H2 RECEPTOR ANTAGONISTS, 929
- STOMACH, 3677, 4531*
  - ACIDS, 81, 3630*, 7940*
  - AMINO ACIDS, 941, 2744*, 3630*, 3631*, 3653, 7940*
  - ANALGESICS AND ANTIPYRETICS, 6552*
  - ANESTHESIA, 6552*
  - ANTI-INFLAMMATORY AGENTS, 7329
  - ANTIEMETICS, 47*, 3633*, 5309*
  - APPENDICITIS, 326
  - ASPIRIN, 2730*
  - BARIUM, 7953
  - CALCIUM, 5306*
  - CERULEIN, 6027
  - CHOLECYSTECTOMY, 6552*
  - CHOLECYSTOKININ, 67, 3648
  - DIABETES, 6224*
  - DIET, 2770
  - DIETARY FACTORS, 81, 2768, 2770
  - DRUG EFFECTS ON, 2730*, 2761, 3209, 3633*, 5309*, 5323*, 5331, 5332, 7329, 7945, 7949, 7953
  - DRUGS, 4088
  - DUMPING SYNDROME, 4059
  - DUODENUM, 58, 7940*
  - ELECTROPHYSIOLOGY, 68, 920, 1833*, 3644, 4541, 5190, 7333, 7334
  - ESOPHAGUS, ARTIFICIAL, 295
  - FATS, 3630*, 3647, 7940*
  - FEEDING, 1137
  - FOOD, 7330
  - GASTRECTOMY, 6908, 7593, 7601
  - GASTRIN, 3645
  - GLUCAGON, 67, 3648
  - GLUCOSE, 940, 7940*
  - HORMONE EFFECTS ON, 3645, 3648, 6027

MOTILITY (continued)

- STOMACH (continued)
  - HORMONES, 922
  - HORMONES, GASTROINTESTINAL, 3648
  - HYPOXIA, 2771
  - INSULIN, 3645
  - INTESTINE, SMALL, 3631*
  - LIPIDS, 940
  - MARKER STUDY, 248, 2768, 2770, 6224*
  - MORPHOLOGY, 1833*
  - MORPHOMETRY, 3990
  - MOTILIN, 66
  - NERVOUS CONTROL, 57, 942, 1833*, 1860, 3630*, 3635*, 3695, 6698*, 7332
  - OSMOTIC PRESSURE, 941
  - OXYGEN, 2771
  - PANCREOZYMIN, 3648
  - PARASITES AND PARASITIC DISEASES, 8162*
  - PARASYMPATHOLYTICS, 922
  - PEPTIDES, 4534
  - PHYSIOLOGY, 3990
  - POSTURAL FACTORS, 2276
  - POTASSIUM, 7949
  - PRESSURE STUDY, 1861, 5309*, 7331
  - PRIMATES, 5321*
  - PROSTAGLANDINS, 2743*
  - PROTEINS, 3653
  - RADIOISOTOPES, 3629*
  - RADIOLOGY, 6869
  - REVIEW, 57, 2275, 3990
  - SECRETIN, 67, 3648
  - SOMATOSTATIN, 66
  - STRESS, 6835*
  - SURGERY, 2275, 2764, 6908, 7593
  - TECHNIQUES, 63, 2791*, 3936*, 5319*, 5320*
  - TEMPERATURE, 3634*
  - TRACER STUDY, 63
  - ULCER, PEPTIC, 5319*, 6909
  - VAGOTOMY, 1148, 2276, 5324*, 6909, 7322*, 7593, 7940*
  - VASODILATOR AGENTS, 7949
- TEMPERATURE
  - STOMACH, 5330
- VAGOTOMY
  - DUODENUM, 5189
  - STOMACH, 5189
  - TECHNIQUES, 7353*
- VILLI
  - DRUG EFFECTS ON, 2738*

MOUTH

- ABSORPTION
  - CARBOHYDRATES, 7931
  - DRUG EFFECTS ON, 7931
- BEHCET'S SYNDROME
  - REVIEW, 8465
- IRRADIATION
  - NEOPLASMS, MALIGNANT, 2630, 2631
- NEOPLASMS
  - STATISTICAL STUDY, 6601
- NEOPLASMS, MALIGNANT
  - RADIOTHERAPY, 2632, 2633
  - SURGERY, 2632
  - TECHNIQUES, 2633

- MOVEMENT DISORDERS
  - BILIARY TRACT
    - DRUG THERAPY, 4369*
  - DUODENUM
    - CHOLECYSTITIS, 4380
  - ESOPHAGUS
    - CHOLECYSTITIS, 4380

- MUCOPOLYSACCHARIDES
  - SEE ALSO GASTRONE
  - DUODENUM
    - STOMACH, 375
  - RECTUM
    - DISEASE, 251
    - ULTRASTRUCTURE, 251
  - STOMACH
    - DYSPEPSIA, 375
    - ULCER, 375

- MUCUS
  - ESOPHAGUS
    - HISTOCHEMISTRY, 4484*
  - GASTROINTESTINAL SYSTEM
    - CHEMICAL COMPOSITION, 210
  - INTESTINE, SMALL
    - IMMUNOLOGY, 6128*
    - SECRETION, 6128*
  - PERITONEUM
    - BIOCHEMISTRY, 1668
    - THERAPY, 1668
  - PYLORUS
    - CELLS, 7905*
    - SECRETION, 7905*
  - RECTUM
    - HISTOCHEMISTRY, 4485*
    - ULTRASTRUCTURE, 4485*
  - SALIVARY GLANDS
    - MEMBRANES, 867
  - STOMACH, 4494
    - AMINO ACIDS, 4566*
    - CARBOHYDRATES, 4566*
    - CELLS, 7905*
    - DRUG EFFECTS ON, 4859
    - KININS, 7355
    - SECRETION, 4566*, 7905*, 7969*
    - ULCER, 4859
    - ULCER, PEPTIC, 3155
  - ULCER
    - HEALING, 4849

- MUSCLE RELAXANTS
  - ESOPHAGUS
    - VARICES, 4024*
  - PANCREAS
    - BICARBONATE SECRETION, 5390*
    - SECRETION, 5390*

- MUSCLES
  - ALCOHOLISM
    - ELECTROLYTES, 6610
    - MAGNESIUM, 6610
  - AMINO ACIDS
    - DIETARY FACTORS, 4639
  - ANORECTUM
    - MORPHOLOGY, 5329
  - ANTIBODIES
    - IMMUNOGLOBULINS, 2518
  - ANTIGENS
    - BILE, 4357*

- MUSCLES (continued)
  - CECUM
    - DRUG EFFECTS ON, 7947
  - CHOLAGOGUES AND CHOLERETICS
    - DRUG EFFECTS ON, 1008*
    - GALLBLADDER, 1008*
    - INTESTINES, 1008*
  - CIRCULATION
    - HORMONE EFFECTS ON, 4700*
    - HORMONES, GASTROINTESTINAL, 4700*
  - COLON
    - ACETYLCHOLINE, 6026*
    - CHOLECYSTOKININ, 6026*
    - DIVERTICULUM, 3298
    - ELECTROLYTES, 1859
    - ELECTROPHYSIOLOGY, 923
    - GLUCAGON, 6026*
    - GLYCOGEN, 2960*
    - HORMONE EFFECTS ON, 6026*
    - HYPERTENSION, 7327
    - INTESTINAL OBSTRUCTION, 3656
    - MOTILITY, 923
  - DUODENUM
    - ACETYLCHOLINE, 2759
    - MOTILIN, 2759, 2760
    - NERVOUS CONTROL, 5313*
  - ELECTROLYTES
    - MOTILITY, 1859
  - ESOPHAGUS
    - MOTILITY, 6705, 6706, 7937*
    - OBSTRUCTION, 309
    - PERISTALSIS, 7937*
    - POTASSIUM, 5295
    - TEMPERATURE, 1847, 4515*
  - GASTROINTESTINAL SYSTEM
    - CALCIUM, 5306*
    - HISTOCHEMISTRY, 3584*
    - NEOPLASMS, 4416
  - HEPATITIS, CHRONIC
    - ANTIBODIES, 4332*
  - HEPATITIS, INFECTIOUS
    - ANTIBODIES, 2519
    - BIOCHEMISTRY, 2519
    - IMMUNOGLOBULINS, 2519
  - HISTAMINE
    - METABOLISM, 2091
  - HYPERTENSION, PORTAL
    - VEINS, 2885*
  - ILEUM
    - CAFFEINE, 4530*
    - CATECHOLAMINES, 918
    - DRUG EFFECTS ON, 913*
    - ENZYMES, 4530*
    - PROSTAGLANDINS, 1853
  - INTESTINE, LARGE
    - ELECTROPHYSIOLOGY, 7328
    - MOTILITY, 7949, 7951
    - NEOPLASMS, 5223
    - NEOPLASMS, BENIGN, 5223
    - NEOPLASMS, MALIGNANT, 5223
  - INTESTINE, SMALL
    - COLLAGEN, 7488*
    - DRUG EFFECTS ON, 5311*
    - ELECTROPHYSIOLOGY, 4528*
    - ENTEROTOXINS, 1851
    - ESCHERICHIA COLI, 1851
    - HISTAMINE, 7494*
    - NEOPLASMS, 5223
    - NEOPLASMS, BENIGN, 5223

- MUSCLES (continued)
  - INTESTINE, SMALL (continued)
    - NEOPLASMS, MALIGNANT, 5223
    - NERVOUS CONTROL, 5313*, 7910
  - INTESTINES
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4527*
    - AMINO ACIDS, 4527*
    - CALCIUM, 5306*
    - CHOLECYSTOKININ, 5312*
    - GLYCOSIDES, 4712*
    - HORMONE EFFECTS ON, 5312*
    - PSEUDO-OBSTRUCTION, 5652*
    - SYMPATHOMIMETICS, 918
  - JEJUNUM
    - SURGERY, 934
  - LIVER
    - CIRCULATION, 3921
  - LIVER CIRRHOSIS
    - ANTIBODIES, 4332*
  - MALABSORPTION SYNDROMES
    - INFLAMMATION, 3256*
  - ODDI'S SPHINCTER
    - DRUG EFFECTS ON, 913*
  - PARASITES AND PARASITIC DISEASES
    - ESOPHAGUS, 6662
  - RECTUM
    - NEOPLASMS, 7018
    - NEOPLASMS, BENIGN, 8245
  - STOMACH
    - CALCIUM, 5306*
    - CELLS, 2692
    - NEOPLASMS, 5223
    - NEOPLASMS, BENIGN, 5223
    - NEOPLASMS, MALIGNANT, 5223
    - NERVOUS CONTROL, 7910
    - ULTRASTRUCTURE, 2692

- MUSCULOSKELETAL SYSTEM
  - ESOPHAGUS
    - MORPHOLOGY, 7, 2615
    - PHARYNX, 2615
    - STOMACH, 7
  - LIVER DISEASES
    - ANTIBODIES, 631

- MYCOSES
  - CHOLESTASIS
    - IMMUNOGLOBULINS, 1654
  - COLON
    - RADIOLOGY, 4393*
  - DUODENUM
    - RADIOLOGY, 4393*
  - ESOPHAGITIS
    - EPIDEMIOLOGY, 3125*
    - HERPESVIRUSES, 305
  - INTESTINE, LARGE
    - RADIOLOGY, 4393*
  - INTESTINE, SMALL
    - ENTERITIS, 4393*
    - RADIOLOGY, 4393*
  - MALABSORPTION SYNDROMES
    - PROTEIN-LOSING ENTEROPATHIES, 770
  - STOMACH, 8173
    - DIAGNOSIS, 3183
    - THERAPY, 3183

- MYELOMA
  - LIVER
    - NEOPLASMS, MALIGNANT, 8333

- NARCOTICS
  - BLOOD, 5462
  - HEPATITIS
    - DRUG DEPENDENCE, 7764
  - HEPATOCYTES
    - ULTRASTRUCTURE, 3815
  - INTESTINE, SMALL, 5462
    - MOTILITY, 5307*
    - TOLERANCE, 5307*
  - INTESTINES
    - METABOLISM, 8093
  - LIVER
    - METABOLISM, 1985
  - LIVER DISEASES
    - DRUG DEPENDENCE, 7764
  - LIVER INJURY
    - HORMONES, 2869*
  - PANCREAS
    - DRUG EFFECTS ON, 1962
  - VATER'S AMPULLA
    - PRESSURE STUDY, 739

- NAUSEA
  - ANTIEMETICS
    - REVIEW, 8479
  - DRUG THERAPY
    - REVIEW, 8479
  - ETIOLOGY
    - REVIEW, 8479
  - PYLOROPLASTY
    - COMPLICATIONS, 6936
  - VAGOTOMY
    - COMPLICATIONS, 6936

- NECROSIS
  - ALPHA FETOPROTEIN
    - LIVER INJURY, 3030
  - ANALGESICS AND ANTIPYRETICS
    - DRUG METABOLISM, 2105*
  - CIRCULATION, 7857
  - COLON
    - AMEBIASIS, 3557*
    - DISEASES ASSOCIATED WITH, 6380*
    - PNEUMATOSIS, 492
  - ENTERITIS
    - NEONATE, 419
  - GALLBLADDER
    - LIPASE, 2432*
  - HEMORRHAGE, 7857
  - HEPATITIS
    - ALPHA FETOPROTEIN, 3372*
    - MICROORGANISMS, 3033
    - SURVIVAL, 3372*
  - HEPATITIS, CHRONIC
    - VEINS, 689
  - HEPATITIS, INFECTIOUS
    - ALPHA FETOPROTEIN, 3372*
    - DIAGNOSIS, 3435
    - ENZYMES, 3435
    - ISOENZYMES, 3435
    - SURVIVAL, 3372*
  - HEPATITIS, TOXIC
    - LIVER, 6786
    - VIRUSES, 6786

NECROSIS (continued)
- INTESTINE, LARGE
  - IMMUNOSUPPRESSION, 4123
- INTESTINE, SMALL
  - ANGIOGRAPHY, 6960
  - EMBOLIZATION, 6960
  - IMMUNOSUPPRESSION, 4123
  - PARASITES AND PARASITIC DISEASES, 5957*
  - RADIOLOGY, 6952
- INTESTINES
  - GASES, 3933
  - IMMUNOSUPPRESSION, 4123
- LIVER, 3402
  - ALPHA FETOPROTEIN, 3372*
  - ANDROGENS, 3379
  - ANEMIA, APLASTIC, 7111*
  - ANESTHETICS, 7778
  - BACTERIA, 7465
  - BILE ACIDS AND SALTS, 7092*
  - CLEARANCE STUDY, 7092*
  - DIAGNOSIS, 3435, 7092*
  - DISEASES ASSOCIATED WITH, 7111*
  - DRUG-INDUCED, 1589, 4673, 7778
  - ENZYMES, 3435
  - ETIOLOGY, 3379
  - ISOENZYMES, 3435
  - PREVENTION, 6088*
  - SURVIVAL, 3372*
  - THERAPY, 576
  - THROMBOSIS, 7465
  - VEINS, 689
- LIVER DISEASES, ALCOHOLIC
  - ETIOLOGY, 7807*
  - HEPATITIS, 3463*
  - VEINS, 689
- LIVER INJURY
  - CARBON TETRACHLORIDE, 5402*
  - ISCHEMIA, 6088*
- PANCREAS, 8270
  - DIAGNOSIS, 4225
  - DRUG-INDUCED, 2854
  - FATS, 3326*
  - HISTOCHEMISTRY, 3747
  - NEOPLASMS, MALIGNANT, 3326*
  - PATHOLOGY, 2854
  - REVIEW, 2854
  - THERAPY, 6368
- PANCREATIC DISEASES
  - FATS, 7732
- PANCREATIC DUCT
  - HISTOCHEMISTRY, 3747
- PANCREATITIS
  - BONES, 6392
  - COLON, 7735*
  - PATHOLOGY, 4237
  - SURGERY, 4237
- PANCREATITIS, CHRONIC
  - ETIOLOGY, 3354
  - SURGERY, 3354
- STOMACH
  - VAGOTOMY, 6258
- TRANSPLANTATION
  - SURVIVAL, 2453*

NEONATE
- ABSORPTION
  - FATS, 7312

NEONATE (continued)
- ACID SECRETION
  - PENTAGASTRIN, 1903
- ALBUMINS
  - REVIEW, 2546
- ALCOHOLISM, 7442*
- AMEBIASIS
  - SIMULATION, 5497
- ANORECTUM
  - MANOMETRY, 7698
- ASCITES
  - DIAGNOSIS, 6529*
- ATRESIA
  - PROGNOSIS, 4867*
- AUSTRALIA ANTIGEN
  - HEPATITIS, INFECTIOUS, 2495*
- BILE
  - CHEMICAL COMPOSITION, 1638
- BILIRUBIN, 2878*
  - METABOLISM, 7135
- COLON
  - ANOMALY, 466
  - ELECTROPHYSIOLOGY, 1766*
  - OBSTRUCTION, 2168*, 2394
  - PERMEABILITY, 1766*
- DIARRHEA
  - DRUG THERAPY, 4426
  - REVIEW, 8457
  - VIRUSES, 785
- DUODENUM
  - INTESTINAL OBSTRUCTION, 7113*
  - OBSTRUCTION, 1372, 3229
- ENTERITIS
  - NECROSIS, 419
  - SURVIVAL, 419
  - VIRUSES, 229
- ENTEROCOLITIS, NECROTIZING
  - BACTERIAL INFECTIONS, 4432
  - DIAGNOSIS, 5696
  - DISEASES ASSOCIATED WITH, 2592*
  - EPIDEMIOLOGY, 2592*
  - GANGRENE, 4185
  - INFANT, 793
  - PARENTERAL ALIMENTATION, 5183
  - PROGNOSIS, 5696
  - REVIEW, 2611
  - RISK FACTORS, 5697
  - THERAPY, 5183, 5694, 5696
  - VITAMIN A, 5201
- ENTEROKINASE
  - DEFICIENCY, 1369
- ESCHERICHIA COLI
  - ENTERITIS, 418
- ESOPHAGUS
  - ATRESIA, 6211
- FECES
  - BACTERIA, 185
- FEEDING
  - TECHNIQUES, 2066
- GALLBLADDER
  - BILE ACIDS AND SALTS, 7396*
- GASTRIN, 2825
- GASTROINTESTINAL SYSTEM
  - PERFORATION, 5211
- HEPATITIS, 6424
  - DISEASES ASSOCIATED WITH, 6486*
  - ETIOLOGY, 6460*
  - PROGNOSIS, 3413*, 6486*

- NEONATE (continued)
  - HEPATITIS (continued)
    - SURVIVAL, 6486*
    - TRANSMISSION, 5857*
  - HEPATITIS, INFECTIOUS, 5092
    - AUSTRALIA ANTIGEN, 2492*
    - NUCLEOTIDASE, 4750*
    - SEQUELAE, 4284*
    - TRANSMISSION, 5077*
  - HEPATOCYTES
    - CELL CULTURE, 3802
  - HERNIA
    - SIMULATION, 5725
  - HIRSCHSPRUNG'S DISEASE
    - DIAGNOSIS, 494
    - REVIEW, 7007
    - THERAPY, 494
  - HYPERBILIRUBINEMIA, 6437
    - ALPHA 1 ANTITRYPSIN, 8286*
    - ALPHA FETOPROTEIN, 3408*
    - DIAGNOSIS, 3408*, 4277*
    - DRUG-INDUCED, 7772*
    - ETIOLOGY, 7772*
    - HEPATITIS, INFECTIOUS, 8286*
    - HYPERTENSION, PORTAL, 8286*
    - OXYTOCIN, 5842*
    - PHOTOTHERAPY, 3405*, 5062*, 8337*
    - PROSTAGLANDINS, 5842*
    - REVIEW, 7776
    - REYE'S SYNDROME, 8286*
    - THERAPY, 7776, 8286*
  - HYPOCHLORHYDRIA, 4553*
  - ILEUM
    - CELLS, 5471*
    - TRANSPORT, 6023
  - INDOCYANINE GREEN
    - HYPERBILIRUBINEMIA, 5061*
    - KINETICS, 5061*
  - INTESTINAL ABSORPTION
    - CADMIUM, 7299*
    - LIPIDS, 5289*
    - TRANSMISSION, 7304*
  - INTESTINAL OBSTRUCTION
    - DIAGNOSIS, 3304
    - ETIOLOGY, 7113*
    - HIRSCHSPRUNG'S DISEASE, 7007
    - MILK, 6954
    - THERAPY, 3304
  - INTESTINE, LARGE
    - OBSTRUCTION, 2394
  - INTESTINE, SMALL
    - ABSORPTION, 7311, 7312
    - ATRESIA, 4867*
    - DEFICIENCY, 1369
    - FEEDING, 2066
    - GROWTH FACTORS, 7502
    - HORMONE CONTROL, 7502
    - INTESTINAL ABSORPTION, 7304*
    - OBSTRUCTION, 3229
    - PERFORATION, 6962
    - REGENERATION, 3018
    - STENOSIS, 4867*
    - SURGERY, 6961
    - THYROID GLAND, 7502
    - TRANSPLANTATION, 3018
    - TRANSPORT, 6023
  - INTESTINES
    - ABSORPTION, 4116
    - BILE ACIDS AND SALTS, 7396*

- NEONATE (continued)
  - INTESTINES (continued)
    - THERA, 8210
    - IMMUNOGLOBULINS, 6818*
    - LACTASE, 6130*
    - OBSTRUCTION, 3229
  - JAUNDICE, 6437
    - AGE FACTORS, 6435*
    - ALPHA FETOPROTEIN, 3408*
    - BILIRUBIN, 6435*
    - COMPLICATIONS, 3406*
    - DIAGNOSIS, 3408*, 4277*
    - DIARRHEA, 3406*
    - DRUG-INDUCED, 7772*
    - DRUG THERAPY, 7134
    - EPIDEMIOLOGY, 1505*
    - ETIOLOGY, 7772*, 8338
    - LACTOSE INTOLERANCE, 5065
    - NUCLEOTIDASE, 4750*
    - OXYTOCIN, 5842*
    - PHOTOTHERAPY, 5062*, 7134, 8337*
    - PROSTAGLANDINS, 5842*
    - THERAPY, 7134
  - JAUNDICE, CHOLESTATIC
    - DIAGNOSIS, 3409*
  - JAUNDICE, OBSTRUCTIVE
    - ETIOLOGY, 5024*
    - PATHOLOGY, 5024*
    - PROGNOSIS, 5024*
  - LACTASE
    - DEFICIENCY, 3406*
  - LIPOPROTEINS
    - JAUNDICE, OBSTRUCTIVE, 5159*
  - LIVER
    - CHOLESTASIS, 5024*
    - CHYLOMICRONS, 7461
    - CLEARANCE STUDY, 3793
    - HEMANGIOMA, 2457*
    - HEMATOPOIESIS, 1155
    - NEOPLASMS, 6406*
    - PROTEINS, 5406*
    - ULTRASTRUCTURE, 7461
  - LIVER CIRRHOSIS
    - ANTIBODIES, 5102*
    - AUSTRALIA ANTIGEN, 5102*
    - FAMILIAL FACTORS, 7149*
    - IMMUNOGLOBULINS, 5102*
    - TRANSMISSION, 7149*
  - LIVER DISEASES
    - NUCLEOTIDASE, 4750*
  - MALABSORPTION SYNDROMES
    - LACTOSE, 3406*
    - REVIEW, 8457
  - MECONIUM
    - CHEMICAL COMPOSITION, 1638
  - MILK
    - HORMONES, GASTROINTESTINAL, 6714*
    - METABOLISM, 6714*
  - PANCREAS
    - NERVOUS CONTROL, 6747*
    - PARASYMPATHOMIMETICS, 1943
    - SECRETION, 6747*
  - PARENTERAL ALIMENTATION
    - REVIEW, 8486
  - PROTEINS
    - DEFICIENCY, 5448
    - INTESTINES, 5448
    - SYNTHESIS, 5406*

NEONATE (continued)
- PYLORUS
  - OBSTRUCTION, 7113*
- RADIOLOGY
  - COLON, 2168*
  - INTESTINAL OBSTRUCTION, 2168*
- RECTUM
  - ANOMALY, 5725
  - MANOMETRY, 7698
- SALIVARY GLANDS
  - NERVOUS CONTROL, 5346
- SERUM
  - GASTRIN, 1890, 4553*
- SHIGELLOSIS
  - DIET, 1697
  - THERAPY, 1697
- STEROIDS
  - ANDROGENS, 129
- STOMACH
  - MORPHOLOGY, 3002
  - RUPTURE, 2142, 2262
  - SECRETION, 3002

NEOPLASM METASTASIS
- ALPHA FETOPROTEIN
  - DIAGNOSIS, 5012*
- BONES
  - RADIONUCLIDES, 6998*
  - SCANNING, SCINTILLATION, 6998*
- CARCINOID TUMOR
  - LIVER, 7102*
- COLON, 4171
  - ADOLESCENCE, 5734
  - BONES, 7006
  - CHOLANGIOGRAPHY, 6997*
  - DIAGNOSIS, 6997*
  - NEOPLASMS, MALIGNANT, 6997*
  - OBSTRUCTION, 2242
  - RADIONUCLIDES, 6998*, 7006
  - SCANNING, SCINTILLATION, 6998*
- DRUG METABOLISM
  - LIVER FUNCTION TESTS, 7746*
- DUODENUM
  - POLYPS, 6969
- ESOPHAGUS, 3129
  - PROGNOSIS, 4022*
  - SURGERY, 4022*
- GALLBLADDER
  - ANGIOGRAPHY, 5052
  - SURGERY, 5052
- INTESTINE, LARGE
  - DIAGNOSIS, 4162
  - RADIOLOGY, 4162
- INTESTINE, SMALL, 6289*
  - PERFORATION, 4455
- JAUNDICE, OBSTRUCTIVE
  - CHOLANGIOGRAPHY, 5926*
  - DIAGNOSIS, 5926*
  - ENDOSCOPY, 5926*
  - SURGERY, 7217*
- JEJUNUM
  - NEOPLASMS, MALIGNANT, 8222
- LIVER, 4213*, 5048
  - ACYLTRANSFERASES, 4254*
  - ANGIOGRAPHY, 1453*, 5052
  - BIOPSY, 5021*
  - CARCINOEMBRYONIC ANTIGEN, 5549
  - CARCINOGENS, 5474*
  - CHILD, 5019*

NEOPLASM METASTASIS (continued)
- LIVER (continued)
  - CIRCULATION, 8045*
  - DIAGNOSIS, 266, 554, 1181*, 2472, 4254*
  - DISEASES ASSOCIATED WITH, 7667
  - DRUG THERAPY, 556, 5019*
  - EMBOLIZATION, 8045*
  - LAPAROSCOPY, 1181*
  - LIVER FUNCTION TESTS, 1476
  - RADIONUCLIDES, 6998*, 7658*
  - RADIOTHERAPY, 5019*
  - SCANNING, SCINTILLATION, 1476, 2209, 5549, 6998*, 7658*, 7667
  - SURGERY, 5052, 5835
  - SURVIVAL, 5019*
  - TRACE ELEMENTS, 3390
  - ULTRASONOGRAPHY, 266, 7125, 7227
  - ZINC, 560
- NEOPLASMS, BENIGN
  - CHILD, 5011*
  - ULTRASONOGRAPHY, 5011*
- NUCLEIC ACIDS
  - ENZYMES, 272
- PANCREAS, 7726*
  - HYPERCALCEMIA, 5776
  - ULCER, PEPTIC, 5776
- RECTUM
  - BONES, 7006
  - CARCINOEMBRYONIC ANTIGEN, 5549
  - NEOPLASMS, MALIGNANT, 8241
  - RADIONUCLIDES, 7006
  - SCANNING, SCINTILLATION, 5549
- RESPIRATORY SYSTEM
  - LIVER, 8329
  - SCANNING, SCINTILLATION, 8329
- SALIVARY GLANDS
  - LYMPH, 6615
- STOMACH, 8177, 8178
  - DIAGNOSIS, 2242, 6890
  - DRUG THERAPY, 6249
  - MORPHOLOGY, 3129
  - NEOPLASMS, MALIGNANT, 329
  - RECURRENCE, 1283*
  - SURGERY, 1283*
  - SURVIVAL, 6252
  - THERAPY, 3129
- URINARY SYSTEM
  - DISEASES ASSOCIATED WITH, 2461*

NEOPLASMS
- ALCOHOLS
  - NITROSAMINES, 6213
- ALPHA FETOPROTEIN
  - PROGNOSIS, 6590*
- AMYLASES
  - DIAGNOSIS, 2411*
  - SERUM, 2411*
- ANGIOGRAPHY
  - CIRCULATION, 7267
- ANOMALY
  - SIMULATION, 2233
- ANUS
  - INTEGUMENTARY SYSTEM, 7011
- APPENDIX, 5741
- BACTERIA, 7465
- BILE DUCTS
  - GALLBLADDER, 1624
  - NERVOUS SYSTEM, 1624

NEOPLASMS (continued)
- BILE DUCTS (continued)
  - SURGERY, 1624
- BILIARY TRACT
  - CHOLANGIOGRAPHY, 3948*
  - DIAGNOSIS, 3948*
  - DRUG-INDUCED, 6797
  - ENDOSCOPY, 5524
  - RADIOLOGY, 5137*
- BIOCHEMISTRY
  - GASTROINTESTINAL SYSTEM, 775
  - REVIEW, 775
- CARCINOEMBRYONIC ANTIGEN
  - ANTIGENS, 5006*
  - PANCREAS, 1440*
  - RADIOIMMUNOASSAY, 5588*
  - STOMACH, 5557*, 5588*
- CARCINOGENS
  - DIETARY FACTORS, 1663
- CECUM
  - DIAGNOSIS, 4175, 6294, 7702
  - INFLAMMATION, 7702
  - MORPHOLOGY, 7702
  - RADIOLOGY, 4175, 6294, 7702
- COLITIS
  - POLYPS, 5253*
- COLITIS, ULCERATIVE
  - DIAGNOSIS, 5761*
  - FAMILIAL FACTORS, 516
  - REVIEW, 1739
- COLON, 4171
  - ADOLESCENCE, 4955, 5734
  - AMINES, 6999*
  - ANOMALY, 2384
  - ANUS, 7019
  - BACTERIA, 8234*
  - BARIUM, 8256
  - BILE ACIDS AND SALTS, 7659*
  - BIOPSY, 3293
  - CARCINOEMBRYONIC ANTIGEN, 7049, 8252
  - CELLS, 5473*
  - CHOLESTEROL, 7659*
  - COLITIS, ULCERATIVE, 7008
  - DIAGNOSIS, 3289, 3290, 4170, 4928*, 5743, 6326*
  - DIARRHEA, 7040
  - DIET, 8234*
  - DIETARY FACTORS, 2626, 5600
  - DRUG THERAPY, 1135, 8233*
  - ENDOSCOPY, 3290, 7704
  - ENZYMES, 4930*
  - EPIDEMIOLOGY, 3292, 5600, 8234*
  - ETIOLOGY, 3312, 7008, 7659*
  - FAMILIAL FACTORS, 516
  - FECES, 8234*
  - FIBERS, 4401, 8234*
  - HEMORRHAGE, 7040
  - IMMUNOLOGY, 7003, 7051
  - INTUSSUSCEPTION, 7035
  - LIPIDS, 2626
  - MACROMOLECULES, 3273*
  - MORHOLOGY, 7052
  - MOTILITY, 2385
  - NUTRITION, 5600
  - POLLUTION, 5600
  - POLYPS, 3312, 6334*, 7008
  - PRECANCEROUS CONDITIONS, 2134
  - PREVENTION, 7008

NEOPLASMS (continued)
- COLON (continued)
  - PROGNOSIS, 3293, 5739, 7051
  - PROTEINS, 8243
  - RADIOLOGY, 255, 7704, 8256
  - RADIONUCLIDES, 5749
  - RECTUM, 6326*, 6999*, 7008, 7009, 7040, 7051, 8233*, 8252
  - REVIEW, 5743
  - RISK FACTORS, 8234*
  - SCANNING, SCINTILLATION, 5749, 5752
  - SIMULATION, 1135
  - STEROIDS, 8234*
  - SURGERY, 7009
  - TECHNIQUES, 255
  - ULTRASTRUCTURE, 3293, 7032
  - URINARY SYSTEM, 4153*
  - VILLI, 7676
- COMMON BILE DUCT
  - REVIEW, 4360*
- CONTRACEPTIVES, ORAL
  - LIVER, 8293*
- CROHN'S DISEASE
  - ANUS, 5981*
  - DUODENUM, 3582
  - INTESTINE, SMALL, 5986
  - REVIEW, 1739
  - UROGENITAL SYSTEM, 7285
- CUSHING'S SYNDROME
  - LIVER, 8291*
- DERMATITIS HERPETIFORMIS
  - JEJUNUM, 5655*
- DIAGNOSIS
  - TECHNIQUES, 4928*, 6326*, 7568*
- DIARRHEA
  - HORMONES, 782
- DIET
  - EPIDEMIOLOGY, 7260
  - FIBERS, 4401
  - REVIEW, 7260
- DRUG THERAPY
  - REVIEW, 7247
  - SURGERY, 7247
- DUODENUM, 3243, 4887
  - ANGIOGRAPHY, 3239
  - ENDOSCOPY, 6976
  - RADIOLOGY, 1222
  - TECHNIQUES, 1222
- ECHINOCOCCOSIS
  - GASTROINTESTINAL SYSTEM, 6628
- ENDOSCOPY
  - STOMACH, 3992
- ESOPHAGEAL DISEASES
  - DIAGNOSIS, 3128
- ESOPHAGUS
  - ALCOHOLS, 6213
  - BIOPSY, 3149
  - DIAGNOSIS, 1259*, 3149
  - ENDOSCOPY, 3061, 3149
  - EPIDEMIOLOGY, 6870
  - HIATAL HERNIA, 5573
  - NERVOUS CONTROL, 2225
  - NITROSAMINES, 6213
  - RADIOLOGY, 1259*, 3131, 5558*, 6870
  - RADIOTHERAPY, 4021*
  - RESPIRATORY SYSTEM, 2235

- NEOPLASMS (continued)
  - ESOPHAGUS (continued)
    - REVIEW, 6216
    - STRICTURE, 5573
    - THERAPY, 6216
    - ULTRASONOGRAPHY, 5756
  - ETIOLOGY
    - ETIOLOGY, 7008
    - POLYPS, 7008
  - FATTY ACIDS
    - LIVER, 1167
    - METABOLISM, 1167
    - TRANSPORT, 1167
  - FETUS
    - ENZYMES, 1423
  - GALLBLADDER
    - CHOLELITHIASIS, 7203*
    - DIAGNOSIS, 7203*
    - LAPAROSCOPY, 262
    - SURGERY, 7203*
    - THERAPY, 6560*
  - GARDNER'S SYNDROME
    - ABDOMEN, 1422
    - DUODENUM, 5654*
    - VATER'S AMPULLA, 5654*
  - GASTRITIS
    - FAMILIAL FACTORS, 1284*
  - GASTROINTESTINAL DISEASES
    - DRUG THERAPY, 1323
  - GASTROINTESTINAL SYSTEM, 4409, 7890
    - CHILD, 7569
    - DIAGNOSIS, 7569
    - DIET, 1663
    - ENVIRONMENTAL FACTORS, 772
    - GENETIC FACTORS, 772
    - IMMUNITY, 5949
    - IMMUNOTHERAPY, 5949
    - JAUNDICE, OBSTRUCTIVE, 636
    - LAPAROSCOPY, 7569
    - LYMPHATIC SYSTEM, 1278
    - MUSCLES, 4416
    - REVIEW, 8111
    - SURGERY, 6595, 6596
  - GENETICS
    - REVIEW, 7239
  - GLYCOPROTEINS
    - SERUM, 7263
  - HYPOCHOLESTEREMIC AGENTS
    - LIVER, 159
    - MICROBODIES, 159
  - ILEUM
    - CECUM, 6294
    - CROHN'S DISEASE, 7278
    - DIAGNOSIS, 6294
    - INTESTINAL OBSTRUCTION, 6955
    - RADIOLOGY, 6294
    - SURGERY, 4889
  - INFANT
    - HYPOGLYCEMIA, 3335
  - INTESTINAL OBSTRUCTION
    - ETIOLOGY, 4880*
    - IATROGENESIS, 4880*
  - INTESTINE, LARGE
    - CERULOPLASMIN, 5613
    - COPPER, 5613
    - DIAGNOSIS, 3288, 4174, 4175, 4814*
    - EPIDEMIOLOGY, 469, 1396
    - GROWTH FACTORS, 221
    - IMMUNOSUPPRESSION, 221

- NEOPLASMS (continued)
  - INTESTINE, LARGE (continued)
    - MUSCLES, 5223
    - POLYPS, 7058
    - RADIOLOGY, 3288, 4175
    - REVIEW, 4174
    - SCHISTOSOMIASIS, 1728
    - STATISTICAL STUDY, 6601
    - SURVIVAL, 469
    - THERAPY, 4174
    - ULTRASONOGRAPHY, 4814*
  - INTESTINE, SMALL, 6289*
    - CROHN'S DISEASE, 7278
    - DIAGNOSIS, 4814*
    - MUSCLES, 5223
    - POLYPS, 6943
    - ULTRASONOGRAPHY, 4814*
  - INTESTINES, 4409
    - ETIOLOGY, 4880*
    - FOREIGN BODIES, 4880*
    - IATROGENESIS, 4880*
    - INFLAMMATION, 4880*
    - RADIOLOGY, 7024
    - TISSUE ADHESIVES, 3879
  - JAUNDICE
    - HEPATITIS, 3425*
  - JAUNDICE, OBSTRUCTIVE
    - BILE DUCTS, 2579*
    - PANCREAS, 2579*
    - URINARY SYSTEM, 2579*
  - JEJUNUM
    - MACROGLOBULINEMIA, 2623
  - KIDNEYS
    - ENZYMES, 1481
    - SIMULATION, 1481
  - LAPAROSCOPY
    - TECHNIQUES, 8318
  - LIVER, 8313
    - AFLATOXINS, 7100*
    - AGE FACTORS, 4338*
    - ALKALINE PHOSPHATASE, 563
    - ALPHA FETOPROTEIN, 3391, 6081*, 7089*, 7096*, 7104*
    - ANDROGENS, 3379
    - ANGIOGRAPHY, 1210, 1249, 5811*, 5836, 7747*
    - ANTINEOPLASTIC AGENTS, 7748*
    - ANTIOXIDANTS, 7425*
    - AUSTRALIA ANTIGEN, 3391, 7151*
    - BLEEDING, 7118
    - CARCINOGENS, 2029, 2150, 2938, 6801, 7100*, 7425*
    - CELL CULTURE, 6081*
    - CHILD, 1250, 5013*, 5014*, 5015*, 5037*, 7096*
    - CHOLESTEROL, 7097*
    - CLASSIFICATION, 8331
    - CONTRACEPTIVES, ORAL, 7745*
    - CYSTS, 5031*
    - DIAGNOSIS, 554, 1250, 2044, 3940*, 3966, 5014*, 5836, 6196, 8132, 8318
    - DISEASES ASSOCIATED WITH, 4347
    - L-DOPA, 7474
    - DOPAMINE, 7474
    - DRUG-INDUCED, 6799, 6800, 7474
    - DRUG METABOLISM, 7746*
    - DRUG THERAPY, 555, 3389, 7099*, 8289*

- NEOPLASMS (continued)
  - LIVER (continued)
    - DUCTS, 5016*
    - ENDOSCOPY, 263, 5524
    - ENZYMES, 1481
    - EPIDEMIOLOGY, 7101*
    - ETIOLOGY, 1563, 3379
    - FAMILIAL FACTORS, 3391
    - GLUCONEOGENESIS, 2938
    - GLUCURONIDASE, 166
    - GLYCOLYSIS, 2938
    - GLYCOSIDES, 7100*
    - HEPATITIS, CHRONIC, 4331*, 8288*
    - HEPATOCYTES, 7101*
    - HORMONES, ADRENAL CORTEX, 8291*
    - HYDROCARBONS, 7100*
    - HYPERTROPHY, 6406*
    - IMMUNITY, 7151*
    - IMMUNOGLOBULINS, 8356*
    - IMMUNOLOGY, 6800
    - IMMUNOTHERAPY, 3391
    - INFANT, 6406*
    - ISCHEMIA, 4660
    - LAPAROSCOPY, 8318
    - LIPIDS, 1168, 7097*
    - MORPHOLOGY, 8331
    - NEONATE, 6406*
    - NITROSAMINES, 7100*
    - NUCLEIC ACIDS, 4660
    - PATHOLOGY, 2044, 5015*, 6407*, 6801, 8331
    - PHENOBARBITAL, 7425*
    - PLASMA, 4331*
    - PROGNOSIS, 5037*
    - RADIOLOGY, 5013*
    - RADIOTHERAPY, 7099*
    - RECURRENCE, 7096*
    - REVIEW, 2043, 8331
    - SCANNING, SCINTILLATION, 1244, 3100
    - SERUM, 4331*
    - SHUNT, 5811*
    - SIMULATION, 1481, 2043, 2150
    - SURGERY, 619, 5037*
    - TECHNIQUES, 6196
    - THERAPY, 4660
    - THYROCALCITONIN, 8291*
    - TOMOMETRY, 3940*
    - TOXINS, 7100*
    - TRANSPLANTATION, 3447
    - ULTRASONOGRAPHY, 1246, 5050, 7227, 8132
    - ULTRASTRUCTURE, 6407*
    - VEINS, 584
    - ZINC, 560
  - LIVER CIRRHOSIS
    - AGE FACTORS, 4338*, 4347
    - AUSTRALIA ANTIGEN, 4347
    - DIAGNOSIS, 7097*
    - DISEASES ASSOCIATED WITH, 4347
    - EPIDEMIOLOGY, 1479, 2559
    - LIVER, 2559
    - SEX FACTORS, 4347
  - LIVER DISEASES
    - ANGIOGRAPHY, 7086*
    - BIOPSY, 3104
    - CHILD, 7086*
    - DIAGNOSIS, 3104
    - EPIDEMIOLOGY, 1477

- NEOPLASMS (continued)
  - LIVER DISEASES (continued)
    - LAPAROSCOPY, 3104
    - LIVER, 1477
    - SURGERY, 3104
  - LYMPHATIC SYSTEM
    - GASTROINTESTINAL SYSTEM, 1665
  - MESENTERY
    - COLON, 2628
  - MOUTH
    - STATISTICAL STUDY, 6601
  - NUCLEIC ACIDS
    - CARCINOGENS, 158
    - LIVER, 158
    - SYNTHESIS, 158
    - ZINC, 158
  - PANCREAS, 4213*, 7726*
    - ANGIOGRAPHY, 3050*, 6362*
    - ASCITES, 7724*
    - CALCULI, 1706
    - CARCINOEMBRYONIC ANTIGEN, 5779
    - DIAGNOSIS, 1927*, 2411*, 2424, 3050*, 4985, 5782, 6180, 6183, 6362*
    - DIARRHEA, 1686
    - DRUG THERAPY, 6373
    - ENDOSCOPY, 3050*, 5523, 6362*
    - GASTRIN, 2625
    - HEMORRHAGE, 7734*
    - IMMUNOGLOBULINS, 2857
    - LIVER, 4213*
    - OCCUPATIONAL FACTORS, 6375
    - PANCREATOGRAPHY, 3050*
    - PATHOLOGY, 3328*
    - RADIOLOGY, 1222
    - RADIONUCLIDES, 3050*
    - RADIOTHERAPY, 6373
    - RISK FACTORS, 5782
    - SCANNING, SCINTILLATION, 6183
    - SECRETION, 8267*
    - SURGERY, 6362*, 6373
    - SURVIVAL, 5775, 6375
    - TOMOGRAPHY, 4985
    - ULTRASONOGRAPHY, 1231, 3050*, 6180
    - ZOLLINGER-ELLISON SYNDROME, 1706
  - PANCREATECTOMY
    - PROGNOSIS, 2422
    - REVIEW, 2423
    - SEQUELAE, 2421
    - TECHNIQUES, 2421
  - PANCREATIC DISEASES
    - PANCREAS FUNCTION TESTS, 5778
  - PANCREATIC DUCT
    - PATHOLOGY, 3328*
    - SIMULATION, 1443
  - PANCREATITIS
    - DIAGNOSIS, 2433*
    - PANCREATOGRAPHY, 5772*
  - PERITONEUM
    - PATHOLOGY, 3553
    - PROGNOSIS, 3553
    - RADIOTHERAPY, 3553
    - SURGERY, 3553
  - PERITONITIS
    - ETIOLOGY, 4880*
  - POLYPS
    - INTESTINE, LARGE, 1394*, 7048
    - PREVENTION, 7008

NEOPLASMS (continued)
- PORTACAVAL SHUNT
  - STIMULATION, 559
- PREVENTION
  - SURGERY, 462
- PROTEINS
  - SERUM, 8243
- RADIOLOGY
  - VATER'S AMPULLA, 4359*
- RADIOTHERAPY
  - PROGNOSIS, 4021*
- RECTUM
  - AGE FACTORS, 6339
  - AMINES, 6999*
  - BIOPSY, 3293
  - CARCINOEMBRYONIC ANTIGEN, 8252
  - COLITIS, ULCERATIVE, 7008
  - DIAGNOSIS, 4006, 4928*, 5743, 6326*, 6339, 6345
  - DIARRHEA, 7040
  - DIETARY FACTORS, 5600
  - DRUG THERAPY, 8233*
  - ENDOSCOPY, 4006
  - ENZYMES, 4930*
  - EPIDEMIOLOGY, 3292
  - ETIOLOGY, 7008
  - HEMORRHAGE, 7040
  - IMMUNOLOGY, 7003, 7051
  - INTUSSUSCEPTION, 7708
  - IRRADIATION, 4152*
  - MORPHOLOGY, 6345
  - MUSCLES, 7018
  - OBSTRUCTION, 7021
  - OCCUPATIONAL FACTORS, 6375
  - POLYPS, 3311, 7008
  - PREVENTION, 7008
  - PROGNOSIS, 3293, 5739, 7051
  - RADIOLOGY, 1253
  - RADIOTHERAPY, 4152*
  - REVIEW, 5743
  - SCANNING, SCINTILLATION, 5752
  - SURGERY, 479, 7009, 8248
  - SURVIVAL, 6375
  - THERAPY, 6339
  - ULTRASTRUCTURE, 3293
  - VILLI, 7676
- RESPIRATORY SYSTEM
  - CERULOPLASMIN, 5613
  - COPPER, 5613
- SALIVARY GLANDS, 3554
  - CHILD, 6600, 8485
  - ETIOLOGY, 7240
  - INFANT, 6600
  - PATHOLOGY, 6639
  - RADIOTHERAPY, 6632
  - REVIEW, 7241, 8485
  - THERAPY, 6613
- SCANNING, SCINTILLATION
  - LIVER, 6196
- SECRETION
  - HORMONES, ADRENAL CORTEX, 8291*
  - THYROCALCITONIN, 8291*
- SERUM
  - CERULOPLASMIN, 5613
  - COPPER, 5613
- SIGMOID
  - INTUSSUSCEPTION, 7708
- STEATORRHEA
  - CHOLECYSTOKININ, 5445*

NEOPLASMS (continued)
- STEATORRHEA (continued)
  - PANCREOZYMIN, 5445*
  - SOMATOSTATIN, 5445*
- STOMACH, 4409, 6244
  - ALPHA FETOPROTEIN, 4803*, 7089*
  - ANEMIA, 3992
  - BIOPSY, 3149, 3156
  - BLOOD, 4055
  - CALCIFICATION, 332
  - CERULOPLASMIN, 5613
  - CHEMORECEPTORS, 314*
  - COPPER, 5613
  - CYTOLOGY, 4065
  - DIAGNOSIS, 330, 3060, 3079, 3081, 3084, 3149, 3156, 4039*, 4054, 4814*, 7568*
  - DIETARY FACTORS, 5600
  - DRUG THERAPY, 6248, 6877*
  - ENDOSCOPY, 1235, 2222, 3149, 3156, 4054, 4807*
  - ENZYMES, 4055
  - EPIDEMIOLOGY, 5600, 7567*
  - ETHNIC FACTORS, 7567*
  - ETIOLOGY, 6881
  - FOOD, 6881
  - GASTRECTOMY, 5597*
  - GASTRIN, 1236
  - HIATAL HERNIA, 5573
  - IMMUNOTHERAPY, 6877*
  - KINETICS, 6876*
  - LYMPHOMA, 5590*
  - METAPLASIA, 4740*
  - MITOSIS, 6876*
  - MUSCLES, 5223
  - NITRATES, 2626
  - NITRITES, 2626, 6881
  - NUTRITION, 5600
  - PATHOLOGY, 4052
  - PEPSINOGEN, 1324
  - POLLUTION, 5600
  - PROLAPSE, 3165
  - PROTEINS, 1324
  - RADIOIMMUNOASSAY, 3935*
  - RADIOLOGY, 330, 2222, 3165, 4977*, 5590*
  - RECURRENCE, 1283*, 6252
  - SCANNING, SCINTILLATION, 3084
  - STRICTURE, 5573
  - SURGERY, 1283*, 2240, 3165, 6248, 6252
  - SURVIVAL, 6252, 6877*
  - TECHNIQUES, 1235
  - ULTRASTRUCTURE, 1298
- STOMACH DISEASES
  - DIAGNOSIS, 3162
- SURGERY
  - COMPLICATIONS, 6595, 6596
  - NUTRITION DISORDERS, 6595, 6596
  - PANCREATECTOMY, 4215
  - REVIEW, 7247
  - UROGENITAL SYSTEM, 6595
- THYROID GLAND
  - BLEEDING, 798
- TOMOGRAPHY
  - COMPUTERS, 6363*
  - PANCREATIC DISEASES, 6363*
- ULCER
  - PROGNOSIS, 4075*

- NEOPLASMS (continued)
  - ULCER (continued)
    - SIMULATION, 2297
    - STOMACH, 4075*
    - SURGERY, 2240
  - URINARY SYSTEM
    - ALPHA FETOPROTEIN, 7131
    - SURGERY, 4153*
  - UROGENITAL SYSTEM
    - CECUM, 5728
    - COMPLICATIONS, 6595
  - VENEREAL DISEASES
    - STOMACH, 6240
  - ZOLLINGER-ELLISON SYNDROME
    - GASTRIN, 2625

- NEOPLASMS, BENIGN
  - APPENDIX
    - NEOPLASMS, MALIGNANT, 1408
    - POLYPS, 1409
  - BILE DUCTS
    - REVIEW, 4374
  - CECUM
    - APPENDICITIS, 7034
  - CHILD
    - DIAGNOSIS, 8290*
  - COLON
    - DIAGNOSIS, 4177
    - PATHOLOGY, 4177
    - POLYPS, 5731
    - THERAPY, 4177
  - DUODENUM, 8196
    - BRUNNER'S GLAND, 409
    - DIAGNOSIS, 8197
    - ENDOSCOPY, 8197
    - INTUSSUSCEPTION, 5659
  - ENDOCRINE GLANDS
    - REVIEW, 3540
  - ESOPHAGUS
    - DIAGNOSIS, 1259*
  - GALLBLADDER
    - ANGIOGRAPHY, 1571*
    - ANOMALY, 7219*
    - DIAGNOSIS, 1571*
    - RADIOLOGY, 737
    - SURGERY, 737
  - GASTRIN
    - DUODENUM, 4102*
    - STOMACH, 4102*
  - INTESTINE, LARGE
    - DIAGNOSIS, 7711
    - MUSCLES, 5223
  - INTESTINE, SMALL, 8196
    - MUSCLES, 5223
  - JAUNDICE, OBSTRUCTIVE
    - BILE DUCTS, 7218*
  - JEJUNUM
    - DIAGNOSIS, 410
  - KIDNEYS
    - ANOMALY, 7219*
  - LIVER
    - ANGIOGRAPHY, 5831
    - ANOMALY, 7219*
    - CHILD, 5011*
    - CLOTTING, 8326
    - CONTRACEPTIVES, ORAL, 6409*, 7767
    - DIAGNOSIS, 2460*, 5808*
    - DRUG-INDUCED, 7767
    - HEMORRHAGE, 6409*

- NEOPLASMS, BENIGN (continued)
  - LIVER (continued)
    - HYPERTROPHY, 7770
    - PATHOLOGY, 8312
    - RADIOTHERAPY, 5813*
    - SEX FACTORS, 8312
    - SURGERY, 561, 8326
    - THERAPY, 7767
    - ULTRASONOGRAPHY, 5011*
  - LYMPHATIC SYSTEM
    - HYPERPLASIA, 1666
  - NEOPLASM METASTASIS
    - CHILD, 5011*
    - ULTRASONOGRAPHY, 5011*
  - NEOPLASMS, MALIGNANT, 5234
    - CHILD, 5011*
    - ULTRASONOGRAPHY, 5011*
  - PANCREAS
    - BIOCHEMISTRY, 2420
    - CYSTS, 520*
    - JAUNDICE, OBSTRUCTIVE, 525
    - SURGERY, 520*
  - RECTUM
    - DIAGNOSIS, 4177
    - MUSCLES, 8245
    - PATHOLOGY, 4177
    - THERAPY, 4177
  - SALIVARY GLANDS, 7256
    - ADENOSINE TRIPHOSPHATASE, 7296
    - ALKALINE PHOSPHATASE, 7296
    - DIAGNOSIS, 8463
    - IRRADIATION, 5954
    - NEOPLASMS, MALIGNANT, 6594
    - ULTRASTRUCTURE, 7296
  - STOMACH, 4823, 6238
    - CYTOLOGY, 4065
    - DIAGNOSIS, 4039*, 8179
    - GASTRECTOMY, 5606
    - MUSCLES, 5223
    - RADIOLOGY, 1325
    - THERAPY, 8179

- NEOPLASMS, MALIGNANT
  - ABDOMEN
    - DIAGNOSIS, 4769
    - LAPAROSCOPY, 4769
  - ALDOLASE
    - ISOENZYMES, 8292*
  - ALPHA FETOPROTEIN
    - DIAGNOSIS, 5012*
  - ANGIOGRAPHY
    - LIVER, 3105
    - VEINS, 3105
  - ANORECTUM
    - FISSURE, 7672
  - ANTINEOPLASTIC AGENTS
    - ABSORPTION, 3164
    - GASTROINTESTINAL SYSTEM, 771, 3164
  - ANUS, 7673
    - DIAGNOSIS, 477
    - THERAPY, 477, 5750
  - APPENDIX
    - NEOPLASMS, BENIGN, 1408
    - SURVIVAL, 2380
  - AUSTRALIA ANTIGEN
    - LIVER, 675
  - BILE DUCTS
    - ATRESIA, 3482*
    - CALCULI, 3513

- NEOPLASMS, MALIGNANT (continued)
    - BILE DUCTS (continued)
        - CYSTS, 7849
        - DIAGNOSIS, 6190
        - DISEASES ASSOCIATED WITH, 5053
        - INTESTINE, SMALL, 562
        - RADIOLOGY, 6190
        - SURGERY, 4376, 7325*
    - BILIARY TRACT
        - CYSTS, 6561*, 7849
        - DISEASES ASSOCIATED WITH, 6561*
    - BLOOD
        - CLOTTING, 8326
    - CARCINOEMBRYONIC ANTIGEN
        - COLITIS, ULCERATIVE, 460
        - EVOLUTION, 452*
        - INTESTINE, LARGE, 452*, 460
    - CELIAC DISEASE
        - INTESTINES, 3266
    - CHILD
        - DIAGNOSIS, 8290*
    - CHOLELITHIASIS
        - DISEASES ASSOCIATED WITH, 4376
        - PANCREAS, 564
    - COLITIS
        - DISEASES ASSOCIATED WITH, 3295
        - ETIOLOGY, 3543
    - COLITIS, ULCERATIVE
        - COMPLICATIONS, 4974
    - COLON, 475, 3891, 4172
        - AGE FACTORS, 1424, 2383
        - ANEMIA, 7665
        - AUTORADIOGRAPHY, 4929*
        - BILE ACIDS AND SALTS, 8103*
        - BREATH TEST, 6323*
        - CARCINOEMBRYONIC ANTIGEN, 5713*, 5715*
        - CARCINOGENS, 222, 5474*
        - CHOLANGIOGRAPHY, 6997*
        - CHOLECYSTECTOMY, 3765*
        - COLOSTOMY, 7523
        - COMPLICATIONS, 7705, 7709
        - CROHN'S DISEASE, 2381
        - DIAGNOSIS, 476, 1193, 2383, 3297, 4173, 4940, 5715*
        - DIETARY FACTORS, 2377, 4696
        - DISEASES ASSOCIATED WITH, 3297, 5715*, 6328*, 7667
        - DIVERTICULUM, 2386, 3301
        - DRUG-INDUCED, 3765*, 4696
        - DRUG THERAPY, 5711*
        - ENDOSCOPY, 4940, 7681
        - ENZYMES, 5713*
        - EPIDEMIOLOGY, 2400, 5711*
        - ETIOLOGY, 2378, 5711*
        - FAMILIAL FACTORS, 473
        - FECES, 6324*
        - FIBERS, 2377
        - FISTULA, 5668
        - GEOGRAPHICAL FACTORS, 1424, 6324*
        - GLYCOPROTEINS, 3852
        - GROWTH FACTORS, 7681
        - IMMUNITY, 5714*
        - IMMUNOTHERAPY, 6144*
        - MARKER STUDY, 5713*
        - MOTILITY, 2378, 6324*
        - NEOPLASM METASTASIS, 6997*
        - POLYPS, 3314, 4197, 4198
        - PROGNOSIS, 2382, 4173, 4941

- NEOPLASMS, MALIGNANT (continued)
    - COLON (continued)
        - PROTEINS, 5713*
        - RADIOLOGY, 3291, 3297, 4007, 4940, 8258
        - RADIONUCLIDES, 7658*
        - RADIOTHERAPY, 5711*, 5712*
        - REVIEW, 7681
        - SCANNING, SCINTILLATION, 7658*
        - SURGERY, 4942, 5711*, 5712*
        - THERAPY, 4173
    - COLOSTOMY
        - COMPLICATIONS, 3891
    - COMMON BILE DUCT CALCULI
        - DISEASES ASSOCIATED WITH, 3513
    - DIAGNOSIS
        - REVIEW, 1425
    - DISEASES ASSOCIATED WITH
        - COLITIS, 6328*
        - LIVER CIRRHOSIS, 5812*
    - DIVERTICULITIS
        - DISEASES ASSOCIATED WITH, 3297, 3301
    - DRUG THERAPY
        - COMPLICATIONS, 4911*
        - DIARRHEA, 4911*
        - GASTROINTESTINAL SYSTEM, 771
        - LIVER, 557
        - MALABSORPTION SYNDROMES, 4911*
        - REVIEW, 771, 7858
        - SEQUELAE, 557
        - STEATORRHEA, 4911*
    - DUODENUM, 7631
        - CHILD, 8198
        - COLON, 5668
        - DIAGNOSIS, 4886, 6975
        - DISEASES ASSOCIATED WITH, 4099*
        - ENDOSCOPY, 8195
        - FISTULA, 5668
        - MORPHOLOGY, 3163
        - SURGERY, 3163, 8198
        - THERAPY, 4886, 6975
    - ENTERITIS
        - ETIOLOGY, 3543
    - ENZYMES
        - DIAGNOSIS, 1459*
    - EPINEPHRINE
        - GASTROINTESTINAL SYSTEM, 234
        - HEMODYNAMICS, 234
    - ESOPHAGUS, 3129, 6222
        - BARRETT'S SYNDROME, 6862*
        - BIOPSY, 4792*
        - COMPLICATIONS, 3130
        - CYTOLOGY, EXFOLIATIVE, 239
        - DIAGNOSIS, 1277, 4792*
        - DISEASES ASSOCIATED WITH, 6862*
        - ENDOSCOPY, 239, 3040*, 4792*
        - FISTULA, 308
        - PROGNOSIS, 7564
        - RADIOLOGY, 239, 1258*
        - RADIOTHERAPY, 7564
        - SURGERY, 1268, 5575, 6202
        - SURVIVAL, 1268, 5575
        - THERAPY, 7564
        - VEINS, 1258*
    - FECES
        - BLOOD, 1193
    - GALLBLADDER
        - ANGIOGRAPHY, 1571*, 5052

NEOPLASMS, MALIGNANT (continued)

- GALLBLADDER (continued)
    - CHOLECYSTECTOMY, 7850
    - DIAGNOSIS, 1571*
    - EPIDEMIOLOGY, 1643
    - PERFORATION, 738
    - RADIOLOGY, 1623
    - SURGERY, 5052
    - THERAPY, 7850
- GARDNER'S SYNDROME
    - DISEASES ASSOCIATED WITH, 3315
- GASTRECTOMY, 4857
    - BIOPSY, 6226*
    - DIAGNOSIS, 4820, 6226*
    - ENDOSCOPY, 6226*
    - JEJUNUM, 336
    - SURVIVAL, 331
- GASTRIN
    - STOMACH, 2602
- GASTROINTESTINAL SYSTEM, 5048
    - AGE FACTORS, 3552
    - ALPHA FETOPROTEIN, 3057
    - ANTIGENS, 3057, 7862
    - ANTINEOPLASTIC AGENTS, 1393*
    - CARCINOEMBRYONIC ANTIGEN, 8126
    - COMPLEMENT, 8462
    - CYTOLOGY, 8137
    - DIAGNOSIS, 8137, 8493
    - DISEASES ASSOCIATED WITH, 7884
    - DRUG THERAPY, 7858, 7876
    - ENZYMES, 7861
    - FAMILIAL FACTORS, 2627
    - FISTULA, 2243
    - GENETICS, 6623
    - HORMONES, 7861
    - IMMUNOLOGY, 3057
    - PROGNOSIS, 3552
    - RADIOLOGY, 4151*
    - RADIOTHERAPY, 7859
    - REVIEW, 7859, 7860
    - SURGERY, 4151*, 7860
    - THERAPY, 3552
- HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 3444
- ILEUM
    - APPENDICITIS, 408
    - NERVOUS SYSTEM, 7612
- INTESTINAL OBSTRUCTION
    - PROGNOSIS, 474
    - RADIOLOGY, 431
    - SURVIVAL, 474
- INTESTINE, LARGE, 7038
    - AGE FACTORS, 2383
    - DIAGNOSIS, 4004, 4162, 4169, 6325*, 7711
    - EPIDEMIOLOGY, 2400
    - IMMUNOLOGY, 1136
    - MUSCLES, 5223
    - NUCLEIC ACIDS, 6325*
    - PROGNOSIS, 4169
    - RADIOLOGY, 4162
    - REVIEW, 1425
    - SIMULATION, 1136
    - THERAPY, 4169
    - TUBERCULOSIS, 453*
- INTESTINE, SMALL
    - DIAGNOSIS, 6287*, 6307
    - MUSCLES, 5223
    - NERVOUS SYSTEM, 7612

NEOPLASMS, MALIGNANT (continued)

- INTESTINE, SMALL (continued)
    - REVIEW, 5664
    - SURGERY, 2321, 6287*
- INTESTINES
    - ANTINEOPLASTIC AGENTS, 470
    - DRUG THERAPY, 470
- INTUSSUSCEPTION
    - RECURRENCE, 1374
- IRRADIATION
    - DRUG THERAPY, 2631
    - MOUTH, 2630, 2631
    - PHARYNX, 2630, 2631
- JAUNDICE, OBSTRUCTIVE
    - DISEASES ASSOCIATED WITH, 5054
    - GASTROINTESTINAL SYSTEM, 2898
    - SURGERY, 7217*
- JEJUNUM
    - INTESTINAL OBSTRUCTION, 4888
    - NEOPLASM METASTASIS, 8222
    - NERVOUS SYSTEM, 7612
    - ULCER, 475
- LIVER, 5814*
    - AGE FACTORS, 2456*
    - ALCOHOLISM, 7768
    - ALDOLASE, 8292*
    - ALPHA 1 ANTITRYPSIN, 5005*
    - ALPHA FETOPROTEIN, 3392, 3408*, 5012*, 5810*, 5812*, 6403*, 6404*, 6405*, 7762, 7768
    - ANGIOGRAPHY, 5043, 5052, 5830
    - ANTIBODIES, 3369*
    - ANTIGENS, 2028
    - AUSTRALIA ANTIGEN, 3369*, 3392, 6434, 7762
    - BILE ACIDS AND SALTS, 4751*
    - BILE DUCTS, 5020*
    - CARCINOGENS, 2153
    - CHILD, 3482*, 7103*
    - CLOTTING, 8326
    - COMPLICATIONS, 5054
    - CONTRACEPTIVES, ORAL, 7126
    - DIAGNOSIS, 548*, 1181*, 1205, 1459*, 3408*, 5012*, 5049, 5809*, 5810*, 5812*, 5830, 6370, 6404*, 7761, 8292*, 8493
    - DISEASES ASSOCIATED WITH, 5018*, 5053, 5812*, 7768
    - DRUG THERAPY, 3388, 6403*
    - EPIDEMIOLOGY, 7768
    - ETIOLOGY, 3369*, 8396*
    - GEOGRAPHICAL FACTORS, 2456*
    - HORMONES, 5051, 5409*
    - HYPERTENSION, PORTAL, 2564
    - HYPERTROPHY, 7770
    - IMMUNITY, 8414
    - ISOENZYMES, 8292*
    - JAUNDICE, OBSTRUCTIVE, 1458*, 3505*
    - LAPAROSCOPY, 1181*, 7761
    - LIVER CIRRHOSIS, 7768
    - LIVER FUNCTION TESTS, 1205
    - METABOLISM, 5409*
    - MORPHOLOGY, 2456*, 8396*
    - MYELOMA, 8333
    - NERVOUS SYSTEM, 2564
    - OBSTRUCTION, 3505*
    - ORGANELLES, 4322*

NEOPLASMS, MALIGNANT (continued)
  LIVER (continued)
    PROGNOSIS, 4263, 5043, 6403*, 6408*, 7098*
    PROGNOSIS, 7103*
    REVIEW, 4263, 5018*
    SCANNING, SCINTILLATION, 3045*, 5809*
    SEX FACTORS, 2456*
    SURGERY, 5043, 5052, 6403*, 6408*, 7098*, 8326
    SURVIVAL, 7098*
    THERAPY, 6408*, 7098*
    ULTRASONOGRAPHY, 3045*
    ULTRASTRUCTURE, 2564, 4322*
    VIRUS DISEASES, 7248
  LIVER CIRRHOSIS, OBSTRUCTIVE
    CHILD, 3482*
    PANCREAS, 564
  LIVER DISEASES, ALCOHOLIC
    SEX FACTORS, 3458*
  LYMPHATIC SYSTEM
    CHILD, 774
    GASTROINTESTINAL SYSTEM, 1667
    MALABSORPTION SYNDROMES, 7639
    RADIOLOGY, 1667
  MALABSORPTION SYNDROMES
    DISEASES ASSOCIATED WITH, 7644
  MEDIASTINUM, 6888
  MENETRIER'S DISEASE
    DIAGNOSIS, 1251
    PANCREAS, 1251
    SURGERY, 1300
  MITOCHONDRIA
    ULTRASTRUCTURE, 8282*
  MOUTH
    RADIOTHERAPY, 2632, 2633
    SURGERY, 2632
    TECHNIQUES, 2633
  NEOPLASMS, BENIGN, 5234
    CHILD, 5011*
    ULTRASONOGRAPHY, 5011*
  NUCLEIC ACIDS
    DIAGNOSIS, 6325*
  NUTRITION DISORDERS
    THERAPY, 7242
  PANCREAS
    AMINO ACIDS, 2425
    ANGIOGRAPHY, 6361*
    ANTIGENS, 2412*
    BICARBONATE SECRETION, 5773*
    BIOPSY, 6361*
    CARCINOEMBRYONIC ANTIGEN, 5773*
    COMPLICATIONS, 4017
    CYTOLOGY, 5771*
    DIAGNOSIS, 3346, 5771*, 5773*, 6361*, 7073, 7725*, 8493
    DRUG-INDUCED, 3746, 4984
    DRUG THERAPY, 4216, 6360*
    ENDOSCOPY, 5771*, 6361*, 7073, 7725*
    ENZYMES, 5773*, 7861
    GLUCURONIDASE, 527
    HORMONES, 7861
    LIPASE, 3346
    NECROSIS, 3326*
    PANCREAS FUNCTION TESTS, 288
    PANCREATOGRAPHY, 3346, 5771*, 6361*, 7073, 7725*

NEOPLASMS, MALIGNANT (continued)
  PANCREAS (continued)
    RADIATION, 4216
    SECRETION, 5773*
    THERAPY, 524
    ULTRASONOGRAPHY, 6361*
    ULTRASTRUCTURE, 3326*
  PREGNANCY
    DRUG-INDUCED, 6617
  PROTEIN-LOSING ENTEROPATHIES
    DISEASES ASSOCIATED WITH, 4099*
  RECTUM, 4172, 4176
    ADOLESCENCE, 478
    AUTORADIOGRAPHY, 4929*
    BACTERIAL INFECTIONS, 1426
    BREATH TEST, 6323*
    CARCINOEMBRYONIC ANTIGEN, 5713*
    COLOSTOMY, 7523
    DIETARY FACTORS, 4696
    DISEASES ASSOCIATED WITH, 7667
    DRUG-INDUCED, 4696
    DRUG THERAPY, 5711*, 7703, 7715
    ENZYMES, 5713*
    EPIDEMIOLOGY, 2400, 5711*
    ETIOLOGY, 5711*
    IMMUNITY, 5714*
    IRRADIATION, 3294
    MARKER STUDY, 5713*
    NEOPLASM METASTASIS, 8241
    POLYPS, 4197
    PROGNOSIS, 2382, 4941
    PROTEINS, 5713*
    RADIOLOGY, 3291
    RADIOTHERAPY, 5712*
    SEQUELAE, 471
    SURGERY, 471, 472, 5711*, 5712*
    TECHNIQUES, 472
    THERAPY, 471, 3294
  RESPIRATORY SYSTEM
    FISTULA, 2243
  RUPTURE
    BLEEDING, 1480
    LIVER, 1480
    SURGERY, 1480
  SALIVARY GLANDS, 5234
    DIAGNOSIS, 8468
    DRUG THERAPY, 8452*
    EPIDEMIOLOGY, 2629
    IRRADIATION, 5236, 5954
    MORPHOLOGY, 1664
    NEOPLASMS, BENIGN, 6594
    REVIEW, 8452*
    THERAPY, 773, 5236, 7249
    ULTRASONOGRAPHY, 6635
    ULTRASTRUCTURE, 1664, 8487
  SERUM
    ENZYMES, 1459*
  SIGMOID
    COMPLICATIONS, 7705
    DRUG THERAPY, 7715
    STRICTURE, 499
  STOMACH, 3129, 4824, 5605, 6886, 6888, 8177, 8178
    AMINO ACIDS, 4821
    AMYLOIDOSIS, 5232
    ANGIOGRAPHY, 3082
    ANTIBODIES, 5589*
    ANTIGENS, 5589*
    BIOCHEMISTRY, 6256

- NEOPLASMS, MALIGNANT (continued)
  - STOMACH (continued)
    - BIOPSY, 245, 5587*, 8174, 8175
    - CELLS, 6875*
    - CYTOLOGY, 4065, 5587*
    - DIAGNOSIS, 1297, 3082, 3160, 3161, 4806*, 4808*, 5587*, 6234, 6887, 7573*, 8174, 8175
    - DISEASES ASSOCIATED WITH, 4822, 5232
    - DRUG THERAPY, 328, 3168
    - ENDOSCOPY, 245, 3040*, 3160, 6887, 6901, 8174, 8175
    - ENVIRONMENTAL FACTORS, 335
    - EPIDEMIOLOGY, 334
    - ESOPHAGUS, 5575
    - GASTRECTOMY, 3168
    - IMMUNOLOGY, 4806*, 5589*
    - ION TRANSPORT, 8176
    - IRRADIATION, 328
    - METAPLASIA, 5621
    - MORPHOLOGY, 3163
    - MUSCLES, 5223
    - NEOPLASM METASTASIS, 329
    - NITROSAMINES, 335
    - PATHOLOGY, 4053, 6901
    - PRECANCEROUS CONDITIONS, 329, 352
    - PROGNOSIS, 3167, 5575, 6901
    - PROLAPSE, 4040*
    - RADIOLOGY, 327, 3161, 8174
    - RADIOTHERAPY, 5575
    - SECRETION, 6256
    - SEQUELAE, 1299
    - SURGERY, 329, 1299, 3163, 4808*, 5575
    - SURVIVAL, 331, 5575
    - ULTRASTRUCTURE, 6256, 6875*
  - THERAPY
    - COMPLICATIONS, 4911*
    - DIARRHEA, 4911*
    - MALABSORPTION SYNDROMES, 4911*
    - REVIEW, 1425
    - STEATORRHEA, 4911*
  - ULCER, PEPTIC
    - SIMULATION, 1349
  - UROGENITAL SYSTEM
    - DIAGNOSIS, 6890
  - VATER'S AMPULLA, 4198
    - DIAGNOSIS, 3083
    - ENDOSCOPY, 3083

- NERVOUS CONTROL
  - ACHALASIA
    - GANGLION CELLS, 2225
  - ACID SECRETION
    - ANESTHESIA, 6049
    - DISTENTION, 960
    - FOOD, 960
    - GASTRIN, 4716*
    - HORMONE EFFECTS ON, 3140*
  - ANORECTUM
    - INCONTINENCE, 4949
  - ANTRUM
    - ACID SECRETION, 71*
    - MOTILITY, 8120
    - VAGOTOMY, 8120
  - BILE
    - ADENOSINE TRIPHOSPHATE, 6106
    - ENZYMES, 6106

- NERVOUS CONTROL (continued)
  - BILE (continued)
    - OXIDOREDUCTASES, 6106
  - BILIARY TRACT, 3791
  - COLON
    - DISTENTION, 2742*
    - MOTILITY, 935, 2742*, 5318*
  - COMMON BILE DUCT, 3791
  - DUMPING SYNDROME
    - ETIOLOGY, 1302
    - OSMOTIC PRESSURE, 1302
  - DUODENUM
    - MOTILITY, 57, 5313*, 6698*
    - MUSCLES, 5313*
  - ESOPHAGEAL REFLUX
    - GANGLION CELLS, 2225
  - ESOPHAGUS
    - DISTENTION, 1838
    - EPITHELIUM, 6
    - MOTILITY, 931, 1839, 4516*, 4519*, 6706, 6707, 7937*
    - NEOPLASMS, 2225
    - PERISTALSIS, 6028, 7937*
    - REVIEW, 858
    - SPASM, 2225
    - SPHINCTER, 930, 1839, 4519*, 6707
  - GALLBLADDER, 3791
    - CHOLECYSTOKININ, 1970*
    - CONNECTIVE TISSUE, 5991*
    - GASTRIN, 1970*
    - HORMONE EFFECTS ON, 1970*
  - GASTRIN, 3680
    - SECRETION, 3668*
    - SERUM, 7970
  - GASTROINTESTINAL SYSTEM
    - MOTILITY, 6700, 7942
  - HELMINTHIASIS
    - DRUG THERAPY, 832
  - ILEUM
    - GLYCOSIDES, 5315*
    - ION TRANSPORT, 7925
  - INTESTINAL OBSTRUCTION
    - ELECTROPHYSIOLOGY, 3627*
  - INTESTINE, LARGE
    - CIRCULATION, 4705*
  - INTESTINE, SMALL
    - CIRCULATION, 4705*
    - L-DOPA, 1084*
    - DOPAMINE, 1084*
    - ELECTROPHYSIOLOGY, 2*
    - ION TRANSPORT, 7925
    - MORPHOGENESIS, 2*
    - MOTILITY, 2*, 921, 4525*, 4526*, 4542, 5313*
    - MUSCLES, 5313*, 7910
    - SEROTONIN, 7513*
    - TRANSPORT, 4542
    - ULTRASTRUCTURE, 2*, 7910
  - INTESTINES
    - CIRCULATION, 4705*
    - DISTENTION, 2742*
    - MOTILITY, 2742*
  - JEJUNUM
    - SUCRASE, 3831*
  - KALLIKREIN
    - SALIVARY GLANDS, 5345
  - LIVER
    - ADENOSINE TRIPHOSPHATE, 6106
    - CIRCULATION, 3864*, 6757*

- NERVOUS CONTROL (continued)
  - LIVER (continued)
    - ENZYMES, 3925, 6106, 6107
    - METABOLISM, 3925
    - OXIDOREDUCTASES, 6106
    - OXYGEN, 6757*
    - ULTRASTRUCTURE, 1755*
  - NEONATE
    - SALIVARY GLANDS, 5346
  - ODDI'S SPHINCTER, 3791
  - PANCREAS
    - ALCOHOLISM, 5391*
    - ALCOHOLS, 1957
    - DRUG EFFECTS ON, 5391*
    - FETUS, 6747*
    - GLUCOSE, 2856
    - NEONATE, 6747*
    - SECRETION, 1937, 2847, 3730, 3731, 6747*
  - PANCREATITIS, CHRONIC
    - ALCOHOLS, 6385
    - PROTEINS, 6385
  - PATHOLOGY
    - FEEDING, 2822
    - STOMACH, 2822
  - PYLORUS
    - MOTILITY, 8120
    - VAGOTOMY, 8120
  - RECTUM
    - COLITIS, ULCERATIVE, 5759*
    - ELECTROPHYSIOLOGY, 7955
    - IRRITABLE COLON, 5759*
    - MOTILITY, 7955
  - SALIVARY GLANDS
    - CIRCULATION, 1109
  - SECRETION
    - GASTRIN, 7967*
    - ULCER, PEPTIC, 2264
  - SERUM
    - GASTRIN, 4551*
  - SPHINCTER
    - DISTENTION, 1838
    - INTESTINES, 64
    - REVIEW, 64
  - STOMACH
    - ACID SECRETION, 71*, 2806, 3681, 3695, 4551*, 5364*, 5366*, 7342*, 7967*, 7968*
    - ADRENERGIC RECEPTOR BLOCKADERS, 5326
    - CHOLELITHIASIS, 3501*
    - CIRCULATION, 976, 7342*
    - DUODENUM, 3004
    - EPITHELIUM, 9
    - GASTRIN, 1897, 3660*, 7967*
    - HORMONES, GASTROINTESTINAL, 1897
    - MOTILITY, 57, 942, 1833*, 1860, 3635*, 3695, 6698*, 7332
    - MUSCLES, 7910
    - SECRETION, 104, 950*, 976, 2264, 3712, 4093, 4551*, 5263*, 5364*
    - ULTRASTRUCTURE, 7910
  - ULCER, PEPTIC
    - ACID SECRETION, 366
    - PEPSIN, 366

- NERVOUS SYSTEM
  - ACID-BASE BALANCE
    - HEPATECTOMY, 3036

- NERVOUS SYSTEM (continued)
  - AMINO ACIDS
    - METABOLISM, 575
    - PATHOLOGY, 676
  - AMMONIA
    - LIVER DISEASES, 1568
    - METABOLISM, 1568
  - APPENDIX
    - HIRSCHSPRUNG'S DISEASE, 454*
  - BILE DUCTS
    - NEOPLASMS, 1624
  - BILIARY TRACT
    - EMBRYOLOGY, 140
  - CHOLECYSTOKININ
    - PANCREOZYMIN, 4548
  - CIRCULATION
    - PERMEABILITY, 3792
  - COLON
    - ANOMALY, 466
  - COMA
    - CIRCULATION, 573, 3792
  - DYSTROPHY
    - FAMILIAL FACTORS, 5057
  - ELECTROPHYSIOLOGY
    - HEPATECTOMY, 3036
  - ENKEPHALINS
    - RADIOIMMUNOASSAY, 5274
  - ESOPHAGUS
    - REVIEW, 858, 5227
  - GASTROINTESTINAL SYSTEM
    - REVIEW, 5227
  - HEMORRHAGE
    - DIAGNOSIS, 4447
  - HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 4329*
  - HIATAL HERNIA
    - REVIEW, 5227
  - HIRSCHSPRUNG'S DISEASE
    - DISEASE, 5721*
  - HORMONES, GASTROINTESTINAL
    - IMMUNOLOGY, 209
  - ILEUM
    - NEOPLASMS, MALIGNANT, 7612
  - INTESTINE, SMALL
    - HYPOTENSION, 6832*
    - MORPHOLOGY, 2127
    - NEOPLASMS, MALIGNANT, 7612
    - SHOCK, 4727, 6832*
  - INTESTINES
    - DISEASE, 7050
    - SHOCK, 4727
  - JEJUNUM
    - NEOPLASMS, MALIGNANT, 7612
  - KERNICTERUS
    - JAUNDICE, OBSTRUCTIVE, 7107*
    - LIVER CIRRHOSIS, 7107*
  - LIVER
    - EMBRYOLOGY, 140
    - NEOPLASMS, MALIGNANT, 2564
    - PATHOLOGY, 676
  - LIVER CIRRHOSIS
    - DISEASES ASSOCIATED WITH, 4329*
  - LIVER COMA
    - AMINO ACIDS, 4665
    - DOPAMINE, 4665
    - METABOLISM, 1161
    - NOREPINEPHRINE, 4665
    - SEROTONIN, 4665

- NERVOUS SYSTEM (continued)
  - ODDI'S SPHINCTER
    - EMBRYOLOGY, 140
  - PANCREAS
    - EMBRYOLOGY, 140
  - PHOSPHOLIPIDS
    - ALCOHOLS, 149
  - PORTACAVAL SHUNT, 8110
  - RECTUM
    - SURGERY, 4937
  - REYE'S SYNDROME
    - ULTRASTRUCTURE, 3403
  - SHUNT
    - MITOCHONDRIA, 5479*
  - STOMACH
    - REVIEW, 5227
    - ULCER, 198, 978

- NEUROMUSCULAR DISEASES
  - COLON, 4950
  - INTESTINES
    - PSEUDO-OBSTRUCTION, 5215
  - RECTUM, 4950

- NICOTINE
  - LIVER
    - METABOLISM, 3817
    - PRIMATES, 3817
  - LIVER FUNCTION TESTS
    - LIVER, 3034
  - PANCREAS
    - SECRETIN, 982*
    - SECRETION, 982*
  - SERUM
    - SECRETIN, 982*
  - STOMACH
    - ACID SECRETION, 7348*
  - STRESS
    - STOMACH, 1149
    - ULCER, 1149

- NICOTINIC ACIDS
  - FATTY LIVER
    - ALCOHOLS, 1019*
  - LIVER CIRRHOSIS
    - FIBRINOLYSIS, 710

- NIEMANN-PICK'S DISEASE
  - GENETICS
    - REVIEW, 543*

- NITRATES
  - STOMACH
    - NEOPLASMS, 2626

- NITRITES
  - ESOPHAGUS
    - SPASM, 1264*
  - STOMACH
    - NEOPLASMS, 2626, 6881
    - PENTAGASTRIN, 3085

- NITROGEN
  - CYSTIC FIBROSIS
    - SECRETIN, 2414*
  - FECES
    - DIETARY FACTORS, 6713*
  - GASTRECTOMY
    - METABOLISM, 6910

- NITROGEN (continued)
  - INTESTINES, 6821
    - ABSORPTION, 7913*
    - DIALYSIS, 4407
    - TRANSPORT, 4407, 7913*
  - LIVER
    - METABOLISM, 7460
  - METABOLISM
    - DIETARY FACTORS, 7460
  - PARENTERAL ALIMENTATION
    - METABOLISM, 5180*
  - STOMACH
    - SURGERY, 7638*

- NITROSAMINES
  - CARBON TETRACHLORIDE
    - CARCINOGENS, 152
  - ESOPHAGUS
    - NEOPLASMS, 6213
  - HEPATECTOMY
    - CARCINOGENS, 152
  - LIVER
    - DRUG EFFECTS ON, 1032
    - METABOLISM, 1032, 2918
    - MITOSIS, 168
    - NEOPLASMS, 7100*
    - PATHOLOGY, 168
  - LIVER INJURY
    - DRUG THERAPY, 1165
    - LEAD, 1165
  - NEOPLASMS
    - ALCOHOLS, 6213
  - STOMACH
    - NEOPLASMS, MALIGNANT, 335

- NOREPINEPHRINE
  - ABSORPTION
    - HORMONE EFFECTS ON, 7932
  - ACID SECRETION, 5375
  - DUODENUM
    - METABOLISM, 2977
    - TRANSPORT, 2977
  - LIVER COMA
    - BLOOD PLATELETS, 6510*
    - METABOLISM, 5123*
    - NERVOUS SYSTEM, 4665
    - URINE, 5123*
  - PANCREAS
    - ENZYMES, 3742
    - SECRETION, 3730, 4586*
    - VASOCONSTRICTOR AGENTS, 4586*
  - SECRETION
    - PEPSIN, 8171
  - STOMACH
    - ACID SECRETION, 7342*, 8171
    - CIRCULATION, 7342*
    - HEALING, 4729
  - TRANSPORT
    - HORMONE EFFECTS ON, 7932
  - ULCER, PEPTIC
    - URINE, 5221

- NUCLEIC ACIDS
  - ANESTHESIA
    - PANCREAS, 3727*
  - CELLS
    - INTESTINES, 179

NUCLEIC ACIDS (continued)
- COLON
  - ACIDS, 7483*
  - SURGERY, 1748*
- GASTROINTESTINAL SYSTEM
  - OCCUPATIONAL FACTORS, 1108
  - SYNTHESIS, 1108
- HEPATITIS
  - BINDING, 3942*
- HEPATITIS, CHRONIC
  - BINDING, 3942*
- HEPATITIS, INFECTIOUS
  - DANE PARTICLES, 5480*, 5863*
  - ENZYMES, 273, 1538
  - METABOLISM, 3450
- HEPATOCYTES, 8063
- HEPATOMEGALY, 5417*
- ILEUM
  - BILE, 4688
- INFLAMMATORY BOWEL DISEASES
  - ANTIBODIES, 4211
  - FAMILIAL FACTORS, 4211
- INTESTINE, LARGE
  - NEOPLASMS, MALIGNANT, 6325*
- INTESTINE, SMALL
  - COLON, 6813
  - ENTERECTOMY, 4708*
  - JEJUNUM, 6813
  - SURGERY, 1748*
  - SYNTHESIS, 4708*, 6813
  - VITAMIN D, 6839
- INTESTINES
  - ANTINEOPLASTIC AGENTS, 188
- JEJUNUM
  - BILE, 4688
  - SYNTHESIS, 4923
- LIVER
  - AGE FACTORS, 1073
  - AMINO ACIDS, 2946
  - CIRCADIAN RHYTHM, 3797
  - DIETARY FACTORS, 2009
  - DRUG EFFECTS ON, 6127, 8047
  - ENZYMES, 3801
  - ISCHEMIA, 4660
  - METABOLISM, 1075, 2946
  - NEOPLASMS, 4660
  - REGENERATION, 1075, 3801, 6109, 6810, 7423*
  - SYNTHESIS, 1073, 1075
  - VITAMIN D, 6839
- LIVER CIRRHOSIS
  - BINDING, 3942*
  - ENZYMES, 272
  - REGENERATION, 3800
- LIVER DISEASES
  - ANTIBODIES, 687
  - BINDING, 687, 3942*
- LIVER DISEASES, ALCOHOLIC
  - BINDING, 3942*
- LIVER INJURY
  - CARBON TETRACHLORIDE, 6115
- NEOPLASM METASTASIS
  - ENZYMES, 272
- NEOPLASMS
  - CARCINOGENS, 158
  - LIVER, 158
  - SYNTHESIS, 158
  - ZINC, 158

NUCLEIC ACIDS (continued)
- NEOPLASMS, MALIGNANT
  - DIAGNOSIS, 6325*
- SERUM
  - SYNTHESIS, 6091*
- SYNTHESIS
  - AMMONIA, 179
  - CELIAC DISEASE, 7635*
  - DIETARY FACTORS, 179
  - HUMORAL FACTORS, 6091*
  - INFLAMMATORY BOWEL DISEASES, 7635*
  - INTESTINES, 179
  - MALABSORPTION SYNDROMES, 4923

NUCLEOSIDES
- ILEUM
  - TRANSPORT, 5290*
- INTESTINE, LARGE
  - MOTILITY, 46*
- INTESTINE, SMALL
  - TRANSPORT, 5290*

NUCLEOTIDASE
- HEPATITIS, INFECTIOUS
  - INFANT, 4750*
  - NEONATE, 4750*
- JAUNDICE
  - INFANT, 4750*
  - NEONATE, 4750*
- LIVER
  - FATTY ACIDS, 1058
- LIVER DISEASES
  - INFANT, 4750*
  - NEONATE, 4750*

NUCLEOTIDES
- ILEUM
  - TRANSPORT, 5290*
- INTESTINE, LARGE
  - MOTILITY, 46*
- INTESTINE, SMALL
  - TRANSPORT, 5290*
- LIVER
  - ADENYL CYCLASE, 1987
  - BLOOD PLATELETS, 1164
  - DRUG EFFECTS ON, 1015*
  - ENZYMES, 1043
  - METABOLISM, 1015*
- PANCREAS
  - ACETYLCHOLINE, 115
  - CHOLECYSTOKININ, 115
  - ENZYMES, 110
- STOMACH
  - ASPIRIN, 3663*
  - INTRINSIC FACTOR, 3711
  - PROSTAGLANDINS, 2743*
- TRANSPORT
  - SULFOBROMOPHTHALEIN, 1077

NUTRITION
- AMINES
  - SYNTHESIS, 6806
- COLON
  - NEOPLASMS, 5600
- GASTROINTESTINAL DISEASES
  - CHILD, 7883
  - INFANT, 7883
- INFECTION, 5944
- INTESTINE, SMALL
  - SURGERY, 2069

NUTRITION (continued)

- LIVER
  - SURGERY, 5780
- PANCREAS
  - SURGERY, 5780
- PROTEINS
  - GROWTH FACTORS, 1106
  - PRIMATES, 1106
- RADIOTHERAPY
  - RADIATION EFFECTS ON, 6599
- STOMACH
  - NEOPLASMS, 5600
- UROGENITAL SYSTEM
  - SURGERY, 5780
- VITAMIN A
  - ABSORPTION, 899

NUTRITION DISORDERS

- ABSORPTION
  - IRON, 4512
- ALBUMINS, 7524
- ALPHA FETOPROTEIN, 8484
- ASCARIASIS
  - CHILD, 6654
- CHILD
  - IMMUNOGLOBULINS, 4408
- DIAGNOSIS
  - CHILD, 7887
- DIARRHEA, 4423
  - BACTERIA, 1353
  - INFANT, 7853*
- ENTERITIS, REGIONAL
  - VITAMIN C, 853
- GASTROENTERITIS
  - DIARRHEA, 7244
  - EPIDEMIOLOGY, 7244
- GENETICS
  - METALS, 7252
  - MINERALS, 7252
- INFANT
  - PARENTERAL ALIMENTATION, 7853*
  - THERAPY, 7853*
- INTESTINE, SMALL
  - ABSORPTION, 3621
  - ENZYMES, 7632
- INTESTINES
  - CHILD, 7262
  - IMMUNOGLOBULINS, 4408
  - MORPHOLOGY, 7262
- KWASHIORKOR
  - HORMONES, 7245
  - PROTEINS, 7245
- LIVER
  - CYTOCHROMES, 2053
  - ENZYMES, 1162
  - MORPHOLOGY, 7907
  - PREGNANCY, 816
  - SIMULATION, 1162
- MALABSORPTION SYNDROMES, 3260
- MARASMUS
  - HORMONES, 7245
  - PROTEINS, 7245
- METABOLISM
  - METALS, 7252
  - MINERALS, 7252
- NEOPLASMS
  - SURGERY, 6595, 6596
- NEOPLASMS, MALIGNANT
  - THERAPY, 7242

NUTRITION DISORDERS (continued)

- PANCREAS FUNCTION TESTS
  - DIETARY FACTORS, 2416*
  - SECRETIN, 2416*
- PHOSPHATES
  - FAMILIAL FACTORS, 802
  - TRANSPORT, 802
- PROTEINS
  - BIOCHEMISTRY, 441
  - CHILD, 441
  - EPIDEMIOLOGY, 441
- SALIVARY GLANDS
  - ULTRASTRUCTURE, 3596
- SERUM
  - PROTEINS, 7856*
- SHUNT, INTESTINAL
  - METABOLISM, 403
  - THERAPY, 403
- SIMULATION
  - PREGNANCY, 816
- SODIUM
  - CHILD, 5947
  - TRANSPORT, 5947
- STOMACH
  - ACID SECRETION, 7873
  - SURGERY, 7638*
- THERAPY
  - PARENTERAL ALIMENTATION, 7853*
- WATER, ELECTROLYTE BALANCE
  - CHILD, 5947

OBESITY

- ASPIRIN
  - SURGERY, 2324
- BILE ACIDS AND SALTS
  - METABOLISM, 7459
- BILIARY TRACT
  - CHOLESTEROL, 1583
  - LIPIDS, 1583
- GALLBLADDER DISEASES
  - STATISTICAL STUDY, 1633
- GASES
  - INTESTINE, SMALL, 2337
- INTESTINE, SMALL
  - MORPHOLOGY, 2332, 8194*
  - SHUNT, INTESTINAL, 6944
  - SURGERY, 2324
- JEJUNUM
  - SURGERY, 2332
- LIPIDS
  - METABOLISM, 8303*
- LIVER
  - BIOPSY, 3555
  - CLEARANCE STUDY, 3555
  - COMPLICATIONS, 2455*
  - FIBROSIS, 3555
  - METABOLISM, 622
  - MORPHOLOGY, 3555
  - SHUNT, INTESTINAL, 622
  - SURGERY, 2316*, 2455*
  - TRIGLYCERIDES, 2316*
- MAGNESIUM
  - DEFICIENCY, 2336
- MALABSORPTION SYNDROMES
  - SURGERY, 2365
- SECRETION
  - SHUNT, INTESTINAL, 1307

OBESITY (continued)
- SHUNT
  - STOMACH, 5693
  - TECHNIQUES, 5693
- SHUNT, INTESTINAL, 1358, 1652, 4897, 5669, 5693, 8216
  - ABSORPTION, 4107*
  - ALKALINE PHOSPHATASE, 7625
  - AMINO ACIDS, 4874*, 5661
  - ARTHRITIS, 7629
  - BILE ACIDS AND SALTS, 4106*, 4878*
  - COMPLICATIONS, 405, 2316*, 3226, 4893, 4896, 5650*, 7629, 7630
  - DRUG METABOLISM, 5673
  - DRUGS, 5673
  - ELECTROLYTES, 4895
  - FATTY ACIDS, 444
  - IMMUNOLOGY, 6958
  - INTESTINE, SMALL, 5692
  - LIPIDS, 623, 4894
  - LIVER, 2316*, 4106*
  - LIVER FUNCTION TESTS, 4106*, 4895, 6293*, 7625
  - METABOLISM, 404
  - MORPHOLOGY, 8098
  - PROGNOSIS, 5677, 7622
  - RADIOLOGY, 1359, 4873*
  - REVIEW, 2330
  - SEQUELAE, 2619
  - SURVIVAL, 4893, 6965
  - TECHNIQUES, 406, 4893, 5672
  - THERAPY, 6963
  - TUBERCULOSIS, 433
  - VILLI, 4107*
  - VITAMIN D, 3223*
- STOMACH
  - SHUNT, 1308
  - SURGERY, 2273
- SURGERY
  - ACIDOSIS, 2335
  - ACIDS, 6942*
  - BILE ACIDS AND SALTS, 6942*
  - BODY COMPOSITION, 2333
  - CHOLESTEROL, 6942*
  - COMPLICATIONS, 2273, 2331, 2333, 2335, 2336, 2337, 3836
  - FATS, 6942*
  - FECES, 6942*
  - GASES, 2337
  - INTESTINE, SMALL, 2332
  - MALABSORPTION SYNDROMES, 2981
  - PHOSPHOLIPIDS, 6942*
  - PROGNOSIS, 2273, 2331
  - REVIEW, 1357, 7630
  - SEQUELAE, 2331, 2333
  - SHUNT, INTESTINAL, 7623, 7624
  - STEROLS, 6942*
- THERAPY
  - REVIEW, 7630
  - SHUNT, INTESTINAL, 7623, 7624, 7630
  - SURGERY, 4062

OBSTRUCTION
- BILE
  - HEPATOCYTES, 2677*
  - SECRETION, 5419*
- BILE ACIDS AND SALTS
  - SECRETION, 5419*

OBSTRUCTION (continued)
- BILE DUCTS, 2889*, 5419*
  - BICARBONATE SECRETION, 1978*
  - BILE ACIDS AND SALTS, 1978*
  - BILIRUBIN, 1978*
  - CELLS, 5264*
  - CHOLECYSTECTOMY, 8443
  - CLEARANCE STUDY, 1978*
  - DRAINAGE, 6580*
  - FASCIOLIASIS, 3568
  - FISTULA, 766
  - MORPHOMETRY, 6847
  - SIMULATION, 1978*, 6847
  - ULTRASTRUCTURE, 6847
- BILIARY TRACT
  - CHOLELITHIASIS, 7647
  - CHOLESTASIS, 1601
  - DIAGNOSIS, 542*, 768, 7823*
  - ETIOLOGY, 3973
  - LIPOPROTEINS, 1063
  - REGENERATION, 153
  - SECRETION, 5419*
  - SEDATIVES, 2003
  - SIMULATION, 1601
  - SLEEP, 2003
  - SURGERY, 768
  - SURVIVAL, 153, 768
  - THERAPY, 3973
  - ULTRASONOGRAPHY, 7823*, 7845
- BILIARY TRACT DISEASES
  - ALKALINE PHOSPHATASE, 4249*
- CECUM
  - CYSTIC FIBROSIS, 6364*
  - DISEASES ASSOCIATED WITH, 6364*
- CHOLANGIOGRAPHY
  - BILE DUCTS, 3102
- COLON
  - ADHESIONS, 4167
  - CHILD, 508
  - COMPLICATIONS, 7709
  - DIAGNOSIS, 2394
  - ENDOSCOPY, 1421
  - NEONATE, 2394
  - THERAPY, 1421
- COLONOSCOPY
  - COMPLICATIONS, 7010
- COMMON BILE DUCT
  - BIOCHEMISTRY, 2884*
  - PATHOLOGY, 2884*
  - SURGERY, 734
- CONTRAST MEDIA
  - DIAGNOSIS, 2394
- DUODENUM, 427, 8213
  - ADOLESCENCE, 1195
  - CHILD, 1195, 7611
  - GENETIC FACTORS, 1195
  - HEMATOMA, 426
  - NEONATE, 1372, 3229
  - PATHOLOGY, 4121
  - RADIOLOGY, 1195
  - SURGERY, 7611
  - SURVIVAL, 1372
  - VARICES, 6291*
  - WOUNDS AND INJURIES, 426
- ENDOSCOPY
  - ESOPHAGUS, 6201
- ESOPHAGUS
  - FOOD, 6199*
  - GLUCAGON, 6199*

- OBSTRUCTION (continued)
  - ESOPHAGUS (continued)
    - HEMATOMA, 310
    - HERNIA, 1306
    - INTESTINAL OBSTRUCTION, 4800
    - MUSCLES, 309
    - THERAPY, 6199*
  - GALLBLADDER DISEASES
    - ETIOLOGY, 1602
    - INFANT, 1602
  - GASTRECTOMY
    - COMPLICATIONS, 1288*
  - GASTROENTEROSTOMY
    - LAPAROSCOPY, 6295
  - HEPATOCYTES
    - VEINS, 3032
  - HYPERTENSION, PORTAL
    - BILE DUCTS, 3905
  - ILEUM
    - CYSTIC FIBROSIS, 6364*
    - DISEASES ASSOCIATED WITH, 6364*
    - GRANULOMA, 3242
    - POLYPS, 1371, 3242
    - SURGERY, 6364*
  - INFLAMMATORY BOWEL DISEASES
    - UROGENITAL SYSTEM, 6676*
  - INTESTINE, LARGE
    - CYSTIC FIBROSIS, 6364*
    - DIAGNOSIS, 2394
    - DISEASES ASSOCIATED WITH, 6364*
    - NEONATE, 2394
    - SURGERY, 6364*
  - INTESTINE, SMALL, 8213
    - BILE DUCTS, 5433*
    - CYSTIC FIBROSIS, 6364*
    - DISEASES ASSOCIATED WITH, 6364*
    - ENDOSCOPY, 2319
    - GRANULOMA, 3242
    - INTUBATION, 2318
    - MALABSORPTION SYNDROMES, 7643
    - NEONATE, 3229
    - PATHOLOGY, 4121
    - POLYPS, 3242
    - SURGERY, 6364*
    - TRANSPORT, 2717
  - INTESTINES, 3879
    - CHOLELITHIASIS, 3228
    - DIAGNOSIS, 3228
    - NEONATE, 3229
    - PSYCHOLOGICAL FACTORS, 7628
    - THERAPY, 3228
  - JAUNDICE
    - INTUBATION, 2578*
  - JEJUNUM
    - CYSTIC FIBROSIS, 6364*
    - DISEASES ASSOCIATED WITH, 6364*
    - SURGERY, 6364*
  - LIVER
    - CIRCULATION, 154
    - COMMON BILE DUCT, 2899
    - LYMPHATIC SYSTEM, 4723
    - NEOPLASMS, MALIGNANT, 3505*
    - VEINS, 584, 5040*
  - LIVER DISEASES
    - ALKALINE PHOSPHATASE, 4249*
    - VITAMIN B6, 2448*
  - LYMPHATIC SYSTEM
    - MALABSORPTION SYNDROMES, 7643

- OBSTRUCTION (continued)
  - MECKEL'S DIVERTICULUM
    - COMPLICATIONS, 4870*
    - RADIOLOGY, 4870*
  - NEONATE
    - COLON, 2168*
  - NEOPLASM METASTASIS
    - COLON, 2242
  - PANCREAS
    - BILE DUCTS, 5433*
    - DIAGNOSIS, 2178*
    - DUCT, 2178*
  - PANCREATIC DUCT
    - SECRETION, 3748
    - SURGERY, 734
    - TECHNIQUES, 4584*
  - PANCREATITIS, CHRONIC
    - THERAPY, 4584*
  - PANCREATOGRAPHY
    - REVIEW, 2178*
  - PARASITES AND PARASITIC DISEASES
    - DUODENUM, 8190*
  - PYLORUS
    - ANOMALY, 1305
    - ETIOLOGY, 7113*
    - NEONATE, 7113*
  - RECTUM
    - NEOPLASMS, 7021
  - SALIVARY GLANDS
    - MORPHOLOGY, 5
  - STOMACH
    - AGE FACTORS, 2279
    - ANOMALY, 1305
    - DIAGNOSIS, 2279
    - HERNIA, 1306
  - ULCER
    - DIAGNOSIS, 2302
    - DUODENUM, 2302
    - REVEIW, 2302
    - SURGERY, 2302
  - VAGOTOMY
    - COMPLICATIONS, 1288*
  - VARICES
    - CIRCULATION, 6291*

- OBSTRUCTIVE JAUNDICE
  - SEE JAUNDICE, OBSTRUCTIVE

- ODDI'S SPHINCTER
  - ALCOHOLS
    - ELECTROPHYSIOLOGY, 2745*
  - ANOMALY
    - DIAGNOSIS, 5774*
    - ENDOSCOPY, 5774*
  - BILE
    - SECRETION, 2021
  - BILE ACIDS AND SALTS
    - SECRETION, 2021
  - BILE DUCTS
    - SURGERY, 733
  - BILIARY TRACT
    - INFLAMMATION, 728
  - BILIRUBIN
    - EXCRETION, 2021
  - CERULEIN
    - MANOMETRY, 3637*
  - CHOLECYSTOKININ
    - MANOMETRY, 3637*

- ODDI'S SPHINCTER (continued)
  - DRUG EFFECTS ON
    - ADRENERGIC RECEPTOR AGONISTS, 3791
    - ADRENERGIC RECEPTOR BLOCKADERS, 3791
    - CERULEIN, 2747
    - CHOLECYSTOKININ, 2747
    - ELECTROPHYSIOLOGY, 2745*
  - DRUGS
    - MOTILITY, 65
  - ELECTROPHYSIOLOGY
    - CERULEIN, 69
    - MOTILITY, 65
  - HORMONE EFFECTS ON, 3649
  - HORMONES, GASTROINTESTINAL, 3649
  - MORPHOLOGY, 732
  - MOTILITY
    - ADRENERGIC RECEPTOR AGONISTS, 6848
    - DRUG EFFECTS ON, 6848
    - PRESSURE STUDY, 7335
    - VAGOTOMY, 6848
  - MUSCLES
    - DRUG EFFECTS ON, 913*
  - NERVOUS CONTROL, 3791
  - NERVOUS SYSTEM
    - EMBRYOLOGY, 140
  - PATHOLOGY, 732
  - STENOSIS
    - DIAGNOSIS, 5774*
    - ENDOSCOPY, 5774*
    - SURGERY, 7838
  - VAGOTOMY
    - ELECTROPHYSIOLOGY, 2745*

- OMENTUM
  - ANOMALY
    - TORSION, 5222
  - TORSION
    - DIAGNOSIS, 5222
    - ETIOLOGY, 5222

- ORAL CONTRACEPTIVES
  - SEE CONTRACEPTIVES, ORAL

- ORGAN CULTURE
  - ANTRUM
    - GASTRIN, 2803
  - CHILD
    - REVIEW, 6953
  - GASTROINTESTINAL SYSTEM, 2109
  - GLYCOPROTEINS
    - MARKER STUDY, 2061*
    - SYNTHESIS, 2061*
  - INTESTINE, SMALL
    - DRUG EFFECTS ON, 3839
    - GLUCOSE, 7300*
    - METABOLISM, 7300*
    - MORPHOLOGY, 7903*
    - MORPHOMETRY, 7903*
    - PENTAGASTRIN, 3839
    - TECHNIQUES, 3883
    - ULTRASTRUCTURE, 7903*
  - INTESTINES
    - VITAMIN D, 2075
  - JEJUNUM
    - MORPHOLOGY, 7903*
    - MORPHOMETRY, 7903*
    - ULTRASTRUCTURE, 7903*

- ORGAN CULTURE (continued)
  - LIVER, 1464
    - LIPIDS, 5399*
    - OXYGEN, 2689
    - TECHNIQUES, 3916
    - ULTRASTRUCTURE, 2689
  - PANCREAS
    - TECHNIQUES, 3900
  - STOMACH, 866
    - ANTRUM, 4554*

- OROTIC ACID
  - FATTY LIVER
    - SEX FACTORS, 163
  - GALACTOSE
    - EXCRETION, 2034
  - HEPATITIS, INFECTIOUS
    - GALACTOSAMINE, 1041
  - LIVER
    - GALACTOSE, 2034
    - METABOLISM, 1038

- OSMOTIC PRESSURE
  - DUMPING SYNDROME
    - NERVOUS CONTROL, 1302
  - INTESTINE, SMALL
    - EPITHELIUM, 2711
    - GLUCOSE, 8095
    - PERMEABILITY, 877
  - JEJUNUM
    - GLUCOSE, 8095
  - LIVER
    - DRUG EFFECTS ON, 1173
    - WATER, ELECTROLYTE BALANCE, 135
  - STOMACH
    - GLUCOSE, 4568*
    - METABOLISM, 4568*
    - MOTILITY, 941
    - PROSTAGLANDINS, 1924

- OXALATES
  - ABSORPTION
    - CATHARTICS, 6019
    - DRUG EFFECTS ON, 6019
  - CELIAC DISEASE
    - TRANSPORT, 5704*
  - COLON
    - ABSORPTION, 2593*, 6019, 6020
    - TRANSPORT, 6020
  - CROHN'S DISEASE
    - CHOLELITHIASIS, 4475*
    - URINARY SYSTEM, 4475*
    - URINE, 4258*
  - ENTERECTOMY
    - ABSORPTION, 5703*
    - TRANSPORT, 5703*
  - ILEAL DISEASES
    - CALCULI, 8227*
  - ILEUM
    - ENTERECTOMY, 5703*
  - INFLAMMATORY BOWEL DISEASES
    - EXCRETION, 6586*
  - INTESTINES
    - SURGERY, 4258*
  - LIVER CIRRHOSIS
    - URINE, 4258*
  - MALABSORPTION SYNDROMES
    - EXCRETION, 6586*
    - FATS, 5704*
    - URINE, 4258*, 6320

OXALATES (continued)

- PANCREATIC DISEASES
  - EXCRETION, 6586*
- PANCREATITIS, CHRONIC
  - URINE, 4258*
- SHUNT, INTESTINAL
  - CALCULI, 8227*
  - KIDNEY DISEASES, 4112
  - RENAL FAILURE, 5689
- SPRUE
  - ABSORPTION, 5704*
  - TRANSPORT, 5704*
  - URINE, 4258*
- URINE
  - ANTIBIOTICS, 5658*
  - BILE ACIDS AND SALTS, 5658*
  - CALCIUM, 5658*
  - DRUG EFFECTS ON, 5658*

OXIDATION

- ALCOHOLS
  - HEPATITIS, 5430*
- CECUM
  - BACTERIA, 7509*
- CHOLESTEROL
  - BILE ACIDS AND SALTS, 3777
- DRUG METABOLISM
  - CATECHOLAMINES, 2103*
- FATTY ACIDS
  - AGE FACTORS, 1996
  - ENZYMES, 1996
  - LIVER, 1996
- FATTY LIVER
  - ALCOHOLS, 5116
- GLUCOSE
  - DIETARY FACTORS, 176
  - INTESTINES, 176
- HEPATOCYTES
  - ALCOHOLISM, 5398*
- LIVER
  - ALCOHOLS, 1036, 3760*, 7410*
  - ALDEHYDES, 3760*
  - CATECHOLAMINES, 2103*
  - FATTY ACIDS, 3760*, 7482
  - HEXOBARBITAL, 5418*
  - MICROSOMES, 1031
- LIVER CIRRHOSIS
  - AMMONIA, 5121*
  - DRUG EFFECTS ON, 5121*
  - PHENOLS, 5121*
- MITOCHONDRIA
  - LIVER, 2013
  - METABOLISM, 2013
  - VITAMIN B2, 2013
- PANCREAS
  - ALCOHOLS, 3726*
- STOMACH
  - GLUCOSE, 4568*
- ULCER, PEPTIC
  - THERAPY, 6265

OXIDATIVE PHOSPHORYLATION

- DRUG EFFECTS ON
  - ALCOHOLS, 4637
- HEPATOCYTES
  - MITOCHONDRIA, 4637
- LIVER
  - DRUG EFFECTS ON, 3732
  - HEPATECTOMY, 1021*

OXIDATIVE PHOSPHORYLATION (continued)

- LIVER (continued)
  - MITOCHONDRIA, 3732
  - VITAMIN D, 142
- MITOCHONDRIA
  - ASPIRIN, 1879*
- STOMACH
  - MITOCHONDRIA, 1879*
  - WOUNDS AND INJURIES, 1909
- ULCER
  - STRESS, 6730*

OXIDOREDUCTASES

- BILE
  - NERVOUS CONTROL, 6106
- BILE ACIDS AND SALTS
  - ANALYSIS, 607
- LACTATES
  - IMMUNOGLOBULINS, 6153
- LIVER
  - ALCOHOLS, 4623*
  - ALDEHYDES. 2025
  - CARBON TETRACHLORIDE, 7406*
  - DRUG EFFECTS ON, 4623*
  - KINETICS, 5435
  - NERVOUS CONTROL, 6106
- LIVER DISEASES
  - LIVER FUNCTION TESTS, 640
- LIVER INJURY
  - DRUG-INDUCED, 7406*
  - HYDROCARBONS, CHLORINATED, 2922
- STEROIDS
  - ADRENAL GLANDS, 1651
  - LIVER, 1651
- ULCER, PEPTIC
  - VITAMINS, 389

OXYGEN

- ABDOMEN
  - SURGERY, 7583
- ACID SECRETION
  - PROSTAGLANDINS, 968
- FLUOROCARBONS
  - THERAPY, 3097
- HEPATITIS
  - THERAPY, 8075
- HEPATITIS, CHRONIC
  - THERAPY, 692
- HEPATITIS, TOXIC
  - THERAPY, 8075
- ILEUM
  - CIRCULATION, 2126
  - ISCHEMIA, 3866*
- INTESTINAL OBSTRUCTION
  - CIRCULATION, 4707*
  - SIMULATION, 5310*
  - THERAPY, 5675
- INTESTINE, SMALL
  - CIRCULATION, 4707*
  - DISTENTION, 4707*
  - ISCHEMIA, 3866*
  - PARASITES AND PARASITIC DISEASES, 3882
- LIVER
  - GALACTOSE, 3782
  - HORMONE CONTROL, 7995*
  - HORMONES, 2042
  - HYPOXIA, 3750*
  - KINETICS, 2042

OXYGEN (continued)
- LIVER (continued)
  - NERVOUS CONTROL, 6757*
  - ORGAN CULTURE, 2689
  - PEPTIDES, 7995*
  - PITUITARY GLAND, 7995*
- LIVER CIRRHOSIS
  - THERAPY, 692
- LIVER INJURY
  - THERAPY, 8075
- STOMACH
  - CELLS, 3684
  - ELECTROPHYSIOLOGY, 3006
  - ISCHEMIA, 3006
  - METABOLISM, 1894
  - MOTILITY, 2771
  - SECRETAGOGUES, 1894
  - WOUNDS AND INJURIES, 1909

OXYTOCIN
- HYPERBILIRUBINEMIA
  - NEONATE, 5842*
- JAUNDICE
  - NEONATE, 5842*

PAIN
- ABDOMEN
  - AMYLASES, 6387
  - CHILD, 2620
  - PANCREATITIS, 6387
  - PSYCHOLOGICAL FACTORS, 2620
  - THERAPY, 2620
- ESOPHAGITIS, 3127*
- ESOPHAGUS
  - REFLUX, 3127*
- HEPATITIS
  - DIAGNOSIS, 1546
- INTESTINE, SMALL
  - SURGERY, 5682
- LIVER CIRRHOSIS
  - ABDOMEN, 8405
- LIVER DISEASES
  - THERAPY, 585
- PANCREAS, 7733
  - BIOPSY, 4976*
  - DIAGNOSIS, 4976*
- PANCREATIC DISEASES, 3336*
- PANCREATITIS, 3336*
  - CHOLANGIOGRAPHY, 2429*
  - PANCREATOGRAPHY, 2429*
  - RADIOLOGY, 2429*
- PYLOROPLASTY
  - COMPLICATIONS, 6936
- STOMACH
  - ACID SECRETION, 7980
  - SECRETION, 7980
- ULCER, PEPTIC, 6232
  - ANTACIDS, 2283*
  - THERAPY, 5625*
- VAGOTOMY
  - COMPLICATIONS, 6936

PANCREAS
- ABSCESS
  - COMPLICATIONS, 3333
  - MICROORGANISMS, 3332
- ABSORPTION
  - AMINO ACIDS, 7933
  - CARBOHYDRATES, 7933

PANCREAS (continued)
- ACETYLCHOLINE
  - ENZYMES, 115, 996
  - LIPASE, 2848
  - NUCLEOTIDES, 115
  - PROTEINS, 2848
- ACIDITY
  - SECRETION, 1337*
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - DOPAMINE, 1947
  - ENZYMES, 2845
  - HORMONE EFFECTS ON, 2845
  - SECRETIN, 986, 1947, 2845
- ADENOSINE TRIPHOSPHATE
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 6059*
- ADENYL CYCLASE
  - CHOLECYSTOKININ, 2853
  - HORMONES, 118, 990
  - PANCREOZYMIN, 2853
  - SECRETIN, 118, 2853
- ADRENERGIC RECEPTOR BLOCKADERS
  - SECRETION, 2856
- ALCOHOLISM, 6369
  - PARASYMPATHOMIMETICS, 7367*
- ALCOHOLS
  - HORMONE EFFECTS ON, 1931*
  - NERVOUS CONTROL, 1957
  - OXIDATION, 3726*
  - PARASYMPATHOMIMETICS, 1957
  - SECRETIN, 1956
- AMINO ACIDS
  - METABOLISM, 2842, 3734
  - TRANSPORT, 2841
- AMYLASES
  - ACIDS, 2837*
  - CHOLECYSTOKININ, 3724*
  - HORMONE CONTROL, 7985*
  - HORMONES, GASTROINTESTINAL, 1936
  - HYDROLYSIS, 6064
  - IONOPHORES, 1958
  - PANCREOZYMIN, 3724*
  - PARASYMPATHOMIMETICS, 4602
  - SECRETIN, 3724*
  - SECRETION, 4603
  - STARVATION, 4595*
- ANESTHESIA
  - AMYLASES, 3727*
  - LIPASE, 3727*
  - NUCLEIC ACIDS, 3727*
  - PROTEINS, 3727*
- ANEURYSM
  - ARTERIES, 2433*
  - HEMORRHAGE, 7734*
- ANOMALY, 3328*
  - DIAGNOSIS, 2179*
  - ENDOSCOPY, 1219, 2410*, 6179
  - HEMORRHAGE, 7734*
  - NEOPLASMS, BENIGN, 2410*
  - PANCREATOGRAPHY, 6179
  - RADIOLOGY, 2410*
  - SIMULATION, 2410*
- ANTISPASMODICS
  - ENZYMES, 3742
- ARTERIES
  - RADIOISOTOPES, 3899
  - SCANNING, SCINTILLATION, 3899

PANCREAS (continued)
- ASCITES
  - ANTIGENS, 2412*
  - CALCIFICATION, 5781
  - DIAGNOSIS, 3325*
  - ETIOLOGY, 7724*
  - NEOPLASMS, 7724*
  - PANCREATOGRAPHY, 3325*, 7724*
- ATROPHY, 6749
- BICARBONATE SECRETION, 1942, 2836*
  - ACIDITY, 1933, 1939, 1949, 5387*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 114
  - ALCOHOLS, 1931*, 4683*, 7368*
  - ANESTHETICS, 7372*
  - ATROPINE, 8182
  - CERULEIN, 4234
  - CHOLAGOGUES AND CHOLERETICS, 6753
  - CHOLECYSTOKININ, 4234
  - DIETARY FACTORS, 5387*
  - DIURETICS, 4590*
  - DOPAMINE, 3740
  - DRUG EFFECTS ON, 3740, 3749*, 4590*, 4683*, 5390*, 6753, 7368*, 7372*, 7731
  - FATS, 5358*
  - FOOD, 1939
  - GASTRIN, 1922
  - HORMONE EFFECTS ON, 4234, 4588*, 4593*, 5386*, 6060*
  - HORMONES, GASTROINTESTINAL, 4593*, 5388*
  - HYPERGLYCEMIA, 7380
  - MUSCLE RELAXANTS, 5390*
  - PARASYMPATHOMIMETICS, 4594*
  - PARENTERAL ALIMENTATION, 1940
  - PEPTIDES, 4592*
  - RADIATION EFFECTS ON, 983*
  - SECRETIN, 986, 3860, 4593*, 5386*, 5388*
  - SOMATOSTATIN, 1949, 6060*
  - THYROCALCITONIN, 4588*
  - ULCER, PEPTIC, 8182
  - VAGOTOMY, 2287*
- BILE DUCTS
  - OBSTRUCTION, 5433*
- BILIARY TRACT DISEASES
  - ENDOSCOPY, 283
- BIOPSY
  - JAUNDICE, 4976*
  - PAIN, 4976*
  - TECHNIQUES, 4976*, 7069
- BLOOD
  - ELECTROPHYSIOLOGY, 1224
- CADMIUM
  - EXCRETION, 6066
- CALCIUM, 4585*
  - ENZYMES, 110, 111, 995
  - IONOPHORES, 1958
  - SYMPATHOMIMETICS, 7369*
  - TRANSPORT, 45
- CALCULI
  - PANCREATITIS, CHRONIC, 7078*
- CARCINOEMBRYONIC ANTIGEN
  - NEOPLASMS, 1440*
  - PANCREATITIS, 1440*
  - PLASMA, 1440*
- CARCINOGENS
  - HYPERTROPHY, 3037

PANCREAS (continued)
- CELIAC DISEASE
  - SECRETION, 2357
- CELLS
  - HORMONES, GASTROINTESTINAL, 5272
  - MEMBRANES, 2679*
  - SOMATOSTATIN, 3744
  - ULTRASTRUCTURE, 2680
- CERULEIN
  - ADENYL CYCLASE, 1758
  - BINDING, 1758, 4600
- CHOLANGIOGRAPHY, 3950
  - CONTRAST MEDIA, 3118
- CHOLECYSTITIS
  - ENZYMES, 4378
- CHOLECYSTOKININ
  - BIOASSAY, 5394
  - CALCIUM, 1941
  - ENZYMES, 115, 1941
  - MORPHOLOGY, 999
  - NUCLEOTIDES, 115
  - SECRETION, 1944
- CHOLELITHIASIS
  - NEOPLASMS, MALIGNANT, 564
- CHOLERA
  - ENZYMES, 5505
- CHYMOTRYPSIN, 3122
  - HORMONES, GASTROINTESTINAL, 1936
- CHYMOTRYPSINOGEN
  - ENZYMES, 1930*
  - TRYPSIN, 1930*
- CIRCULATION
  - ELECTROPHYSIOLOGY, 1224
- COMPUTERS
  - TOMOGRAPHY, 3119
- CONTRAST MEDIA
  - ANGIOGRAPHY, 286
  - ENDOSCOPY, 281, 282, 1439*, 2218, 3113
  - MORPHOLOGY, 2159
  - PANCREATITIS, 2159, 2218
  - TECHNIQUES, 3113
  - ULTRASONOGRAPHY, 286
- CYSTIC FIBROSIS
  - CHILD, 4214*
  - CLEARANCE STUDY, 2414*
- CYSTS
  - DIAGNOSIS, 3346, 7727
  - ENDOSCOPY, 7727
  - LIPASE, 3346
  - PANCREATOGRAPHY, 3346, 7727
- DIABETES
  - INSULIN, 1747*
  - MORPHOLOGY, 1747*
  - SIMULATION, 1747*
- DIAGNOSIS
  - JAUNDICE, 4976*
  - PAIN, 4976*
- DIARRHEA
  - NEOPLASMS, 1686
  - ZOLLINGER-ELLISON SYNDROME, 1686
- DIGESTION
  - CARBOHYDRATES, 7933
  - CATECHOLAMINES, 218
  - DRUG EFFECTS ON, 218
  - PROTEINS, 1960, 7933
- DISEASE
  - ANGIOGRAPHY, 7608*
  - CHILD, 5191

PANCREAS (continued)
  DRUG EFFECTS ON
    ALKALOIDS, 7371*
  DUODENUM
    DISEASE, 7608*
    LIPIDS, 218
    ULCER, 1348
  ELECTRICAL CONTROL
    PARASYMPATHOMIMETICS, 4594*
  EMBRYOLOGY, 5266*
  ENDOSCOPY, 3120, 3950
    ACIDS, 2843
    PANCREATOGRAPHY, 6151*, 6359*
    REVIEW, 1223
    SECRETIN, 2843
    SECRETION, 2843
    TECHNIQUES, 280, 2843, 3117, 5523
  ENZYMES, 4598, 7989
    ACETYLCHOLINE, 3742
    BILE, 2419
    BINDING, 2419
    BIOCHEMISTRY, 1952
    CERULEIN, 3742, 4234
    CHENODEOXYCHOLIC ACID, 1955
    CHOLECYSTOKININ, 4234
    CIRCADIAN RHYTHM, 3843, 7377
    DIABETES, 7986*
    DIETARY FACTORS, 7377
    DRUG EFFECTS ON, 3739, 5389*
    GLUCOSE, 3742
    HORMONE EFFECTS ON, 4234, 7373*
    HYPERGLYCEMIA, 7986*
    MORPHOLOGY, 4599
    PARASYMPATHOMIMETICS, 4602
    RADIATION EFFECTS ON, 983*
    SECRETION, 1961, 4599, 5433*, 7723*
    SYMPATHOMIMETICS, 7369*
    VITAMIN B12, 2419
  FATS
    EXCRETION, 6371
    NECROSIS, 3326*
  FATTY ACIDS
    ALCOHOLISM, 3743
    METABOLISM, 2772*
  FEEDING
    ENZYMES, 997
  FISTULA, 7828
    DIAGNOSIS, 3334
    ENDOSCOPY, 6376
    PANCREATOGRAPHY, 3334
    SURGERY, 6376, 7729
  FOOD
    DIGESTION, 2967
  GALLBLADDER
    ANOMALY, 2432*
  GASTRECTOMY
    ATROPHY, 2288*
  GASTRIN
    NEOPLASMS, 2625
    SURGERY, 2625
  GLUCAGON
    BICARBONATE SECRETION, 2855
    SECRETION, 2855
  GLUCOSE
    HYPERGLYCEMIA, 2856
    HYPERPHAGIA, 2856
    NERVOUS CONTROL, 2856
    SECRETION, 2856

PANCREAS (continued)
  GLYCOPROTEINS
    TRANSPORT, 2835*
  GUANYL CYCLASE
    ALCOHOLS, 7338*
  HEPATITIS, CHRONIC
    AMYLASES, 3370*
  HETEROTOPIA
    DIAGNOSIS, 5784
  HORMONE CONTROL
    DUODENUM, 2969
  HORMONES, 7983*
    BINDING, 116, 1002
    ENZYMES, 111
    REVIEW, 8125
    SECRETION, 6061
  HORMONES, GASTROINTESTINAL
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 996
    AMYLASES, 2849
    ENZYMES, 996, 997
    GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 996
    SECRETION, 1950, 2849
  HYPOPLASIA, 4218
    ENTEROKINASE, 5700*
  ILEUM
    GROWTH SUBSTANCES, 5443*
    MORPHOLOGY, 2851
  INFLAMMATION
    DRUG THERAPY, 2427
    FISTULA, 7729
    STEROIDS, 2427, 7736*
  INSULIN, 806
    MORPHOLOGY, 1747*
  INTESTINE, SMALL
    ATROPHY, 6061
    BILE, 5293*
    HYPOPLASIA, 2851
    LACTATION, 5293*
    SECRETION, 2851, 2930, 3585*, 5293*
  INTESTINES, 5457
    DEFICIENCY, 5457
    SECRETION, 5457
  ISCHEMIA
    PEPTIDE HYDROLASES, 4713*
  JAUNDICE, OBSTRUCTIVE
    CYSTS, 7228
    NEOPLASMS, 2579*
  JEJUNUM
    MORPHOLOGY, 2851
    SECRETION, 4688
    SURGERY, 1439*
  LEUKEMIA
    COMPLICATIONS, 6419*
  LIPASE
    CIRCADIAN RHYTHM, 7377
    DIETARY FACTORS, 7377
    EXTRACTS, TISSUE, 1079
    HORMONES, GASTROINTESTINAL, 1936
  LIPIDS
    METABOLISM, 3737
  LIVER CIRRHOSIS
    PANCREOZYMIN, 8401*
    SECRETIN, 8401*
  LIVER CIRRHOSIS, OBSTRUCTIVE
    NEOPLASMS, MALIGNANT, 564

- PANCREAS (continued)
  - LIVER DISEASES
    - AMYLASES, 3370*
  - MEMBRANES
    - ULTRASTRUCTURE, 2679*
  - MENETRIER'S DISEASE
    - NEOPLASMS, MALIGNANT, 1251
  - MORPHOLOGY, 3328*, 3597
    - DRUG EFFECTS ON, 6683*
  - NARCOTICS
    - DRUG EFFECTS ON, 1962
  - NECROSIS, 8270
    - DIAGNOSIS, 4225
    - DRUG-INDUCED, 2854
    - HISTOCHEMISTRY, 3747
    - PATHOLOGY, 2854
    - REVIEW, 2854
    - THERAPY, 6368
  - NEOPLASM METASTASIS, 7726*
    - HYPERCALCEMIA, 5776
    - ULCER, PEPTIC, 5776
  - NEOPLASMS, 4213*, 7726*
    - ANGIOGRAPHY, 3050*, 6362*
    - CALCULI, 1706
    - CARCINOEMBRYONIC ANTIGEN, 5779
    - DIAGNOSIS, 1927*, 2411*, 2424, 3050*, 4985, 5782, 6180, 6183, 6362*
    - DRUG THERAPY, 6373
    - ENDOSCOPY, 3050*, 5523, 6362*
    - HEMORRHAGE, 7734*
    - IMMUNOGLOBULINS, 2857
    - LIVER, 4213*
    - OCCUPATIONAL FACTORS, 6375
    - PANCREATOGRAPHY, 3050*
    - PATHOLOGY, 3328*
    - RADIOLOGY, 1222
    - RADIONUCLIDES, 3050*
    - RADIOTHERAPY, 6373
    - RISK FACTORS, 5782
    - SCANNING, SCINTILLATION, 6183
    - SURGERY, 6362*, 6373
    - SURVIVAL, 5775, 6375
    - TOMOGRAPHY, 4985
    - ULTRASONOGRAPHY, 3050*, 6180
    - ZOLLINGER-ELLISON SYNDROME, 1706
  - NEOPLASMS, BENIGN
    - BIOCHEMISTRY, 2420
    - CYSTS, 520*
    - JAUNDICE, OBSTRUCTIVE, 525
    - SURGERY, 520*
  - NEOPLASMS, MALIGNANT
    - AMINO ACIDS, 2425
    - ANGIOGRAPHY, 6361*
    - ANTIGENS, 2412*
    - BICARBONATE SECRETION, 5773*
    - BIOPSY, 6361*
    - CARCINOEMBRYONIC ANTIGEN, 5773*
    - COMPLICATIONS, 4017
    - CYTOLOGY, 5771*
    - DIAGNOSIS, 3346, 5771*, 5773*, 6361*, 7073, 7725*, 8493
    - DRUG-INDUCED, 3746, 4984
    - DRUG THERAPY, 4216, 6360*
    - ENDOSCOPY, 5771*, 6361*, 7073, 7725*
    - ENZYMES, 5773*, 7861
    - GLUCURONIDASE, 527
    - HORMONES, 7861

- PANCREAS (continued)
  - NEOPLASMS, MALIGNANT (continued)
    - LIPASE, 3346
    - NECROSIS, 3326*
    - PANCREAS FUNCTION TESTS, 288
    - PANCREATOGRAPHY, 3346, 5771*, 6361*, 7073, 7725*
    - RADIATION, 4216
    - SECRETION, 5773*
    - THERAPY, 524
    - ULTRASONOGRAPHY, 6361*
    - ULTRASTRUCTURE, 3326*
  - NERVOUS CONTROL
    - ALCOHOLISM, 5391*
    - DRUG EFFECTS ON, 5391*
    - FETUS, 6747*
    - NEONATE, 6747*
  - NERVOUS SYSTEM
    - EMBRYOLOGY, 140
  - NOREPINEPHRINE
    - ENZYMES, 3742
  - NUCLEOTIDES
    - ENZYMES, 110
  - OBSTRUCTION, 2178*
    - DIAGNOSIS, 2178*
  - ORGAN CULTURE
    - TECHNIQUES, 3900
  - PAIN, 7733
  - PANCREATIC DISEASES
    - ENDOSCOPY, 283
  - PANCREATITIS
    - PATHOLOGY, 3328*
    - SCANNING, SCINTILLATION, 1225
    - SECRETION, 1225, 5481*
    - SERUM, 5481*
  - PANCREATITIS, CHRONIC
    - SECRETION, 2221
  - PANCREATOGRAPHY, 3950
    - TECHNIQUES, 3976
  - PARASYMPATHOMIMETICS
    - FETUS, 1943
    - HORMONES, ADRENAL CORTEX, 1943
    - NEONATE, 1943
  - PATHOLOGY
    - HORMONES, ADRENAL CORTEX, 6752
  - PENTAGASTRIN
    - SECRETION, 1944
  - PEPTIDASE
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - PEPTIDES
    - AMYLASES, 2849
    - DIETARY FACTORS, 1928*
    - HORMONE EFFECTS ON, 1928*
    - RADIOIMMUNOASSAY, 1927*
    - SECRETION, 1928*, 2849
    - VAGOTOMY, 1928*
  - PERFUSION
    - ALDEHYDES, 993
    - TECHNIQUES, 3900
  - PROSTAGLANDINS
    - SECRETION, 99, 2859
  - PROTEINS
    - ACETYLCHOLINE, 1954
    - BILE ACIDS AND SALTS, 1963
    - ENZYMES, 997, 1961
    - HORMONE EFFECTS ON, 3724*, 5385*, 7373*
    - PARASYMPATHOMIMETICS, 4594*, 4602

PANCREAS (continued)
- PROTEINS (continued)
  - PEPTIDES, 1960
  - SECRETION, 1942, 2834*, 5385*
  - SYMPATHOMIMETICS, 7369*
  - SYNTHESIS, 1934, 3724*, 5385*, 7987*
  - TRACER STUDY, 2834*
  - TRANSPORT, 894
  - TRYPSIN, 1963
- PSEUDOCYSTS
  - ARTERIOGRAPHY, 5521*
  - ASCITES, 3325*
  - BLEEDING, 1444
  - COMPLICATIONS, 4217, 6366*
  - DIAGNOSIS, 5521*, 6182, 6366*, 8269
  - DIARRHEA, 4217
  - ENDOSCOPY, 6366*
  - HEMATOBILIA, 1444
  - HEMORRHAGE, 6365*
  - HORMONES, GASTROINTESTINAL, 4217
  - INFANT, 6374
  - PANCREATOGRAPHY, 6366*
  - SURGERY, 6365*
  - ULTRASONOGRAPHY, 6182, 6372, 8269
- RADIOLOGY, 3120
  - ANOMALY, 2179*
  - ENDOSCOPY, 2217
  - TECHNIQUES, 2217, 3114
- REGENERATION, 5266*
- SCANNING, SCINTILLATION, 1217, 6853*
  - CYSTS, 1442
  - DYES, 2833*
  - RADIOISOTOPES, 2833*
  - REVIEW, 8332
  - TECHNIQUES, 3978, 5540
  - THERAPY, 1226
- SCLERODERMA
  - SECRETION, 3327*
- SECRETAGOGUES, 4585*
  - BIOASSAY, 5394
  - CHEMICAL COMPOSITION, 88
- SECRETIN, 4999, 7983*
  - ACIDITY, 1949, 5387*
  - BIOASSAY, 5394
  - CHYMOTRYPSIN, 2840
  - DIETARY FACTORS, 5387*
  - ENZYMES, 2840
  - GROWTH FACTORS, 1138
  - HORMONE EFFECTS ON, 1946, 6060*
  - METABOLISM, 7381
  - NICOTINE, 982*
  - PLASMA, 7374*
  - SECRETION, 1944
  - SOMATOSTATIN, 1949, 6060*
  - TECHNIQUES, 7374*
- SECRETION, 3728, 5000, 6754, 7068
  - ACETYLCHOLINE, 1954
  - ACIDS, 1942
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 987, 2853, 4585*
  - ADENYL CYCLASE, 2853
  - ADRENERGIC RECEPTOR AGONISTS, 4586*
  - ADRENERGIC RECEPTOR BLOCKADERS, 4586*
  - AGE FACTORS, 2846, 6748, 7988
  - ALCOHOLISM, 3743

PANCREAS (continued)
- SECRETION (continued)
  - ALCOHOLS, 112, 1931*, 1957, 4601, 4683*, 7368*
  - AMINO ACIDS, 4677*
  - AMYLASES, 1936, 2837*, 3735, 5389*, 5442*, 7370*, 7984*, 7985*
  - ANESTHETICS, 7372*
  - ANTIHORMONES, 1942
  - ANTRUM, 3729
  - CALCIUM, 112, 113, 988
  - CARBOXYPEPTIDASES, 1959
  - CATECHOLAMINES, 3730
  - CHOLANGIOGRAPHY, 8267*
  - CHOLECYSTOKININ, 981, 1937, 2852
  - CHYMOTRYPSIN, 1936, 5442*, 7982*
  - CHYMOTRYPSINOGEN, 1930*
  - CIRCADIAN RHYTHM, 6750
  - DEFICIENCY, 6371
  - DIABETES, 5168*
  - DIAGNOSIS, 8267*
  - DIET, 1932, 5392
  - DIETARY FACTORS, 991, 3735
  - DIGESTION, 1932
  - DIURETICS, 4590*
  - DOPAMINE, 3730, 4587*
  - DRUG EFFECTS ON, 994, 2847, 3749*, 4590*, 4604, 4683*, 5389*, 5390*, 6683*, 6752, 7368*, 7370*, 7371*, 7372*, 7570, 7731
  - ELECTROLYTES, 992, 1951, 4590*
  - ENDOSCOPY, 3117
  - ENTERECTOMY, 3741, 5443*
  - ENZYMES, 985, 991, 1935, 2836*, 3729, 3735, 3735, 4602, 5389*, 5390*, 5442*, 6751, 7371*, 7731, 7984*
  - EPINEPHRINE, 3730
  - FATTY ACIDS, 3743
  - FEEDING, 3735
  - FETUS, 6747*
  - FISTULA, 5392
  - GASTRECTOMY, 7571
  - GASTRIN, 959, 4591*
  - GLYCOPROTEINS, 2835*
  - HORMONE CONTROL, 2969, 7985*
  - HORMONE EFFECTS ON, 1936, 3724*, 4588*, 4999, 5442*, 7375*
  - HORMONES, 117
  - HORMONES, ADRENAL CORTEX, 6752
  - HORMONES, GASTROINTESTINAL, 5388*
  - HYPERALIMENTATION, 989, 2844
  - HYPERGLYCEMIA, 7380
  - IMMUNOGLOBULINS, 2857, 6067
  - KINETICS, 1938
  - LIPASE, 1936, 3735, 5389*, 5442*
  - MAGNESIUM, 113
  - MARKER STUDY, 248
  - MORPHOLOGY, 109, 7366*
  - MUSCLE RELAXANTS, 5390*
  - NEONATE, 6747*
  - NEOPLASMS, 8267*
  - NERVOUS CONTROL, 1937, 2847, 3730, 3731, 6747*
  - NICOTINE, 982*
  - NOREPINEPHRINE, 3730, 4586*
  - PANCREATITIS, 531
  - PANCREOZYMIN, 981, 1937, 2852
  - PARASYMPATHOMIMETICS, 6747*

PANCREAS (continued)
- SECRETION (continued)
    - PEPTIDES, 1927*, 4592*
    - PERFUSION, 984
    - PROSTAGLANDINS, 6745*
    - PROTEINS, 2160, 4585*, 4602, 7376, 7380
    - RADIATION EFFECTS ON, 983*
    - REVIEW, 2847, 3987, 8125
    - SECRETIN, 117, 984, 998, 1945, 2855, 3731, 5387*, 5388*, 7374*
    - SHUNT, INTESTINAL, 521
    - SIMULATION, 992, 1926*, 1951
    - STEROIDS, 2862
    - SULFATES, 4583*
    - SYMPATHOMIMETICS, 1948, 3730
    - TECHNIQUES, 989, 3976
    - THYROCALCITONIN, 4588*
    - TRANSPLANTATION, 5393
    - TRYPSIN, 2863, 3735, 7723*, 7982*
    - TRYPSIN INHIBITORS, 521
    - TRYPSINOGEN, 1930*
    - ULCER, 1348
    - ULCER, PEPTIC, 6929
    - ULTRASTRUCTURE, 4492*
    - VAGOTOMY, 1746*
    - VASOCONSTRICTOR AGENTS, 4586*
    - VASODILATOR AGENTS, 4586*
    - WATER, 4590*
    - WATER, ELECTROLYTE BALANCE, 1926*
- SJOGREN'S SYNDROME
    - SECRETION, 3327*
- SOMATOSTATIN
    - SECRETION, 3038
    - TRIGLYCERIDES, 3038
- STOMACH
    - ANOMALY, 4977*
    - CHILD, 5191
    - ECTOPIA, 3157
    - RADIOLOGY, 2179*
    - SURGERY, 5494
- SURGERY, 3120
    - ENDOSCOPY, 4980, 6154
    - NUTRITION, 5780
    - PANCREATOGRAPHY, 4980
    - PATHOLOGY, 3901
    - REGENERATION, 2163
- SYNTHESIS
    - AMYLASES, 2837*
- THYROID GLAND
    - HORMONES, 2111
- TOMOGRAPHY, 6367*, 6853*
    - ANALYSIS, 6856*
    - COMPUTERS, 6192
    - DIAGNOSIS, 6855*
    - TECHNIQUES, 6856*
    - ULTRASONOGRAPHY, 6855*
- TOXICOLOGY
    - DIETARY FACTORS, 2162
- TRANSPLANTATION, 3533
    - DUODENUM, 5482*
    - HYPOTHERMIA, 1130
    - INSULIN, 5482*
    - PERFUSION, 1130
    - SIMULATION, 1129
- TRANSPORT
    - AMINO ACIDS, 7987*
    - HISTOCHEMISTRY, 4491*
    - MEMBRANES, 4491*

PANCREAS (continued)
- TRANSPORT (continued)
    - ULTRASTRUCTURE, 4491
- TRYPSIN
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
    - FEEDING, 1636
    - INTESTINE, SMALL, 7723*
    - PHYSICAL FACTORS, 1636
- TRYPSIN INHIBITORS
    - CHEMICAL COMPOSITION, 1000, 1001
    - DRUG EFFFECTS ON, 3331
    - ENZYMES, 2863
    - MORPHOLOGY, 2863
    - PROTEINS, 2863
- TRYPSINOGEN
    - ENZYMES, 1930*
- ULCER, PEPTIC, 7602
- ULTRASONOGRAPHY, 6151*, 6181, 6359*
    - CYSTS, 1231
    - MORPHOLOGY, 284
    - NEOPLASMS, 1231
    - PANCREATITIS, CHRONIC, 1231
    - REVIEW, 8132
    - TECHNIQUES, 7547
    - TOMOGRAPHY, 2214
- ULTRASTRUCTURE, 2835*, 3597
- VAGOTOMY
    - SECRETION, 5494
    - SIMULATION, 1746*
    - ULTRASTRUCTURE, 1746*
- VASOCONSTRICTOR AGENTS
    - NOREPINEPHRINE, 4586*
- VASODILATOR AGENTS
    - ADRENERGIC RECEPTOR AGONISTS, 4586*
    - DOPAMINE, 4587*
- VEINS
    - FETUS, 5998
    - ULTRASTRUCTURE, 5998
- VITAMIN B12, 897
    - ABSORPTION, 1779*
    - BINDING, 3835*
    - SECRETION, 1779*
- WOUNDS AND INJURIES
    - ALCOHOLS, 2441
    - DIAGNOSIS, 6195
    - FISTULA, 7729
- ZINC, 8134
- ZOLLINGER-ELLISON SYNDROME
    - IMMUNOGLOBULINS, 2857

PANCREAS FUNCTION TESTS
- ANESTHESIA
    - HORMONE EFFECTS ON, 2861
    - SECRETION, 2861
- CHYMOTRYPSIN
    - FECES, 3122
- CLEARANCE STUDY
    - AMYLASES, 2993*
- DUODENUM
    - ULCER, PEPTIC, 6929
- GASTRECTOMY
    - BICARBONATE SECRETION, 2288*
    - STEATORRHEA, 2288*
- HEPATITIS, INFECTIOUS
    - AMYLASES, 6463*
- NUTRITION DISORDERS
    - DIETARY FACTORS, 2416*

PANCREAS FUNCTION TESTS (continued)
    NUTRITION DISORDERS (continued)
        SECRETIN, 2416*
    PANCREAS
        NEOPLASMS, MALIGNANT, 288
    PANCREATIC DISEASES
        DIAGNOSIS, 4212*, 4597, 5774*
        NEOPLASMS, 5778
        PATHOLOGY, 2220
        PEPTIDES, 1230
        REVIEW, 4597
    PANCREATITIS
        DIAGNOSIS, 5774*
        RADIOLOGY, 2429*
    PANCREATITIS, CHRONIC
        DIAGNOSIS, 4997
        TECHNIQUES, 2850, 8271*
    PANCREATOGRAPHY, 4212*
    REVIEW, 8125
    SCANNING, SCINTILLATION, 4212*
        TECHNIQUES, 6148
    SECRETIN
        DIETARY FACTORS, 2416*
        PANCREOZYMIN, 1228
    SECRETION
        HORMONE EFFECTS ON, 2861
    TECHNIQUES, 6178
        PANCREOZYMIN, 1228

PANCREATECTOMY
    ABSORPTION
        VITAMIN B12, 1780*
    GASTRIN
        SOMATOSTATIN, 3225
    IMMUNOLOGY, 4232
    INTESTINE, SMALL
        SECRETION, 3838
    LIPIDS
        ABSORPTION, 174*
    NEOPLASMS
        PROGNOSIS, 2422
        REVIEW, 2423
        SEQUELAE, 2421
        SURGERY, 4215
        TECHNIQUES, 2421
    PANCREATITIS
        BLEEDING, 2161
        PROGNOSIS, 2422
        SEQUELAE, 2421
        TECHNIQUES, 2421
    PANCREATITIS, CHRONIC, 8280
        COMPLICATIONS, 2422, 3351
        PROGNOSIS, 2422, 3351, 4994, 7739
        REVIEW, 2422
    PEPTIDES, 4578
    REGENERATION
        HYPERPLASIA, 2839*
        HYPERTROPHY, 2839*
    TECHNIQUES, 1780*, 4215
    ZOLLINGER-ELLISON SYNDROME
        THERAPY, 1705

PANCREATIC DISEASES
    ABSORPTION
        BILE ACIDS AND SALTS, 4909*
        ELECTROLYTES, 4391*
        VITAMIN B12, 1441*
        WATER, 4391*

PANCREATIC DISEASES (continued)
    AMYLASES, 3121
        DIAGNOSIS, 5788*
    ANGIOGRAPHY
        DRUGS, 1221
        HEMORRHAGE, 7734*
    BREATH TEST
        CARBON DIOXIDE, 4909*
    CALCULI
        CHEMICAL COMPOSITION, 2428
    CARCINOEMBRYONIC ANTIGEN
        DIAGNOSIS, 1440*
    CELLS
        AUTODIGESTION, 2417*
    CERULEIN
        AMYLASES, 3938*
        BICARBONATE SECRETION, 3938*
        ENZYMES, 3938*
    CHILD
        DISEASES ASSOCIATED WITH, 2463*
        LIVER DISEASES, 2463*
    CHOLANGIOGRAPHY
        ENDOSCOPY, 283
        PANCREATOGRAPHY, 5154*
    CHOLERA
        ABSORPTION, 4391*
        SECRETION, 4391*
    CYSTS
        CHILD, 5244*
    DIAGNOSIS, 1220
        AMYLASES, 3975
        ANGIOGRAPHY, 7070
        CHOLECYSTOKININ, 4981
        COMPUTERS, 4985
        ENDOSCOPY, 3049*, 5774*, 6151*, 6359*, 7071
        ENZYMES, 3975
        LAPAROSCOPY, 7070
        LIPASE, 3975
        PANCREAS FUNCTION TESTS, 4212*, 4597, 5774*
        PANCREATOGRAPHY, 3049*, 5774*, 6151*, 6359*, 7071
        REVIEW, 1573*
        TECHNIQUES, 3975
        TOMOGRAPHY, 4985
        TRYPSIN, 5520*
        ULTRASONOGRAPHY, 6151*, 6180, 6182, 6359*, 7070, 7547, 8132
    DUODENOSCOPY
        DIAGNOSIS, 8439
        THERAPY, 8439
    DUODENUM
        ENZYMES, 7722*
    ENDOSCOPY
        PANCREATOGRAPHY, 6359*
        REVIEW, 4018
    ETIOLOGY
        REVIEW, 3747
    H2 RECEPTOR ANTAGONISTS
        DRUG THERAPY, 2415*
    HISTOCHEMISTRY
        TECHNIQUES, 3747
    HYPERGLYCEMIA
        SIMULATION, 3121
    MALABSORPTION SYNDROMES
        VITAMIN B12, 871*
    NECROSIS
        FATS, 7732

PANCREATIC DISEASES (continued)
- NEOPLASMS
  - PANCREAS FUNCTION TESTS, 5778
- OXALATES
  - EXCRETION, 6586*
- PAIN, 3336*
- PANCREAS
  - ENDOSCOPY, 283
- PANCREAS FUNCTION TESTS
  - PATHOLOGY, 2220
  - PEPTIDES, 1230
  - REVIEW, 4597
- PANCREATIC DUCT
  - RADIOLOGY, 2215, 2216
  - ULTRASONOGRAPHY, 2215
- PANCREATOGRAPHY
  - PROGNOSIS, 5154*
  - ULTRASONOGRAPHY, 3330
- RADIOLOGY
  - DIAGNOSIS, 3977
  - STATISTICAL STUDY, 3977
- SALIVARY GLANDS
  - AMYLASES, 5788*
  - SURGERY, 5777
- SCANNING, SCINTILLATION
  - DIAGNOSIS, 287
  - LIVER, 287
  - TECHNIQUES, 3983
- SECRETION
  - ELECTROLYTES, 4391*
  - IMMUNOGLOBULINS, 2857
  - WATER, 4391*
- SERUM
  - GLUCURONIDASE, 527
- SIMULATION
  - ZYMOGENS, 2418*
- STEATORRHEA
  - AGE FACTORS, 6311*
  - ETIOLOGY, 6311*
- STOMACH
  - SECRETION, 2415*
- SURGERY
  - JAUNDICE, 5161*
- THERAPY
  - ENDOSCOPY, 3049*
  - ENZYMES, 2426, 4978, 4979, 5785
- TOMOGRAPHY
  - ANGIOGRAPHY, 6854*
  - COMPUTERS, 4985, 6363*
  - NEOPLASMS, 6363*
  - ULTRASONOGRAPHY, 6854*
- TRANSPORT
  - FATTY ACIDS, 7316
- ULTRASONOGRAPHY, 6181
  - DIAGNOSIS, 285
  - TECHNIQUES, 5535
- VITAMIN B12
  - ABSORPTION, 5783
- ZYMOGENS
  - ULTRASTRUCTURE, 2417*, 2418*

PANCREATIC DUCT
- ANOMALY, 3328*, 5165
- ATROPHY
  - TECHNIQUES, 4584*
- BLEEDING
  - DIAGNOSIS, 2219
- CELLS
  - BIOCHEMISTRY, 1756, 1953

PANCREATIC DUCT (continued)
- CELLS (continued)
  - HORMONES, GASTROINTESTINAL, 1757
  - METABOLISM, 1756, 1953
  - SECRETION, 1757
- COMMON BILE DUCT
  - SURGERY, 1614
- DIGESTION
  - SURGERY, 4605
- DRAINAGE
  - SURGERY, 2848
- DUODENUM
  - DIVERTICULUM, 523
  - SURGERY, 1614
- ENDOSCOPY, 3120
  - SURGERY, 3116
- GASES
  - BILIARY TRACT, 522
  - RADIOLOGY, 522
- HETEROTOPIA
  - DIAGNOSIS, 5784
- HISTOCHEMISTRY
  - TECHNIQUES, 3747
- HYPERPLASIA
  - SURGERY, 2980
- HYPERTROPHY
  - SURGERY, 2980
- INTESTINE, SMALL
  - HYPERPLASIA, 2980
  - HYPERTROPHY, 2980
- MANOMETRY
  - PRESSURE STUDY, 5519*
- MORPHOLOGY, 3328*
  - AGE FACTORS, 7906
  - PANCREATITIS, 3350
  - SHUNT, 3350
  - SURGERY, 3350
- NECROSIS
  - HISTOCHEMISTRY, 3747
- NEOPLASMS
  - PATHOLOGY, 3328*
  - SIMULATION, 1443
- OBSTRUCTION
  - SECRETION, 3748
  - SURGERY, 734
  - TECHNIQUES, 4584*
- PANCREATIC DISEASES
  - RADIOLOGY, 2215, 2216
  - ULTRASONOGRAPHY, 2215
- PANCREATITIS
  - PATHOLOGY, 3328*
- PANCREATITIS, CHRONIC
  - MORPHOLOGY, 4990*
  - SURGERY, 4239
- RADIOLOGY, 3120
- REFLUX
  - MANOMETRY, 7199*
- SECRETION
  - HORMONE EFFECTS ON, 1757
- SURGERY, 3120
  - COMPLICATIONS, 1443
- TOMOGRAPHY, 6367*
- VATER'S AMPULLA
  - STENOSIS, 4982
- WOUNDS AND INJURIES
  - IATROGENESIS, 7589

PANCREATITIS
- ABDOMEN
  - PAIN, 6387

- PANCREATITIS (continued)
  - ABSCESS
    - COMPLICATIONS, 3333
    - DIAGNOSIS, 4992*
    - PREVENTION, 4992*
    - THERAPY, 4992*
  - ACIDOSIS
    - DRUG-INDUCED, 5787*
  - ADOLESCENCE
    - AMYLASES, 5786*
    - ETIOLOGY, 5786*
    - SURVIVAL, 5786*
    - THERAPY, 5786*
  - ALBUMINS
    - HYPOCALCEMIA, 5789*
  - ALCOHOLISM
    - ANEURYSM, 4244
    - CHOLECYSTOGRAPHY, 4991*
    - METABOLISM, 4243
  - ALCOHOLS, 4227
    - ETIOLOGY, 4222*
  - ALPHA 1 ANTITRYPSIN, 4998
  - AMYLASES
    - CLEARANCE STUDY, 4226
    - CREATININE, 3343*, 3982
    - DIAGNOSIS, 3982
    - TECHNIQUES, 1450
  - ANEURYSM
    - ARTERIES, 2433*
    - MESENTERY, 4244
  - ANGIOGRAPHY
    - COMPLICATIONS, 6391
  - ANTIBIOTICS
    - ALCOHOLISM, 526*
  - AORTOGRAPHY
    - COMPLICATIONS, 6391
  - ASCITES
    - AMYLASES, 4219*
  - BILE
    - REFLUX, 2444
  - BILIARY TRACT DISEASES
    - PROGNOSIS, 4986*
    - SURGERY, 4986*
    - THERAPY, 4986*
  - BIOCHEMISTRY
    - ENZYMES, 2420
  - BLEEDING
    - PANCREATECTOMY, 2161
    - SIMULATION, 2161
  - BONES
    - DISEASES ASSOCIATED WITH, 6392
    - ISCHEMIA, 6392
    - NECROSIS, 6392
  - CALCIFICATION, 5794
    - ALCOHOLISM, 537
  - CARCINOEMBRYONIC ANTIGEN
    - PANCREAS, 1440*
    - PLASMA, 1440*
  - CAROLI'S DISEASE
    - COLITIS, 4221*
    - DIAGNOSIS, 4221*
    - ENDOSCOPY, 4221*
  - CHILD
    - AMYLASES, 5786*, 6387
    - COMPLICATIONS, 6384
    - ETIOLOGY, 5786*
    - SURVIVAL, 5786*
    - THERAPY, 5786*

- PANCREATITIS (continued)
  - CHOLANGIOGRAPHY
    - DIAGNOSIS, 2429*
  - CHOLELITHIASIS
    - AMYLASES, 2430*
    - COMPLICATIONS, 2444
    - DIAGNOSIS, 2430*
    - DISEASES ASSOCIATED WITH, 3338*, 3344*
    - ETIOLOGY, 4222*
    - JAUNDICE, 2430*
    - PROGNOSIS, 4986*
    - SURGERY, 4986*, 7075*
    - THERAPY, 4986*
  - CLEARANCE STUDY
    - AMYLASES, 2993*, 3492*, 4787
  - CLOTTING
    - SIMULATION, 533
  - COLON
    - DISEASES ASSOCIATED WITH, 7735*
    - FISTULA, 5791*
    - INFLAMMATION, 7735*
    - NECROSIS, 7735*
    - STENOSIS, 4993
    - STRICTURE, 2431*
  - COMPLEMENT
    - ETIOLOGY, 530
    - IMMUNOLOGY, 530
  - COMPLICATIONS, 4238, 6380*
    - BACTERIAL INFECTIONS, 4236
    - CARDIOVASCULAR SYSTEM, 4236
    - COLON, 3352, 4993
    - DIARRHEA, 4217
    - ETIOLOGY, 4236
    - FISTULA, 7728
    - HYPOCALCEMIA, 7076*
    - PSEUDOCYSTS, 7728
    - RESPIRATORY SYSTEM, 4236
    - THERAPY, 4236
    - URINARY SYSTEM, 4236
  - DIAGNOSIS, 3982, 6383
    - AMYLASES, 3902, 3981
    - ANGIOGRAPHY, 3050*
    - CLEARANCE STUDY, 2993*, 3492*, 4226
    - COMPUTERS, 4985
    - ENDOSCOPY, 3050*, 5774*
    - LIPASE, 3902
    - PANCREAS FUNCTION TESTS, 5774*
    - PANCREATOGRAPHY, 5774*
    - RADIONUCLIDES, 3050*
    - SCANNING, SCINTILLATION, 3345
    - TECHNIQUES, 2435
    - TOMOGRAPHY, 4985
    - ULTRASONOGRAPHY, 3050*, 3943*, 6182
  - DIET
    - THERAPY, 3527
  - DIETARY FACTORS
    - ETIOLOGY, 2438
  - DIVERTICULUM
    - BLEEDING, 5662
    - REFLUX, 2447
  - DRAINAGE
    - SURGERY, 528
  - DRUG-INDUCED
    - ANALGESICS AND ANTIPYRETICS, 3339*
    - CERULEIN, 4589*
  - DRUG THERAPY, 3347, 3348, 4228

- PANCREATITIS (continued)
  - DUODENUM
    - BLEEDING, 5662
    - DIVERTICULUM, 2447, 5662
  - ENDOSCOPY
    - CONTRAST MEDIA, 1225
  - ENTEROVIRUSES
    - ETIOLOGY, 4222*
  - ENZYMES, 4998
    - AMYLASES, 3123
  - EPIDEMIOLOGY, 1449
  - ETIOLOGY, 3340*
    - ANOMALY, 4983
    - DIETARY FACTORS, 7080
    - DIURETICS, 4230
    - DRUGS, 4230
    - HYPERLIPEMIA, 4596*
    - REVIEW, 2443
    - VIRUSES, 3341*
  - FATTY ACIDS
    - DEFICIENCY, 7080
  - FIBRINOLYSIS
    - BLOOD, 532
  - GALLSTONES
    - COMPLICATIONS, 2444
    - ETIOLOGY, 2438
    - RADIOLOGY, 2445
  - GASTRECTOMY
    - COMPLICATIONS, 7571
  - GASTRIN
    - ALCOHOLISM, 2602
  - GASTROINTESTINAL SYSTEM
    - SURGERY, 535
  - GLUCAGON, 4987*
    - SURVIVAL, 2106*
  - HEMATOLOGY, 8273
  - HEMORRHAGE
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2838*
    - ADENYL CYCLASE, 2838*
    - ALBUMINS, 4231
    - DRUG-INDUCED, 5787*
    - SIMULATION, 4231
    - SURGERY, 7077*
  - HEPATITIS, INFECTIOUS
    - DISEASES ASSOCIATED WITH, 8376
  - HERNIA
    - DIAGNOSIS, 7081
  - HETEROTOPIA
    - GALLBLADDER, 2432*
  - HORMONES, GASTROINTESTINAL, 4217
  - HYPERLIPOPROTEINEMIA
    - ETIOLOGY, 3355
    - PATHOLOGY, 3355
  - HYPOCALCEMIA
    - ETIOLOGY, 4233
    - GLUCAGON, 4233
    - HORMONES, 4233
  - IMMUNOLOGY, 4232
    - SIMULATION, 194
  - INFLAMMATION, 4235
  - INTESTINE, LARGE
    - PERFORATION, 3333
  - INTESTINE, SMALL
    - PERFORATION, 3333
  - INTESTINES
    - PERFORATION, 3333
  - JAUNDICE
    - CHILD, 541

- PANCREATITIS (continued)
  - JAUNDICE, OBSTRUCTIVE
    - ETIOLOGY, 5002
  - KIDNEY DISEASES
    - COMPLICATIONS, 3340*
  - KIDNEYS
    - TRANSPLANTATION, 3340*
  - LIPOPROTEINS
    - LIPASE, 1451
  - LIVER
    - ENZYMES, 3732
  - LYMPH
    - DRAINAGE, 7990
  - NECROSIS
    - PATHOLOGY, 4237
    - SURGERY, 4237
  - NEOPLASMS
    - DIAGNOSIS, 2433*
    - PANCREATOGRAPHY, 5772*
  - PAIN, 3336*
    - CHOLANGIOGRAPHY, 2429*
    - PANCREATOGRAPHY, 2429*
    - RADIOLOGY, 2429*
  - PANCREAS
    - CONTRAST MEDIA, 2159, 2218
    - PATHOLOGY, 3328*
    - SCANNING, SCINTILLATION, 1225
    - SECRETION, 531, 1225, 5481*
  - PANCREATECTOMY
    - PROGNOSIS, 2422
    - SEQUELAE, 2421
    - TECHNIQUES, 2421
  - PANCREATIC DUCT
    - MORPHOLOGY, 3350
    - PATHOLOGY, 3328*
  - PANCREATITIS, CHRONIC
    - PROGNOSIS, 3337*
    - SURVIVAL, 3337*
  - PARENTERAL ALIMENTATION
    - THERAPY, 3527
  - PATHOLOGY
    - REVIEW, 2443
  - PERITONEUM, 4235
  - PREGNANCY, 6388
  - PROGNOSIS
    - REVIEW, 1446
    - STATISTICAL STUDY, 6377*
  - PSEUDOCYSTS, 4217
    - COMPLICATIONS, 6389
    - ETIOLOGY, 1447*
    - SURVIVAL, 1447*
    - THERAPY, 1447*
  - RADIOLOGY
    - COMPLICATIONS, 3352
    - PANCREAS FUNCTION TESTS, 2429*
  - REFLUX
    - MANOMETRY, 7075*
  - RETROPERITONEAL SPACE
    - RADIONUCLIDES, 6386
  - RISK FACTORS
    - STATISTICAL STUDY, 6377*
  - SECRETIN, 4999
  - SECRETION
    - CERULEIN, 289
    - DIET, 529
    - HORMONE EFFECTS ON, 4999
    - HORMONES, 289
    - IMMUNOGLOBULINS, 2857

PANCREATITIS (continued)
- SERUM
  - ALBUMINS, 5789*
  - AMYLASES, 6381
  - CALCIUM, 5789*
  - GLUCURONIDASE, 527
  - PANCREAS, 5481*
- SIMULATION
  - AMYLASE, 1450
  - DRUG THERAPY, 2436, 3736
  - GLUCAGON, 2106*
  - MESENTERY, 3733
  - MICROCIRCULATION, 3733
  - SERUM, 195*
  - TECHNIQUES, 1445*
  - THERAPY, 2106*, 2437, 3732
- SOMATOSTATIN
  - THERAPY, 2437
- STATISTICAL STUDY
  - SURVIVAL, 6377*
- STENOSIS
  - COLON, 4223*
- STRESS
  - ETIOLOGY, 4222*
- SURGERY, 4227
  - COMPLICATIONS, 534
  - ETIOLOGY, 536
  - PROGNOSIS, 8277
- THERAPY, 3347, 6383, 7990
  - ENDOSCOPY, 4996
  - HORMONES, ADRENAL CORTEX, 4229
  - JAUNDICE, 5793*
  - PANCREATOGRAPHY, 4996
  - REVIEW, 6390
- TOMOGRAPHY
  - COMPUTERS, 4985, 6382
  - ULTRASONOGRAPHY, 6382
- ULCER
  - SURGERY, 8276
- ULTRASONOGRAPHY, 4220*
  - DIAGNOSIS, 285
- URINARY SYSTEM
  - COMPLICATIONS, 1448*

PANCREATITIS, CHRONIC
- ABDOMEN
  - HEMORRHAGE, 7734*
- ALCOHOLISM
  - COMPLICATIONS, 4989*
  - GASTRIN, 3356
  - SURGERY, 2442
- ALCOHOLS
  - ETIOLOGY, 2440
  - FATS, 6385
  - GENETICS, 4988*
  - NERVOUS CONTROL, 6385
  - PROTEINS, 6385
- AMYLASES
  - DIAGNOSIS, 2411*
  - ISOENZYMES, 4224*, 8272*
  - SERUM, 2411*
- ANGIOGRAPHY
  - REVIEW, 3939*
- ASCITES
  - AMYLASES, 4219*
- BICARBONATE SECRETION
  - DRUG EFFECTS ON, 7731
  - TECHNIQUES, 2850
- BILE ACIDS AND SALTS, 2446

PANCREATITIS, CHRONIC (continued)
- BILE DUCTS
  - MORPHOLOGY, 4989*
- BILIARY TRACT
  - STRICTURE, 8274*
- BIOCHEMISTRY
  - DIAGNOSIS, 290
- CERULEIN
  - BICARBONATE SECRETION, 2850
- CHOLESTASIS
  - ETIOLOGY, 539
- CIRCULATION
  - COMPLICATIONS, 540
- CLASSIFICATION, 7737
- COMPLICATIONS, 7740
  - BILIARY TRACT, 8274*
  - BLEEDING, 1452
  - CHOLESTASIS, 4989*
  - DIABETES, 6379*
  - DIAGNOSIS, 4017
  - DUODENUM, 5790*
  - HYPOGLYCEMIA, 6379*
  - JAUNDICE, OBSTRUCTIVE, 8274*
  - MALABSORPTION SYNDROMES, 8279
  - METABOLISM, 8279
  - STRICTURE, 8274*
- CONTRAST MEDIA
  - ENDOSCOPY, 2221
- DIAGNOSIS, 291, 1227, 2221
  - AMYLASES, 8272*
  - ANGIOGRAPHY, 7083
  - CHOLANGIOGRAPHY, 7083
  - CLASSIFICATION, 2434
  - ENDOSCOPY, 4997, 5790*, 7082
  - ISOENZYMES, 8272*
  - LIPASE, 3346
  - MORPHOLOGY, 2434
  - PANCREAS FUNCTION TESTS, 4997
  - PANCREATOGRAPHY, 3346, 4997, 5790*
  - RADIOLOGY, 7082, 7083
  - REVIEW, 8278
  - SCANNING, SCINTILLATION, 3345, 7082
  - ULTRASONOGRAPHY, 6180, 7082
- DIETARY FACTORS
  - ETIOLOGY, 2439
- DIGESTION, 7740, 8279
- DISEASES ASSOCIATED WITH, 3357
  - KIDNEYS, 5792*
- DRUG THERAPY, 3348
  - CHOLECYSTOKININ, 5001
- ENDOSCOPY
  - PROGNOSIS, 4995
- ETIOLOGY
  - REVIEW, 2443, 8278
- FECES
  - FATS, 7740
- HEMORRHAGE
  - ETIOLOGY, 7079*
  - HYPERTENSION, PORTAL, 7079*
- HYPERLIPOPROTEINEMIA
  - DISEASES ASSOCIATED WITH, 3342*
- HYPOGLYCEMIA
  - SOMATOSTATIN, 6378*
- IMMUNOLOGY, 7991
- INTESTINE, SMALL
  - VITAMIN B12, 4510*
- JEJUNUM
  - DIAGNOSIS, 3353

PANCREATITIS, CHRONIC (continued)

- JEJUNUM (continued)
  - ETIOLOGY, 3353
  - PATHOLOGY, 3353
- METABOLISM, 8279
- MORPHOLOGY, 7738
- NECROSIS
  - ETIOLOGY, 3354
  - SURGERY, 3354
- OXALATES
  - URINE, 4258*
- PANCREAS
  - CALCULI, 7078*
  - SECRETION, 2221
  - ULTRASONOGRAPHY, 1231
- PANCREAS FUNCTION TESTS
  - TECHNIQUES, 2850, 8271*
- PANCREATECTOMY, 8280
  - COMPLICATIONS, 2422, 3351
  - PROGNOSIS, 2422, 3351, 4994, 7739
  - REVIEW, 2422
- PANCREATIC DUCT
  - MORPHOLOGY, 4990*
- PANCREATITIS
  - PROGNOSIS, 3337*
  - SURVIVAL, 3337*
- PANCREATOGRAPHY
  - PROGNOSIS, 4995
- PANCREOZYMIN
  - DIAGNOSIS, 1227
- PATHOLOGY, 7738
  - REVIEW, 2443
- PROTEINS
  - NERVOUS CONTROL, 6385
- PSEUDOCYSTS
  - SURGERY, 4994
- RADIOLOGY
  - PREOPERATIVE, 538
  - SURGERY, 538
- REFLUX
  - MANOMETRY, 7075*
- SECRETIN, 4999
  - BICARBONATE SECRETION, 2850
  - DIAGNOSIS, 1227, 1229
  - EXCRETION, 4240
  - SECRETION, 4240
- SECRETION, 7730
  - DRUG EFFECTS ON, 7731
  - ENZYMES, 7731
  - HORMONE EFFECTS ON, 4999
  - IMMUNOGLOBULINS, 2857
- SERUM
  - GASTRIN, 3532
  - GLUCURONIDASE, 527
  - HISTAMINE, 4241
  - SEROTONIN, 4241
  - VITAMIN B12, 3358
- STENOSIS
  - COLON, 4223*
- STRICTURE
  - SURGERY, 4994
- SURGERY, 7737, 8275, 8280
  - PANCREATIC DUCT, 4239
  - PROGNOSIS, 4994, 7739
  - TECHNIQUES, 3349
- THERAPY, 4242
  - ENDOSCOPY, 4995, 4996
  - JAUNDICE, 5793*
  - OBSTRUCTION, 4584*

PANCREATITIS, CHRONIC (continued)

- THERAPY (continued)
  - PANCREATOGRAPHY, 4995, 4996
- ULTRASONOGRAPHY, 4220*

PANCREATOGRAPHY

- CHOLANGIOGRAPHY
  - BILE DUCTS, 4013
  - BILIARY TRACT DISEASES, 5154*
  - PANCREATIC DISEASES, 5154*
  - REVIEW, 1573*
- CHOLECYSTECTOMY
  - COMPLICATIONS, 4017
- COMMON BILE DUCT
  - SURGERY, 2177*
- CONTRAST MEDIA, 3980
- DIAGNOSIS
  - REVIEW, 2178*
- DUODENUM
  - SURGERY, 2177*
- ENDOSCOPY
  - CHOLANGIOGRAPHY, 3049*, 7539
  - COMPLICATIONS, 5790*, 6545*, 7071, 7195*, 8142
  - COMPUTERS, 3979
  - REVIEW, 8142
  - TECHNIQUES, 3049*, 7195*
- JAUNDICE
  - DIAGNOSIS, 3951
- LIPASE
  - CIRCULATION, 3329
- OBSTRUCTION
  - REVIEW, 2178*
- PAIN
  - PANCREATITIS, 2429*
- PANCREAS, 3950
  - ANOMALY, 6179
  - ASCITES, 3325*, 7724*
  - CYSTS, 3346, 7727
  - ENDOSCOPY, 6151*, 6359*
  - FISTULA, 3334
  - NEOPLASMS, 3050*
  - NEOPLASMS, MALIGNANT, 3346, 5771*, 6361*, 7073, 7725*
  - PSEUDOCYSTS, 6366*
  - SURGERY, 4980
  - TECHNIQUES, 3976
- PANCREAS FUNCTION TESTS, 4212*
- PANCREATIC DISEASES
  - DIAGNOSIS, 3049*, 5774*, 6151*, 6359*, 7071
  - ENDOSCOPY, 6359*
  - PROGNOSIS, 5154*
  - ULTRASONOGRAPHY, 3330
- PANCREATITIS
  - DIAGNOSIS, 5774*
  - NEOPLASMS, 5772*
  - THERAPY, 4996
- PANCREATITIS, CHRONIC
  - DIAGNOSIS, 3346, 4997, 5790*
  - PROGNOSIS, 4995
  - THERAPY, 4995, 4996
- REVIEW, 3511
- SERUM
  - AMYLASES, 5529
  - LIPASE, 3947*
- TECHNIQUES, 4785, 4786

- PANCREOZYMIN
  - CHOLECYSTOKININ
    - DEFICIENCY, 6631
  - DEFICIENCY
    - ANALYSIS, 6631
  - DUODENUM
    - ENZYMES, 5511*
  - FATS
    - METABOLISM, 5445*
  - GASTROINTESTINAL SYSTEM
    - CHOLECYSTOKININ, 4548
  - HORMONES, GASTROINTESTINAL, 2748
  - LIVER CIRRHOSIS
    - PANCREAS, 8401*
  - NEOPLASMS
    - STEATORRHEA, 5445*
  - NERVOUS SYSTEM
    - CHOLECYSTOKININ, 4548
  - PANCREAS
    - ADENYL CYCLASE, 2853
    - AMYLASES, 3724*
    - SECRETION, 981, 1937, 2852
  - PANCREAS FUNCTION TESTS
    - SECRETIN, 1228
    - TECHNIQUES, 1228
  - PANCREATITIS, CHRONIC
    - DIAGNOSIS, 1227
  - REFLUX
    - HORMONE EFFECTS ON, 1333*
  - STOMACH
    - ELECTROPHYSIOLOGY, 3632*
    - MANOMETRY, 3632*
    - MOTILITY, 3648
    - SECRETION, 2852
  - ULCER, PEPTIC
    - REFLUX, 1333*

- PANETH CELL
  - GROWTH FACTORS, 6684

- PARASITES AND PARASITIC DISEASES
  - ANISAKIASIS
    - REVIEW, 825
  - ANTHELMINTICS
    - COMPLICATIONS, 6652
    - DRUG EFFECTS ON, 6650
    - TOLERANCE, 6652
  - ANUS
    - DIAGNOSIS, 3564
    - REVIEW, 3564
    - THERAPY, 3564
  - APPENDIX, 2667
    - ABSCESS, 5962
  - ASSAY
    - ENZYMES, 6640*
  - BILE DUCTS
    - REVIEW, 4374
  - BILIARY TRACT, 820
  - BODY COMPOSITION
    - APPETITE DISORDERS, 5246
  - CYSTS
    - DIAGNOSIS, 4456*
  - DIAGNOSIS, 8504
  - DIARRHEA
    - DIAGNOSIS, 2590*
  - DRUG THERAPY, 1721, 5252, 5496
    - ANTHELMINTICS, 6663
  - DUODENUM
    - OBSTRUCTION, 8190*

- PARASITES AND PARASITIC DISEASES (continued)
  - EPIDEMIOLOGY, 5250
    - OCCUPATIONAL FACTORS, 2661
  - ESOPHAGUS
    - MUSCLES, 6662
  - GASTRIN
    - SERUM, 2829
    - STOMACH, 2829
  - GEOGRAPHICAL FACTORS, 8115
  - GIARDIASIS, 3558*
  - GLUCOSE
    - DIETARY FACTORS, 4738
  - HEPATITIS
    - GRANULOMA, 4459*
  - IMMUNITY
    - ASSAY, 6640*
    - ENZYMES, 6640*
  - IMMUNOGLOBULINS
    - ENZYMES, 6640*
    - IMMUNITY, 6145*
  - IMMUNOSUPPRESSION
    - DIARRHEA, 393*
  - INTESTINE, LARGE
    - IMMUNOLOGY, 3870*
    - INFLAMMATION, 3870*
  - INTESTINE, SMALL
    - CHILD, 5957*
    - GANGRENE, 5957*
    - INFARCTION, 5957*
    - INFLAMMATION, 4739
    - ISCHEMIA, 5957*
    - LYMPHOCYTES, 4739
    - MORPHOLOGY, 6662
    - NECROSIS, 5957*
    - OXYGEN, 3882
    - SEX FACTORS, 6662
    - ULTRASTRUCTURE, 3026, 6662
  - INTESTINES
    - BIOPSY, 1252
    - CHILD, 822, 1711
    - DIAGNOSIS, 253, 6653
    - DRUG THERAPY, 1713
    - EPIDEMIOLOGY, 1711, 4458*, 6653, 6665
    - ETHNIC FACTORS, 822
    - INFANT, 4458*
    - INFECTION, 6653
    - PATHOLOGY, 6668
    - PROSTAGLANDINS, 8119
    - REVIEW, 1710
    - TECHNIQUES, 253
    - THERAPY, 3563
    - TRANSMISSION, 4458*
  - LEISHMANIASIS
    - EPIDEMIOLOGY, 3571
  - LIVER
    - CYSTS, 5965
  - LIVER CIRRHOSIS
    - CHILD, 702
  - MOTILITY
    - INTESTINE, SMALL, 1827*
  - PROTOZOA
    - DIAGNOSIS, 1719
  - SOCIOECONOMIC FACTORS
    - EPIDEMIOLOGY, 2668
  - STOMACH
    - MOTILITY, 8162*
    - SECRETION, 8162*
  - THERAPY, 5250

PARASITES AND PARASITIC DISEASES (continued)
- TRANSMISSION, 8473
  - MILK, 4458*
  - REVIEW, 8472
- UROGENITAL SYSTEM
  - PATHOLOGY, 6668

PARASYMPATHOLYTICS
- SEE ALSO ANTISPASMODICS
- ABSORPTION
  - L-DOPA, 889
- CATHARTICS, 3539
- DUODENUM
  - MOTILITY, 922
  - ULCER, 4073*
- ESOPHAGUS
  - ACHALASIA, 1276
  - MOTILITY, 52
- IRRITABLE COLON
  - DRUG THERAPY, 7671
- SALIVARY GLANDS
  - ULTRASTRUCTURE, 5269
- STOMACH
  - ACID SECRETION, 2789*, 6737
  - MOTILITY, 922
  - SECRETION, 2789*
- ULCER, PEPTIC
  - DRUG EFFECTS ON, 376

PARASYMPATHOMIMETICS
- ACID SECRETION
  - GASTRIN, 5365*
  - PENTAGASTRIN, 5641
- BICARBONATE SECRETION
  - PANCREAS, 4594*
- CALCIUM
  - ABSORPTION, 2999
- ESOPHAGEAL DISEASES
  - SPASM, 5567*
- ESOPHAGUS
  - GASTRIN, 4789*
  - REFLUX, 4794*
  - SPHINCTER, 4789*
- INTESTINES
  - SECRETIN, 2978
- PANCREAS
  - ALCOHOLISM, 7367*
  - ALCOHOLS, 1957
  - AMYLASES, 4602
  - ELECTRICAL CONTROL, 4594*
  - ENZYMES, 4602
  - FETUS, 1943
  - HORMONES, ADRENAL CORTEX, 1943
  - NEONATE, 1943
  - PROTEINS, 4602
  - SECRETION, 6747*
- PROTEINS
  - PANCREAS, 4594*
- RECTUM
  - ELECTROPHYSIOLOGY, 7955
  - MOTILITY, 7955
- STOMACH
  - ACID SECRETION, 964
  - ARTERIES, 1139
  - INTRINSIC FACTOR, 964
  - PEPSIN, 964

PARATHYROID GLANDS
- CALCIUM
  - HORMONE EFFECTS ON, 5347
- CHOLELITHIASIS
  - DISEASES ASSOCIATED WITH, 6564*
- GASTRIN
  - CALCIUM, 4443
- ZOLLINGER-ELLISON SYNDROME
  - DISEASES ASSOCIATED WITH, 5181

PARATYPHOID FEVERS
- SEE SALMONELLOSIS

PARENTERAL ALIMENTATION
- ABDOMEN
  - SURGERY, 6627
- AGE FACTORS, 5946
- ALKALINE PHOSPHATASE
  - METABOLISM, 5184
- AMINO ACIDS
  - METABOLISM, 5184
- AMINO TRANSFERASES
  - METABOLISM, 5184
- ANTIBACTERIALS
  - COMPLICATIONS, 2369*
- BILIRUBIN
  - METABOLISM, 5184
- BODY COMPOSITION
  - ELECTROLYTES, 3859*
  - TRACE ELEMENTS, 3859*
- CHILD, 5946
  - INTESTINE, SMALL, 4866*
- CHOLECYSTITIS, 752
  - LIVER, 752
- COLITIS, ULCERATIVE
  - THERAPY, 3527
- COMPLICATIONS
  - ANEMIA, 8482
- CROHN'S DISEASE
  - CHILD, 4866*
  - ENTEROCOLITIS, 4465*
  - THERAPY, 3527, 4465*
- DIARRHEA
  - ABSORPTION, 3537
  - CHILD, 5946
  - INFANT, 1684
- ELECTROLYTES
  - DIET, 3859*
- ENTERITIS
  - THERAPY, 3527
- ENTEROCOLITIS, NECROTIZING
  - NEONATE, 5183
- GASTROINTESTINAL DISEASES
  - THERAPY, 3527
- GASTROINTESTINAL SYSTEM
  - AMINO ACIDS, 7361
- HYPERBILIRUBINEMIA
  - INFANT, 3407*
- INFECTION
  - CHILD, 5946
- INFLAMMATORY BOWEL DISEASES, 5765
  - THERAPY, 5764
- INTESTINE, SMALL
  - ABSORPTION, 3614
  - ATROPHY, 6061
  - DISEASE, 4866*
  - ENZYMES, 3854
  - FISTULA, 7618
  - GLUCOSE, 3854

- PARENTERAL ALIMENTATION (continued)
  - INTESTINE, SMALL (continued)
    - MORPHOLOGY, 1119
    - PROTEINS, 3854
    - REGENERATION, 4689
    - SHUNT, INTESTINAL, 3888
  - INTESTINES, 7504
    - HELMINTHIASIS, 1712
  - LIPIDS
    - METABOLISM, 5184
  - METABOLISM
    - INSULIN, 5180*
    - NITROGEN, 5180*
    - PROTEINS, 5180*
  - NEONATE
    - REVIEW, 8486
  - NUTRITION DISORDERS
    - INFANT, 7853*
    - THERAPY, 7853*
  - PANCREAS
    - BICARBONATE SECRETION, 1940
  - PSEUDO-OBSTRUCTION
    - CHILD, 4866*
  - SERUM
    - GASTRIN, 3854, 4551*
    - INSULIN, 3854
  - SHORT BOWEL SYNDROME
    - CHILD, 4866*
  - SPRUE
    - CHILD, 4866*
  - STOMACH
    - ACID SECRETION, 4551*
    - SECRETION, 4551*
  - SURGERY
    - REVIEW, 6627

- PELIOSIS HEPATIS
  - DRUG-INDUCED
    - ANDROGENS, 8299*
  - ETIOLOGY
    - ANDROGENS, 3379, 6451*
    - HORMONES, 6451*

- PELLAGRA
  - JEJUNUM
    - MORPHOLOGY, 2366
  - XYLOSE
    - ABSORPTION, 2366
    - IMMUNOGLOBULINS, 2366

- PENTAGASTRIN
  - ACID SECRETION, 4565*
    - ANTRECTOMY, 1885*
    - CHILD, 80
    - DRUG EFFECTS ON, 2795*
    - PARASYMPATHOMIMETICS, 5641
    - SOMATOSTATIN, 1886*
    - TOXINS, 5376
    - ULCER, 2310
  - CIRCULATION
    - STOMACH, 2991*
    - ULCER, 2991*
  - DUODENUM
    - EPITHELIUM, 1343*
  - ESOPHAGITIS
    - SPHINCTER, 1832*
  - ESOPHAGUS
    - SPHINCTER, 1832*, 1844

- PENTAGASTRIN (continued)
  - HEIDENHAIN POUCH
    - ACID SECRETION, 1885*, 7965*
    - TEMPERATURE, 7965*
  - HISTAMINE
    - ACID SECRETION, 973
  - INFANT
    - ACID SECRETION, 1903
  - INTESTINE, SMALL
    - ELECTROPHYSIOLOGY, 3651
    - ORGAN CULTURE, 3839
    - SURGERY, 2069
  - LIVER
    - METABOLISM, 2773*
  - MOTILITY
    - ULCER, 2310
  - NEONATE
    - ACID SECRETION, 1903
  - PANCREAS
    - SECRETION, 1944
  - PEPSIN
    - DRUG EFFECTS ON, 2795*
  - PEPTIDES
    - ACID SECRETION, 947
  - SECRETION
    - ULCER, 1233
  - STOMACH
    - ACID SECRETION, 964, 965, 969, 2140, 2787*, 5369*, 6743, 7962*
    - AMINO ACIDS, 952*
    - CIRCULATION, 965, 2140
    - ELECTRICAL CONTROL, 1862, 1864
    - EPITHELIUM, 1343*
    - INTRINSIC FACTOR, 964
    - METABOLISM, 2773*
    - NITRITES, 3085
    - PEPSIN, 964
    - SECRETION, 383, 384, 2787*, 3085, 7969*
    - THIOCYANATES, 3085
    - TRACER STUDY, 2991*
    - ULCER, 2991*
  - ULCER
    - ACID SECRETION, 5641
  - ULCER, PEPTIC
    - DUODENUM, 8180*
    - SECRETION, 8180*

- PEPSIN
  - DIGESTION
    - GLYCOPROTEINS, 107
  - DRUG EFFECTS ON
    - HISTAMINE, 2795*
    - PENTAGASTRIN, 2795*
  - DUODENUM
    - ULCER, 385, 4092
    - ULCER, PEPTIC, 7594
  - ESOPHAGUS
    - ANOMALY, 4799
    - ION TRANSPORT, 2697*
    - PERMEABILITY, 2697*
  - JEJUNUM
    - ULCER, 2793*
  - MINERALS
    - BINDING, 2604
  - SECRETION
    - CATECHOLAMINES, 8171
    - EPINEPHRINE, 8171
    - NOREPINEPHRINE, 8171

- PEPSIN (continued)
  - SECRETION (continued)
    - ULCER, PEPTIC, 6925, 7594
  - STOMACH
    - ACID SECRETION, 6044
    - ANTIDEPRESSIVE AGENTS, 5382
    - ATROPINE, 6729*
    - DRUG EFFECTS ON, 2792*, 5382
    - GASTRIN, 1922
    - PARASYMPATHOMIMETICS, 964
    - PENTAGASTRIN, 964
    - SECRETAGOGUES, 1904, 1923
    - SECRETIN, 79*
    - SECRETION, 2787*, 2789*, 2792*, 3616, 3671*, 3677, 3858, 4068*, 5364*, 6925, 7362, 7977, 8171
    - SEROTONIN, 6729*
    - TECHNIQUES, 1904
    - ULCER, 385
  - TEMPERATURE
    - SECRETION, 7965*
  - ULCER
    - PERFUSION, 8105*
    - STRESS, 3706
    - THERAPY, 5642
  - ULCER, PEPTIC
    - H2 RECEPTOR ANTAGONISTS, 381
    - NERVOUS CONTROL, 366
    - SECRETION, 4092
  - VAGOTOMY
    - DRUG EFFECTS ON, 2795*

- PEPSINOGEN
  - ANEMIA, PERNICIOUS, 3686
  - DUODENUM
    - ULCER, 3686
  - ESOPHAGUS, 5267
    - ANOMALY, 4799
    - SPHINCTER, 5267
  - SERUM
    - DRUG EFFECTS ON, 3141*
  - STOMACH
    - IMMUNOLOGY, 6741
    - NEOPLASMS, 1324
    - SYNTHESIS, 1324
  - ULCER
    - DRUG-INDUCED, 5373
  - ULCER, PEPTIC
    - DIAGNOSIS, 3186
    - FAMILIAL FACTORS, 4085
    - GENETICS, 4085
    - SERUM, 3186
    - URINE, 3186
  - ZOLLINGER-ELLISON SYNDROME, 3686

- PEPTIC ULCER
  - SEE ULCER, PEPTIC

- PEPTIDASE
  - ABSORPTION
    - PEPTIDE HYDROLASES, 1778*
  - BILIARY TRACT DISEASES
    - DIAGNOSIS, 4251*
  - FECES
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378
  - INTESTINES, 4692
    - ENZYMES, 3261

- PEPTIDASE (continued)
  - JEJUNUM, 4691
  - LIVER DISEASES
    - DIAGNOSIS, 4251*
  - PANCREAS
    - ANTIBIOTICS, 7378
    - DRUG EFFECTS ON, 7378

- PEPTIDE HYDROLASES
  - ABSORPTION
    - PEPTIDASE, 1778*
  - DIET
    - PROTEINS, 74
  - DIGESTION
    - GLYCOPROTEINS, 107
  - ILEUM
    - DIGESTION, 1085*
  - INTESTINE, SMALL
    - DIGESTION, 1085*
    - ISCHEMIA, 4713*
  - ISCHEMIA
    - PANCREAS, 4713*
  - JEJUNUM
    - DIGESTION, 1085*
  - STOMACH
    - ULCER, 7975

- PEPTIDES
  - ABSORPTION
    - ENTERECTOMY, 5305
    - REVIEW, 895
  - ACID SECRETION
    - PENTAGASTRIN, 947
    - STOMACH, 947
  - AMINO ACIDS
    - ABSORPTION, 1778*
  - ANTRUM
    - ENKEPHALINS, 4701*
  - CELIAC DISEASE, 4578
    - JEJUNUM, 2353
  - CLEARANCE STUDY
    - ENTERECTOMY, 3828*
    - NEPHRECTOMY, 3828*
  - COLON
    - MOTILITY, 4534
  - DIABETES
    - ABSORPTION, 6008
    - TRANSPORT, 6008
  - DUODENUM
    - ULCER, 4578
  - GALLBLADDER
    - MOTILITY, 1083
  - GASTRIN
    - CHEMICAL COMPOSITION, 5380
  - GASTROINTESTINAL DISEASES, 4578
  - GASTROINTESTINAL SYSTEM, 2858
    - ENKEPHALINS, 4701*
    - MOTILITY, 4534
  - HORMONES
    - SYNTHESIS, 1143
  - HORMONES, GASTROINTESTINAL, 398
  - ILEUM
    - ABSORPTION, 1778*, 5305
    - MOTILITY, 4534
  - INTESTINE, SMALL
    - ABSORPTION, 16*, 7499*
    - HYDROLYSIS, 1085*
    - MOTILITY, 3652
    - TRANSPORT, 7499*

PEPTIDES (continued)
- INTESTINES
  - MOTILITY, 3652
  - TRANSPORT, 4692, 7913*
- JEJUNUM
  - ABSORPTION, 24, 1778*, 7499*
  - TRANSPORT, 7499*
- LIVER
  - GASTRIN, 2936
  - HORMONE EFFECTS ON, 7995*
  - OXYGEN, 7995*
- LIVER CIRRHOSIS
  - HORMONES, GASTROINTESTINAL, 713
  - SYNTHESIS, 8012*
- PANCREAS
  - AMYLASES, 2849
  - BICARBONATE SECRETION, 4592*
  - DIETARY FACTORS, 1928*
  - HORMONE EFFECTS ON, 1928*
  - PROTEINS, 1960
  - RADIOIMMUNOASSAY, 1927*
  - SECRETION, 1927*, 1928*, 2849, 4592*
  - VAGOTOMY, 1928*
- PANCREATECTOMY, 4578
- PANCREATIC DISEASES
  - PANCREAS FUNCTION TESTS, 1230
- PITUITARY GLAND, 7995*
- STOMACH
  - ACID SECRETION, 969, 4549, 4592*
  - HORMONES, 1144
  - MOTILITY, 4534
  - SECRETION, 4592*
- VAGOTOMY, 4578
- ZOLLINGER-ELLISON SYNDROME
  - ACID SECRETION, 4549

PERFORATION
- AORTA
  - ANEURYSM, 7556
- APPENDECTOMY
  - APPENDICITIS, 1401
- APPENDICITIS
  - COMPLICATIONS, 7699, 7701
- APPENDIX, 1407
  - BACTERIA, 1406
- BILE DUCTS, 7220*
  - INFANT, 3506*
  - REVIEW, 3506*
- BILIARY TRACT
  - CHILD, 7843
- CECUM
  - FECES, 500
  - PSEUDO-OBSTRUCTION, 8236*
  - THERAPY, 8211
- CELIAC DISEASE
  - DERMATITIS HERPETIFORMIS, 3266
  - INTESTINES, 3266
- COLON, 7584
  - AMEBIASIS, 4178
  - DISEASES ASSOCIATED WITH, 1419
  - DIVERTICULUM, 5754
  - ENDOMETRIOSIS, 7001*
  - ENDOSCOPY, 3285, 5708*
  - FECES, 501
  - HEMODIALYSIS, 5727
  - PREGNANCY, 7001*
  - PSEUDO-OBSTRUCTION, 8236*
  - RADIOLOGY, 2396

PERFORATION (continued)
- COLON (continued)
  - SURGERY, 1419
  - SURVIVAL, 1420
  - UROGENITAL SYSTEM, 7705
- COLONOSCOPY
  - COMPLICATIONS, 7010
- COMMON BILE DUCT
  - CYSTS, 5956*
- COMMON BILE DUCT CALCULI
  - COMPLICATIONS, 7220*
- CROHN'S DISEASE, 6675*
  - COLON, 2672*
- DIVERTICULUM
  - BLEEDING, 5662
- DUODENUM
  - CALCULI, 428
  - DIVERTICULUM, 5662
  - IATROGENESIS, 6545*
  - PROGNOSIS, 7595
  - SURGERY, 7595
  - SURVIVAL, 7595
  - THERAPY, 7595
  - ULCER, PEPTIC, 4837*, 6920*, 7595
- ECHINOCOCCOSIS
  - CYSTS, 553
- ENDOMETRIOSIS
  - COMPLICATIONS, 7001*
- ENDOSCOPY
  - COLON, 1199
  - COMPLICATIONS, 6545*
- ENTERITIS, 3238
- ENTEROCOLITIS, NECROTIZING, 3238
- ESOPHAGUS, 300
  - ANTIBIOTICS, 313
  - ENDOSCOPY, 3136
  - IATROGENESIS, 5585
  - THERAPY, 6204
- GALLBLADDER
  - HEMORRHAGE, 7230
  - NEOPLASMS, MALIGNANT, 738
  - SURVIVAL, 5212
- GASTROINTESTINAL SYSTEM
  - NEONATE, 5211
  - SURVIVAL, 5212
  - WOUNDS AND INJURIES, 7621
- ILEUM
  - ENDOSCOPY, 1373
  - SURGERY, 8211
  - THERAPY, 8211
  - ULCER, 4898
- INTESTINE, LARGE
  - IMMUNOSUPPRESSION, 4123
  - PANCREATITIS, 3333
- INTESTINE, SMALL
  - CLEARANCE STUDY, 2993*
  - FETUS, 6962
  - IATROGENESIS, 6545*
  - IMMUNOSUPPRESSION, 4123
  - LYMPHOMA, 5679
  - NEONATE, 6962
  - NEOPLASM METASTASIS, 4455
  - PANCREATITIS, 3333
- INTESTINES
  - COMPLICATIONS, 7621
  - FOREIGN BODIES, 7621
  - IMMUNOSUPPRESSION, 4123
  - PANCREATITIS, 3333
  - SURGERY, 7621, 8211

PERFORATION (continued)
- INTESTINES (continued)
  - SURVIVAL, 5212
  - THERAPY, 8211
  - TUBERCULOSIS, 435
  - WOUNDS AND INJURIES, 7621
- JEJUNUM, 7584
  - DIVERTICULITIS, 1368
  - DIVERTICULUM, 413
- REVIEW, 2621
- SALMONELLOSIS
  - CHILD, 170
  - ILEUM, 2655
  - INTESTINES, 6633
  - SURGERY, 170
  - SURVIVAL, 2655
- SIGMOID
  - ENDOMETRIOSIS, 7001*
  - PREGNANCY, 7001*
  - UROGENITAL SYSTEM, 7705
- STOMACH, 7584
  - COMPLICATIONS, 7621
  - FOREIGN BODIES, 7621
  - SURGERY, 7621
  - SURVIVAL, 5212
  - ULCER, 351
  - WOUNDS AND INJURIES, 7621
- ULCER
  - DUODENUM, 368, 6276
  - ETHNIC FACTORS, 6276
  - LIVER, 368
  - SURGERY, 6273
- ULCER, PEPTIC, 5637
  - CLASSIFICATION, 4837*
  - PROGNOSIS, 7595
  - SURGERY, 4840, 6920*, 7595
  - SURVIVAL, 7595
  - THERAPY, 4064, 6920*, 7595

PERFUSION
- ABSCRPTION
  - DIET, 3600*
- ACIDS
  - DUODENUM, 943
- BLOOD
  - BIOCHEMISTRY, 1163
  - ENZYMES, 1163
  - LIVER, 1163
- CHOLANGIOGRAPHY
  - TECHNIQUES, 3957
- COLITIS
  - ETIOLOGY, 5476*
  - PRESSURE STUDY, 5476*
- COLON
  - ACIDS, 7483*
- DUODENUM
  - ACIDS, 1873*
- HEPATITIS, 5066*
- HEPATOCYTES
  - PRESSURE STUDY, 4606*
  - TECHNIQUES, 4606*
- ILEUM
  - TRANSPORT, 776
- INTESTINE, SMALL
  - BLOOD, 7489*
  - ENZYMES, 7489*
  - GLUCOSE, 1096, 2089
  - TECHNIQUES, 3883

PERFUSION (continued)
- INTESTINES
  - AMINO ACIDS, 2617
  - ELECTROPHYSIOLOGY, 2123
  - RADIOLOGY, 4925*
  - TRANSPLANTATION, 2122
- JEJUNUM
  - GLUCOSE, 8084*
- LIPIDS
  - DUODENUM, 943
- LIVER, 6102
  - AMINO ACIDS, 6761*
  - ANTISPASMODICS, 2947
  - CALCIUM, 15
  - DRUG METABOLISM, 8031*
  - FIBRINOLYSIS, 1174
  - HYPOTHERMIA, 6103
  - LIVER FUNCTION TESTS, 6103
  - MEMBRANES, 15
  - METABOLISM, 4731
  - MORPHOLOGY, 6103
  - TECHNIQUES, 137, 3916, 6068*
  - ULTRASTRUCTURE, 15
- LIVER COMA
  - THERAPY, 2452*, 4666, 5028*
- LIVER DISEASES
  - PROGNOSIS, 2454*
  - REVIEW, 6412*
  - TECHNIQUES, 4260*
  - THERAPY, 2051
- LIVER INJURY
  - SURVIVAL, 6113
  - THERAPY, 5028*, 6113
- PANCREAS
  - ALDEHYDES, 993
  - SECRETION, 984
  - TECHNIQUES, 3900
  - TRANSPLANTATION, 1130
- STOMACH
  - BLOOD, 47*
  - SECRETION, 6053
  - ULCER, 105, 8105*
- ULCER
  - ACIDITY, 8105*
  - PEPSIN, 8105*
  - PRESSURE STUDY, 8105*

PERIHEPATITIS
- BACTERIAL INFECTIONS
  - VENEREAL DISEASES, 8054

PERINEUM
- CROHN'S DISEASE
  - ULCER, 4478
- WOUNDS AND INJURIES
  - THERAPY, 7899

PERISTALSIS
- COLON, 1857
  - ANALGESICS AND ANTIPYRETICS, 923
  - CATECHOLAMINES, 7321*
  - DRUG EFFECTS ON, 923
  - EPINEPHRINE, 919
  - PROSTAGLANDINS, 5317*
  - SYMPATHOMIMETICS, 919
- DUODENUM
  - ACETYLCHOLINE, 2759
  - MOTILIN, 2759

PERISTALSIS (continued)
- ESOPHAGITIS
  - DIAGNOSIS, 4793*
- ESOPHAGUS
  - MANOMETRY, 5308*
  - MUSCLES, 7937*
  - NERVOUS CONTROL, 6028, 7937*
  - PRESSURE STUDY, 4514*
- ILEUM
  - ANTI-INFLAMMATORY AGENTS, 5316*
  - DRUG EFFECTS ON, 2741*, 5316*
  - POTASSIUM, 60
  - PROSTAGLANDINS, 5316*, 5317*
  - PURINES, 7946
- INTESTINAL OBSTRUCTION
  - ELECTROPHYSIOLOGY, 4109*
- INTESTINE, SMALL
  - COMPLICATIONS, 1131
  - MORPHOLOGY, 1131
  - PURINES, 7946
  - SURGERY, 1131, 8218
- PSEUDO-OBSTRUCTION
  - ESOPHAGUS, 2340

PERITONEOSCOPY
- LAPAROSCOPY, 3054

PERITONEUM
- ADHESIONS
  - IATROGENESIS, 5939*
- BARIUM
  - TOXICOLOGY, 219
- ENDOSCOPY
  - COMPLICATIONS, 235
  - DIAGNOSIS, 235
  - EMPHYSEMA, 1199
- GALLBLADDER
  - HERNIA, 1615
- GASES
  - DIAGNOSIS, 8466
  - INTESTINE, SMALL, 6968
- MUCUS
  - BIOCHEMISTRY, 1668
  - THERAPY, 1668
- NEOPLASMS
  - PATHOLOGY, 3553
  - PROGNOSIS, 3553
  - RADIOTHERAPY, 3553
  - SURGERY, 3553
- PANCREATITIS, 4235

PERITONITIS
- ABSCESS
  - AMEBIASIS, 634
  - BILE, 634
  - RUPTURE, 634
- ADRENERGIC RECEPTOR BLOCKADERS
  - THERAPY, 5213
- APPENDECTOMY
  - COMPLICATIONS, 502
- BACTERIAL INFECTIONS, 1698
- CECUM
  - BARIUM, 7039
- DRUG-INDUCED
  - ANTI-INFLAMMATORY AGENTS, 8102*
- DRUG THERAPY
  - ANTIBIOTICS, 6507*
- ETIOLOGY
  - ULCER, 6304

PERITONITIS (continued)
- IATROGENESIS
  - FOREIGN BODIES, 4880*
- INTESTINE, SMALL
  - ULCER, 6304
- LIVER CIRRHOSIS
  - ANTIBIOTICS, 6507*
  - ASCITES, 6507*
  - DRUG THERAPY, 6507*
- LIVER DISEASES
  - MORPHOLOGY, 5840
- NEOPLASMS
  - ETIOLOGY, 4880*
- RECTUM
  - BARIUM, 7039
- SCLEROSIS
  - DRUG-INDUCED, 4110*
- STOMACH
  - BARIUM, 7039
- TUBERCULOSIS, 6597

PEROXIDATION
- CARBON TETRACHLORIDE
  - LIPIDS, 5416*
- CHOLESTASIS
  - MONOAMINE OXIDASE, 6086*
- HEPATITIS, CHRONIC
  - LIPIDS, 8058
- HEPATITIS, INFECTIOUS
  - ENZYMES, 6469*
- LIPIDS
  - CARCINOGENS, 2038
  - ENZYMES, 2037
  - LIVER, 2038, 2040
  - PHENOBARBITAL, 2037, 2038
  - VITAMIN E, 2040
- LIVER
  - LIPIDS, 2037
- LIVER INJURY
  - LIPIDS, 2155

PEROXIDES
- HEPATITIS, 7093*
- LIVER CIRRHOSIS, 7093*
- LIVER DISEASES, 7093*

PESTICIDES
- HEPATITIS, TOXIC
  - DIAGNOSIS, 6439*
  - OCCUPATIONAL FACTORS, 6439*

PEUTZ-JEGHER'S SYNDROME
- DIAGNOSIS
  - REVIEW, 3548
- DUODENUM
  - POLYPS, 6969
- JEJUNUM
  - POLYPS, 1695
- PATHOLOGY, 6604
- POLYPS
  - DUODENUM, 6969
- RADIOLOGY, 3549
- THERAPY
  - REVIEW, 3548

PHAGOCYTOSIS
- LIVER
  - TRANSPLANTATION, 2055

- PHARYNX
  - DEGLUTITION DISORDERS
    - SURGERY, 292*

- PHENOBARBITAL
  - BILE
    - LIPIDS, 6397*
    - THYROID GLAND, 2909
  - CARBOHYDRATES
    - LIVER, 2910
    - METABOLISM, 2910
  - CHOLESTASIS
    - DRUG THERAPY, 3517
  - GILBERT'S DISEASE
    - DRUG METABOLISM, 7775
  - HEPATITIS, INFECTIOUS
    - GALACTOSAMINE, 1041
  - HEPATOCYTES, 7415*
  - HEPATOMEGALY
    - DRUG-INDUCED, 5417*
  - ILEUM
    - BILE ACIDS AND SALTS, 2721
  - INTESTINE, SMALL
    - BILE ACIDS AND SALTS, 2721
  - JAUNDICE, CHRONIC IDIOPATHIC
    - DRUG EFFECTS ON, 4276*
  - LIPIDS
    - METABOLISM, 6397*
    - PEROXIDATION, 2037, 2038
  - LIVER
    - ANESTHETICS, 2915
    - CYTOCHROMES, 5401*
    - DRUG METABOLISM, 5418*
    - ENZYMES, 1043
    - HEME
    - HYPERPLASIA, 171
    - HYPERTROPHY, 171
    - NEOPLASMS, 7425*
    - PENTOSIDES, 2911
    - PORPHYRINS, 2868
  - LIVER CIRRHOSIS
    - DRUG-INDUCED, 4664

- PHENOLS
  - LIVER CIRRHOSIS
    - OXIDATION, 5121*

- PHOSPHATASE, ACID
  - SEE ACID PHOSPHATASE

- PHOSPHATASE, ALKALINE
  - SEE ALKALINE PHOSPHATASE

- PHOSPHATES
  - DUODENUM
    - TRANSPORT, 2722
  - ENEMA
    - COMPLICATIONS, 7683
  - FAMILIAL FACTORS
    - NUTRITION DISORDERS, 802
  - ILEUM
    - TRANSPORT, 2722
  - INTESTINE, SMALL
    - ABSORPTION, 3605*
    - TRANSPORT, 887
  - INTESTINES
    - ABSORPTION, 3605*
    - TRANSPORT, 2722

- PHOSPHATES (continued)
  - STOMACH, 2827
  - TRANSPORT
    - INTESTINE, SMALL, 802
    - NUTRITION DISORDERS, 802

- PHOSPHATIDES
  - SEE PHOSPHOLIPIDS

- PHOSPHODIESTERASES
  - STOMACH
    - ACID SECRETION, 2800

- PHOSPHOLIPASE
  - GALLBLADDER
    - INFLAMMATION, 1578*
    - LYSOLECITHIN, 3757
  - INTESTINES
    - ACIDITY, 4679*
    - FATTY ACIDS, 4679*

- PHOSPHOLIPIDS
  - AGE FACTORS
    - ADENOSINE TRIPHOSPHATASE, 155
  - BILE
    - SECRETION, 2866*
  - BILE ACIDS AND SALTS
    - LIPIDS, 4617*
  - BILIARY TRACT
    - SECRETION, 7398*
  - BILIARY TRACT DISEASES
    - ERYTHROCYTES, 630
  - BLOOD
    - BILIARY TRACT DISEASES, 4250*
    - LIVER DISEASES, 4250*
  - CHOLECYSTITIS, 3491*
  - CHOLELITHIASIS
    - CHOLESTEROL, 6572*
  - CHOLESTASIS, 3385
    - ERYTHROCYTES, 630
  - CHOLESTEROL
    - BILE, 7398*
    - FATTY ACIDS, 7398*
    - LIVER, 7398*
    - SERUM, 7398*
  - CHYLOMICRONS
    - CIRCULATION, 1795
  - CHYME
    - CYTOLOGY, 1098
  - GALLBLADDER
    - EPITHELIUM, 3491*
    - METABOLISM, 3491*
  - INTESTINAL ABSORPTION, 7924
  - INTESTINE, SMALL
    - BILE ACIDS AND SALTS, 1775*
    - FATTY ACIDS, 1775*
    - HYDROLYSIS, 1775*
  - INTESTINES
    - CHYLOMICRONS, 1795, 2130
    - LIPOPROTEINS, 1795
  - LIPIDS
    - ABSORPTION, 892
  - LIPOPROTEINS
    - CIRCULATION, 1795
  - LIVER
    - ACIDS, 6808
    - ADENOSINE TRIPHOSPHATASE, 155
    - ALCOHOLS, 149
    - AMINO ACIDS, 2935

PHOSPHOLIPIDS (continued)
- LIVER (continued)
  - CARBON TETRACHLORIDE, 1064
  - DIETARY FACTORS, 2935
  - DRUG EFFECTS ON, 6127
  - METABOLISM, 1064
  - TECHNIQUES, 6850*
- LIVER CIRRHOSIS, 3385
- LIVER DISEASES, 3385
  - DIAGNOSIS, 6850*
  - ERYTHROCYTES, 630
- NERVOUS SYSTEM
  - ALCOHOLS, 149
- OBESITY
  - SURGERY, 6942*
- RECTUM
  - DISEASE, 251
  - ULTRASTRUCTURE, 251
- STOMACH
  - ASPIRIN, 3663*
  - ELECTROPHYSIOLOGY, 6726*
  - MORPHOLOGY, 6726*

PHOSPHORUS
- ABSORPTION
  - HORMONES, ADRENAL CORTEX, 1362
  - INTESTINES, 1362
  - VITAMIN D, 1362
- CHOLECYSTECTOMY
  - BILE, 6543*
- CHOLELITHIASIS
  - BILE, 6543*

PHOSPHORYLASE
- SEE GLYCOGEN PHOSPHORYLASE

PHOSPHORYLATION, OXIDATIVE
- SEE OXIDATIVE PHOSPHORYLATION

PHOTOTHERAPY
- HYPERBILIRUBINEMIA, 5843*
  - IMMUNOGLOBULINS, 8337*
  - IMMUNOLOGY, 8337*
  - INFANT, 5062*
  - NEONATE, 3405*, 5062*, 8337*
- JAUNDICE
  - COMPLICATIONS, 637
  - IMMUNOGLOBULINS, 8337*
  - IMMUNOLOGY, 8337*
  - INFANT, 637, 5062*
  - LACTOSE INTOLERANCE, 637
  - NEONATE, 5062*, 7134, 8337*
- PLASMA, 8117
- STOMACH
  - ULCER, 5478*

PIGMENTATION
- COLON
  - ENDOSCOPY, 1410
- HEPATITIS, CHRONIC, 2545*
- LIVER CIRRHOSIS, OBSTRUCTIVE, 2545*

PIGMENTS
- CHOLELITHIASIS
  - SIMULATION, 3779
- GALLSTONES
  - BILIRUBIN, 5143*
  - CHEMICAL COMPOSITION, 2575*, 7826*
  - CHEMICAL PROPERTIES, 7826*, 8426*

PIGMENTS (continued)
- GALLSTONES (continued)
  - CHOLESTEROL, 2575*
  - CHROMATOGRAPHY, 7826*
  - REVIEW, 2575*
  - SYNTHESIS, 8426*
- JAUNDICE, CHRONIC IDIOPATHIC
  - LIVER, 638

PITUITARY GLAND
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - HORMONE EFFECTS ON, 5363*
  - SOMATOSTATIN, 5363*
- CHOLECYSTITIS
  - HORMONES, 753
- LIVER
  - GROWTH SUBSTANCES, 2942
  - HORMONE EFFECTS ON, 7995*
  - OXYGEN, 7995*
- PEPTIDES, 7995*

PLASMA
- ALCOHOLISM
  - DIAGNOSIS, 7171*
- ALPHA FETOPROTEIN
  - HEPATITIS, INFECTIOUS, 5879*
- AMINO ACIDS
  - ANALYSIS, 1554*
  - CASEIN, 5281*
- ANTRUM
  - DISTENTION, 2285*
- BILE ACIDS AND SALTS
  - CHOLELITHIASIS, 4670
  - KINETICS, 4670
  - LIVER DISEASES, 4670
- BONES
  - CALCIUM, 5498
- CALCIUM
  - PHOSPHONATES, 5498
- CARCINOEMBRYONIC ANTIGEN
  - PANCREAS, 1440*
  - PANCREATITIS, 1440*
- CHENODEOXYCHOLIC ACID
  - LIVER DISEASES, 4670
- CHOLAGOGUES AND CHOLERETICS
  - CHROMATOGRAPHY, 6098
  - METABOLISM, 6098
- CHOLELITHIASIS
  - CHENODEOXYCHOLIC ACID, 4670
  - CHOLIC ACID, 4670
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 2054
  - BILIRUBIN, 2054
  - IMMUNITY, 8433*
- CHOLESTEROL
  - STEROLS, 6478*
- CHOLIC ACID
  - LIVER DISEASES, 4670
- COLITIS, ULCERATIVE
  - ZINC, 3317*
- CROHN'S DISEASE
  - PROTEINS, 4467*
- DIABETES
  - SECRETIN, 5945
- DIARRHEA
  - PROTEINS, 4467*
- DRUGS
  - BIOASSAY, 5491

PLASMA (continued)
- DRUGS (continued)
  - RADIOIMMUNOASSAY, 5491
  - TECHNIQUES, 5491
- GASTRECTOMY
  - VITAMIN D, 5615
- GASTRIN, 3593
  - VAGOTOMY, 3717
- H2 RECEPTOR ANTAGONISTS
  - GASTRIN, 2784*
- HEPATITIS, CHRONIC
  - CHEMICAL COMPOSITION, 4331*
- HEPATITIS, INFECTIOUS
  - KALLIKREIN, 5097
  - LIPIDS, 5869*
  - LIPOPROTEINS, 8368
  - OCCUPATIONAL FACTORS, 2489*
  - TRANSMISSION, 2489*
- HEPATITIS, SERUM
  - ANTIBODIES, 6483*
- HEPATOCYTES
  - SYNTHESIS, 2879*
- HYPOPROTEINEMIA
  - LEAKAGE, 2531*
- ILEUM
  - PROTEINS, 1773*
- INTESTINAL ABSORPTION
  - VITAMIN D, 7609*
- INTESTINE, SMALL
  - PROTEINS, 1773*
- JAUNDICE
  - BILIRUBIN, 5064*
- JAUNDICE, OBSTRUCTIVE
  - LIPOPROTEINS, 2586, 8368
- KERNICTERUS
  - AMINO ACIDS, 3393
- LIPIDS
  - PORTACAVAL SHUNT, 8046
- LIPOPROTEINS
  - PORTACAVAL SHUNT, 8046
- LIVER
  - LIPOPROTEINS, 6125
  - NEOPLASMS, 4331*
- LIVER CIRRHOSIS
  - CHEMICAL COMPOSITION, 4331*
  - ENDOTOXINS, 6530*
  - HISTAMINE, 5130*
  - HORMONES, ADRENAL CORTEX, 2554
  - HYPOPROTEINEMIA, 2531*
  - IMMUNITY, 8433*
  - RENIN, 2554, 5122*
- LIVER COMA
  - AMINO ACIDS, 3768
- LIVER DISEASES, ALCOHOLIC
  - HYPOPROTEINEMIA, 2531*
- LIVER INJURY
  - DIAGNOSIS, 7171*
- MALABSORPTION SYNDROMES
  - TRIGLYCERIDES, 3248*
- MOTILIN
  - DRUG METABOLISM, 2984*
  - HORMONE EFFECTS ON, 6746*
  - KINETICS, 2984*
- PANCREAS
  - SECRETIN, 7374*
- PHOTOTHERAPY, 8117
- PROTEINS
  - STEROIDS, 1107

PLASMA (continued)
- RADIONUCLIDES
  - DIAGNOSIS, 6828*
- RADIOPROTECTIVE AGENTS
  - EXCRETION, 1786
- SECRETIN, 6819*
  - ACIDITY, 1939
  - FOOD, 1939
  - HORMONE EFFECTS ON, 5386*
  - RADIOIMMUNOASSAY, 6062
- STEROLS
  - METABOLISM, 6478*
- ULCER, PEPTIC
  - GASTRIN, 2285*

PLASMAPHERESIS
- HEPATITIS
  - AUSTRALIA ANTIGEN, 643*

PLATELETS
- SEE BLOOD PLATELETS

PNEUMATOSIS
- ABDOMEN
  - SURGERY, 6300
- APPENDICITIS
  - COLON, 4168
- COLON, 6333*
  - NECROSIS, 492
  - SHUNT, INTESTINAL, 3219*
- DIAGNOSIS
  - SURGERY, 7047
- DISEASES ASSOCIATED WITH
  - PATHOLOGY, 6945
  - RADIOLOGY, 6945
- ENTEROCOLITIS, NECROTIZING
  - INTESTINES, 1689
  - PREMATURITY, 1689
- ILEUM
  - ENDOSCOPY, 1373
- INTESTINE, LARGE
  - ETIOLOGY, 4879*
  - ISCHEMIA, 4879*
  - PATHOLOGY, 4879*
- INTESTINE, SMALL
  - PATHOLOGY, 8163*
- INTESTINES, 6333*
  - ABDOMEN, 6300
  - BACTERIAL INFECTIONS, 4193
  - DISEASES ASSOCIATED WITH, 2477, 5214
  - SHUNT, INTESTINAL, 3219*
  - SIMULATION, 4193
- SHUNT, INTESTINAL
  - COMPLICATIONS, 5651*
- STOMACH
  - CYSTS, 1257
  - EMPHYSEMA, 1257
  - HERNIA, 8163*

POLLUTION
- COLON
  - NEOPLASMS, 5600
- LIVER
  - ABSORPTION, 3810
  - EXCRETION, 3810
- STOMACH
  - NEOPLASMS, 5600

POLYPS
- ANTRUM, 348
  - ANEMIA, 3541
  - GASTRIN, 3541
- APPENDIX, 503
  - NEOPLASMS, BENIGN, 1409
- BARIUM
  - ENEMA, 7002*
- BILE ACIDS AND SALTS
  - CHOLESTEROL, 7659*
  - ETIOLOGY, 7659*
- COLITIS
  - NEOPLASMS, 5253*
- COLITIS, ULCERATIVE
  - DIAGNOSIS, 518
- COLON, 3315, 7668
  - ADOLESCENCE, 4955
  - BARIUM, 7002*
  - BILE ACIDS AND SALTS, 1395*
  - BLOOD, 1193
  - CLASSIFICATION, 3313
  - COLONOSCOPY, 7002*
  - DIAGNOSIS, 250, 254, 7544
  - DISEASES ASSOCIATED WITH, 4197
  - DIVERTICULUM, 3301
  - ENDOSCOPY, 254, 504, 506, 3069, 3285, 7544, 7679, 7681, 7682
  - EPIDEMIOLOGY, 2400, 6334*
  - FAMILIAL FACTORS, 1395*, 3314, 4157*
  - GENETIC FACTORS, 4157*
  - INFANT, 4194, 7710
  - NEOPLASMS, 3312, 4194, 6334*, 7008
  - NEOPLASMS, BENIGN, 5731
  - NEOPLASMS, MALIGNANT, 3314, 4197
  - RADIOLOGY, 4194, 7544
  - REVIEW, 7681, 7682
  - SCHISTOSOMIASIS, 3560*
  - SURGERY, 506, 1395*, 2399
  - THERAPY, 254, 3313, 5726
- COLONIC DISEASES, 3243
- COLONOSCOPY
  - DIAGNOSIS, 5538
- CRONKHITE-CANADA SYNDROME, 5612
- DIVERTICULITIS
  - DISEASES ASSOCIATED WITH, 3301
- DUODENUM
  - ENDOSCOPY, 4111
  - NEOPLASM METASTASIS, 6969
  - PEUTZ-JEGHER'S SYNDROME, 6969
  - SURGERY, 4111
- ENDOSCOPY
  - COLON, 1254
  - DIAGNOSIS, 1254
  - STOMACH, 3992
  - SURGERY, 1254
- ENVIRONMENTAL FACTORS
  - PRECANCEROUS CONDITIONS, 2401
- EPIDEMIOLOGY, 2401
- FAMILIAL FACTORS
  - ENVIRONMENTAL FACTORS, 2401
  - PRECANCEROUS CONDITIONS, 2401
  - REVIEW, 5747
- GALLBLADDER
  - CHILD, 1593
  - RADIOLOGY, 1593
- GARDNER'S SYNDROME
  - DUODENUM, 5654*
  - REVIEW, 7013

POLYPS (continued)
- GASTRITIS, ATROPHIC, 3144*
- GASTROINTESTINAL SYSTEM
  - INFANT, 4124
  - PROGNOSIS, 4124
  - PROTEIN-LOSING ENTEROPATHIES, 4124
- GENETIC FACTORS
  - ENVIRONMENTAL FACTORS, 2401
  - PRECANCEROUS CONDITIONS, 2401
- ILEUM
  - INTUSSUSCEPTION, 2339
  - OBSTRUCTION, 1371, 3242
- INFLAMMATION
  - INTUSSUSCEPTION, 2339
- INTESTINAL OBSTRUCTION
  - COLITIS, ULCERATIVE, 3282*
  - COLON, 3282*
  - INFLAMMATION, 3242
- INTESTINE, LARGE
  - DIAGNOSIS, 7711
  - ENDOSCOPY, 1416, 7669
  - EPIDEMIOLOGY, 1414, 2400
  - FAMILIAL FACTORS, 7048, 7058
  - NEOPLASMS, 7048, 7058
  - PRECANCEROUS CONDITIONS, 1394*
- INTESTINE, SMALL
  - NEOPLASMS, 6943
  - OBSTRUCTION, 3242
- INTESTINES
  - CHILD, 505
  - RADIOLOGY, 4195
- JEJUNUM
  - PEUTZ-JEGHER'S SYNDROME, 1695
- LYMPHATIC SYSTEM
  - RECTUM, 1666
- NEOPLASMS
  - INTESTINE, LARGE, 1394*
- NEOPLASMS, MALIGNANT
  - COLON, 4198
- PEUTZ-JEGHER'S SYNDROME
  - DUODENUM, 6969
- RADIOLOGY
  - COLON, 5538
- RECTUM
  - CLASSIFICATION, 3313
  - DISEASES ASSOCIATED WITH, 4197
  - EPIDEMIOLOGY, 2400, 6334*
  - NEOPLASMS, 3311, 7008
  - NEOPLASMS, MALIGNANT, 4197
  - SCHISTOSOMIASIS, 3560*
  - THERAPY, 3313, 5726
- SIGMOID
  - INFANT, 7710
- STOMACH, 348, 3314, 6229
  - AMINO ACIDS, 4821
  - ANEMIA, 3541, 3992
  - ANEMIA, PERNICIOUS, 3144*
  - CARCINOID TUMOR, 4042*
  - CLASSIFICATION, 4813*
  - CRONKHITE-CANADA SYNDROME, 6241
  - ENDOSCOPY, 2399
  - EROSIONS, 2259
  - GASTRIN, 3541
  - PATHOLOGY, 334
  - RADIOLOGY, 2260
  - SURGERY, 2399, 3185
- SURGERY
  - COLON, 507
  - ENDOSCOPY, 507

- POLYSACCHARIDES
  - COLITIS, ULCERATIVE
    - COLON, 2407*
  - COLON
    - EPITHELIUM, 2407*
  - LIVER
    - TOXINS, 6782*

- PORPHYRIA
  - ANTIGENS, 6420*
  - BIOCHEMISTRY
    - REVIEW, 7114*
  - DRUG THERAPY, 8300*
  - ENZYMES, 7822
  - GENETICS
    - EPIDEMIOLOGY, 5821*
  - IRON
    - METABOLISM, 8309
    - PATHOLOGY, 7755*
  - JAUNDICE, CHRONIC IDIOPATHIC
    - DISEASES ASSOCIATED WITH, 4275*
  - LIVER
    - CHILD, 5059
    - DIAGNOSIS, 5059
    - DRUG METABOLISM, 586
    - DRUG THERAPY, 8311
    - PATHOLOGY, 5820*
    - REVIEW, 5820*
  - LIVER FUNCTION TESTS, 7822
  - METABOLISM
    - REVIEW, 7754*
  - MITOCHONDRIA
    - ULTRASTRUCTURE, 8282*
  - PATHOLOGY
    - REVIEW, 7114*
  - PHLEBOTOMY
    - DIABETES, 7753*
    - PORPHYRINS, 7753*
    - SURVIVAL, 7753*
    - THERAPY, 7753*
  - PORPHYRINS
    - DIAGNOSIS, 3477*
    - EXCRETION, 7754*
    - METABOLISM, 587, 7754*
    - URINE, 587
  - SIMULATION
    - DRUG-INDUCED, 8026*
  - THERAPY, 8300*

- PORPHYRINS
  - DRUG-INDUCED
    - EMBRYOLOGY, 2948
    - LIVER, 2948
  - EXCRETION
    - DRUG EFFECTS ON, 8025*
  - HYDROCARBONS, CHLORINATED
    - ENZYMES, 6785
    - URINE, 6785
  - LIVER
    - ALCOHOLS, 2868
    - CARBOXYLASES, 2949
    - CONTRACEPTIVES, ORAL, 1071
    - DRUG EFFECTS ON, 2868
    - METABOLISM, 7435*
    - PHENOBARBITAL, 2868
    - STEROIDS, 7435*
    - SYNTHESIS, 2868
  - LIVER CIRRHOSIS
    - DIAGNOSIS, 3477*

- PORPHYRIA (continued)
  - LIVER INJURY
    - ENZYMES, 1080, 1081
  - PORPHYRIA
    - DIAGNOSIS, 3477*
    - EXCRETION, 7754*
    - METABOLISM, 587, 7754*
    - PHLEBOTOMY, 7753*
    - URINE, 587
  - URINE
    - EXCRETION, 8025*

- PORTACAVAL SHUNT
  - AMINO ACIDS, 8081
  - BIOCHEMISTRY, 3907
  - ENZYMES, 4778
  - GALLBLADDER
    - MORPHOLOGY, 2537*
  - HYPERCHOLESTEREMIA
    - CHOLESTEROL, 1653
    - LIPOPROTEINS, 1653
  - IMMUNOLOGY, 3907
  - LIPIDS
    - METABOLISM, 2944, 3788
  - LIPOPOLYSACCHARIDES, 3907
  - LIVER
    - REGENERATION, 3904
    - ULTRASOUND, 1553*
  - LIVER CIRRHOSIS, 3486
    - BILE ACIDS AND SALTS, 5133
    - BLEEDING, 1566
    - HYPERTENSION, PORTAL, 4340*
    - LIVER COMA, 5134
    - LIVER FUNCTION TESTS, 1552*
    - PROGNOSIS, 8404
    - SURVIVAL, 4339*
  - LIVER COMA
    - DRUG EFFECTS ON, 2897
    - SLEEP, 6779*
  - LIVER DISEASES, ALCOHOLIC
    - BLEEDING, 2533
  - LIVER FUNCTION TESTS
    - ULTRASOUND, 1553*
  - NEOPLASMS
    - STIMULATION, 559
  - NERVOUS SYSTEM, 8110
  - PLASMA
    - LIPIDS, 8046
    - LIPOPROTEINS, 8046
  - PROGNOSIS
    - TECHNIQUES, 697*
  - RADIOLOGY
    - SEQUELAE, 2537*
  - STOMACH
    - ACID SECRETION, 1905
  - TECHNIQUES, 3906
  - VEINS
    - MORPHOLOGY, 2537*

- PORTAL HYPERTENSION
  - SEE HYPERTENSION, PORTAL

- PORTOGRAPHY
  - TECHNIQUES, 3918
    - COMPLICATIONS, 5541

- POTASSIUM
  - ABSORPTION
    - DRUGS, 874

POTASSIUM (continued)
- ACID SECRETION
  - AMMONIA, 86
- COLON
  - ION TRANSPORT, 6013, 7918*
  - SECRETION, 3833*
  - TRANSPORT, 7918*
  - WATER, ELECTROLYTE BALANCE, 3833*
- DEFICIENCY
  - HORMONES, GASTROINTESTINAL, 5197
- DIARRHEA
  - CHILD, 1683
- ESOPHAGUS
  - DEFICIENCY, 8152
  - MUSCLES, 5295
  - STENOSIS, 8152
- GASTROINTESTINAL DISEASES
  - TRACER STUDY, 324
- ILEUM
  - ABSORPTION, 6001*
  - PERISTALSIS, 60
  - SODIUM, 6001*
- INTESTINE, LARGE
  - MOTILITY, 7949
  - SECRETION, 7271
- INTESTINE, SMALL
  - ULCER, 6939*
- JEJUNUM
  - SECRETION, 3833*
  - WATER, ELECTROLYTE BALANCE, 3833*
- LIVER
  - TRANSPORT, 5408*
- LIVER CIRRHOSIS
  - ASCITES, 2558
  - CELLS, 4345
  - HORMONE EFFECTS ON, 4345
- SALIVARY GLANDS
  - SECRETION, 2120, 7336*, 7337*
  - TRANSPORT, 2120
- SECRETION
  - CATECHOLAMINES, 7336*
- STOMACH
  - ABSORPTION, 4502*
  - ACID SECRETION, 4502*
  - MOTILITY, 7949
  - SECRETION, 6017
  - TRANSPORT, 4502*
- TRANSPORT
  - MEMBRANES, 18*
- ULCER
  - HEMORRHAGE, 4128
- URINARY SYSTEM
  - DISEASE, 7271

PRECANCEROUS CONDITIONS
- COLITIS, ULCERATIVE
  - SURGERY, 6352*
- COLON
  - ENDOSCOPY, 7681
  - MACROMOLECULES, 3273*
  - NEOPLASMS, 2134
  - REVIEW, 7681
- CROHN'S DISEASE
  - INTESTINE, SMALL, 5986
- GASTROINTESTINAL SYSTEM
  - REVIEW, 8111
  - THERAPY, 5950
- HEPATITIS, CHRONIC
  - FIBROSIS, 8288*

PRECANCEROUS CONDITIONS (continued)
- LIVER
  - CARCINOGENS, 2151, 2152, 2153
  - HEPATOCYTES, 2149
  - TECHNIQUES, 558
- POLYPS
  - ENVIRONMENTAL FACTORS, 2401
  - FAMILIAL FACTORS, 2401
  - GENETIC FACTORS, 2401
  - INTESTINE, LARGE, 1394*
- RECTUM, 479
- STOMACH
  - BIOPSY, 5602
  - ENDOSCOPY, 2222
  - NEOPLASMS, MALIGNANT, 329, 352
  - RADIOLOGY, 2222
  - ULCER, 5602
  - ULTRASTRUCTURE, 1298
- SURGERY
  - REVIEW, 6352*
  - SEQUELAE, 6352*

PREGNANCY
- ABSORPTION
  - IRON, 3619
  - VITAMIN B12, 3610*
- ACID SECRETION
  - GASTRIN, 1906
  - HISTAMINE, 1906
  - HORMONE EFFECTS ON, 1906
- ALCOHOLISM, 7442*
- ANESTHESIA
  - ACID SECRETION, 6051
- ANUS
  - DISEASE, 4165
- APPENDICITIS
  - DIAGNOSIS, 6194
- AUSTRALIA ANTIGEN
  - HEPATITIS, INFECTIOUS, 4283*
  - TRANSMISSION, 7153*
- BILE ACIDS AND SALTS
  - METABOLISM, 1156
- CHILD
  - HEPATITIS, INFECTIOUS, 4283*
- CHOLAGOGUES AND CHOLERETICS, 6849
- CHOLELITHIASIS
  - ADOLESCENCE, 2574*
  - BILE ACIDS AND SALTS, 5238
- CHOLESTASIS
  - BILE ACIDS AND SALTS, 6565*
  - CHOLESTEROL, 1581*
  - FATTY ACIDS, 2451*
  - JAUNDICE, 4256*
  - LIPOPROTEINS, 1581*
  - LIVER, 3518
  - LIVER FUNCTION TESTS, 6565*
  - PREMATURITY, 7215*
  - PRURITIS, 4256*
  - STEROIDS, 568
  - ULTRASTRUCTURE, 3518
- COLITIS, ULCERATIVE
  - CROHN'S DISEASE, 4200*
- COLON
  - PERFORATION, 7001*
- COMPLICATIONS
  - HEMORRHOIDS, 4165
- CONSTIPATION
  - CATHARTICS, 5195
  - DRUG THERAPY, 5195

PREGNANCY (continued)
- EROSIONS
  - ASPIRIN, 2144
- ESOPHAGEAL REFLUX
  - ETIOLOGY, 5563*
  - MANOMETRY, 5563*
  - PRESSURE STUDY, 5563*
- HEARTBURN
  - ETIOLOGY, 5563*
  - MANOMETRY, 5563*
  - PRESSURE STUDY, 5563*
- HEMORRHOIDS
  - ETIOLOGY, 4188
- HEPATITIS, 7153*
  - DIETARY FACTORS, 2493*
  - EPIDEMIOLOGY, 2493*
  - SURVIVAL, 2493*
- HEPATITIS, CHRONIC, 7153*
- HEPATITIS, INFECTIOUS
  - AUSTRALIA ANTIGEN, 2492*, 3423*
  - CHOLESTASIS, 3424*
  - SEQUELAE, 4284*
  - THERAPY, 3423*
  - TRANSMISSION, 2491*, 4283*
- HYPERBILIRUBINEMIA
  - DRUG-INDUCED, 8336*
- HYPERTENSION, PORTAL
  - COMPLICATIONS, 8403*
  - REVIEW, 5908*
- INTESTINE, SMALL
  - SHUNT, INTESTINAL, 3226
- INTESTINES
  - LACTASE, 6130*
- IRON
  - PROTEINS, 5459
- JAUNDICE, 4271
  - CONTRACEPTIVES, ORAL, 1496
- JAUNDICE, CHRONIC IDIOPATHIC, 7774*
  - DISEASES ASSOCIATED WITH, 4275*
- LIVER
  - METABOLISM, 816
- LIVER CIRRHOSIS
  - REVIEW, 5908*
- LIVER DISEASES
  - REVIEW, 5796*
- LIVER FUNCTION TESTS
  - JAUNDICE, 1512*
- NEOPLASMS, MALIGNANT
  - DRUG-INDUCED, 6617
- NUTRITION DISORDERS
  - LIVER, 816
  - SIMULATION, 816
- PANCREATITIS, 6388
- PROTEINS
  - ALCOHOLS, 2905
  - DEFICIENCY, 5448
- PROTHROMBIN
  - CHOLESTASIS, 565
- SIGMOID
  - PERFORATION, 7001*
- STOMACH
  - ACIDITY, 6051
  - EROSIONS, 3009
  - ULCER, 3009
- TRANSPORT
  - IRON, 3619
- VITAMIN A
  - TRANSPORT, 2110

PREGNANCY (continued)
- WILSON'S DISEASE
  - REVIEW, 8305*

PREMATURITY
- CHOLESTASIS
  - PREGNANCY, 7215*
- ENTEROCOLITIS, NECROTIZING
  - PNEUMATOSIS, 1689
  - REVIEW, 794
- INTESTINES
  - BACTERIA, 1670

PRIMATES
- CHENODEOXYCHOLIC ACID
  - TOXICOLOGY, 1055
- CHOLELITHIASIS
  - CHOLESTEROL, 1582
- COLON
  - EROSIONS, 3022
- HEPATITIS, INFECTIOUS
  - EPIDEMIOLOGY, 2485*
  - ETIOLOGY, 2485*
  - LIVER, 2104*
  - SIMULATION, 672, 2104*
  - TRANSMISSION, 673, 2508
- HEPATOCYTES
  - ELECTROPHYSIOLOGY, 5992
- LIVER
  - NICOTINE, 3817
- NUTRITION
  - PROTEINS, 1106
- SCHISTOSOMIASIS
  - IMMUNITY, 1729
- SHIGELLOSIS, 1660
- STOMACH
  - ACID SECRETION, 958
  - CIRCULATION, 83
  - MOTILITY, 5321*
- VASOPRESSIN
  - ARTERIES, 2118
  - CIRCULATION, 2118
  - MESENTERY, 2118

PROCTITIS
- COLITIS
  - ANTIBIOTICS, 3275*
  - DIAGNOSIS, 3276*
  - DRUG-INDUCED, 3275*
  - PROGNOSIS, 2387
- COLON
  - BIOPSY, 5723*
  - IMMUNOCHEMISTRY, 8237*
  - MORPHOLOGY, 5723*
  - PATHOLOGY, 8237*
- CROHN'S DISEASE
  - ANUS, 4474*
- SYPHILIS
  - DIAGNOSIS, 6335*

PROCTOCOLITIS
- AMEBIASIS
  - DIAGNOSIS, 3567
  - THERAPY, 3567
- BIOPSY, 7696
- BLEEDING
  - IMMUNOLOGY, 4181

PROCTOCOLITIS (continued)
- CROHN'S DISEASE
  - BIOPSY, 5254*
  - EPIDEMIOLOGY, 1738
  - PROGNOSIS, 5254*
- DIAGNOSIS
  - REVIEW, 3316
- ETIOLOGY, 7696
  - REVIEW, 3316
- HEMORRHAGE, 4956
  - ETIOLOGY, 4206
  - REVIEW, 3316
  - THERAPY, 4206
- ULCER, 4956

PROLACTIN
- LIVER CIRRHOSIS
  - ASCITES, 5124*
  - CIRCADIAN RHYTHM, 6526*
- LIVER DISEASES, ALCOHOLIC
  - LIVER CIRRHOSIS, 5124*

PROLAPSE
- COLON
  - SALMONELLOSIS, 2402
- ILEUM
  - CECUM, 5667
- INTUSSUSCEPTION
  - RECTUM, 497
  - THERAPY, 497
- RECTUM
  - AGE FACTORS, 2402
  - REVIEW, 8254
  - SALMONELLOSIS, 2402
  - SEX FACTORS, 2402
  - STATISTICAL STUDY, 8254
  - SURGERY, 8253
  - THERAPY, 8254
- STOMACH
  - COMPLICATIONS, 3166
  - NEOPLASMS, 3165
  - NEOPLASMS, MALIGNANT, 4040*
  - RADIOLOGY, 3166

PROSTAGLANDINS
- ABSORPTION
  - CALCIUM, 7919*
  - STOMACH, 4562*
- ACHLORHYDRIA
  - ETIOLOGY, 2594*
- ACID SECRETION, 2113
  - OXYGEN, 968
  - STOMACH, 4562*
- BILE
  - CHOLESTEROL, 2890*
  - LIPIDS, 2890*
  - REFLUX, 4564*
  - SECRETION, 6745*
- BLEEDING
  - ASPIRIN, 2141
  - DRUG-INDUCED, 2141
- CHEMICAL COMPOSITION
  - SYNTHESIS, 5328
- CHEMICAL PROPERTIES, 6727*
- CHOLECYSTITIS, 5916*
- CHOLERA
  - TOXINS, 781
- CHOLERESIS, 1050

PROSTAGLANDINS (continued)
- CHOLESTEROL
  - SYNTHESIS, 4652
- COLITIS, ULCERATIVE
  - ETIOLOGY, 4973
  - SYNTHESIS, 6354
- COLON
  - PERISTALSIS, 5317*
- CROHN'S DISEASE
  - ETIOLOGY, 8510
- ESOPHAGUS
  - MOTILITY, 927
- FISTULA
  - ACID SECRETION, 951*
  - SECRETION, 951*
- GASTRITIS, 4067*
- GASTRITIS, ATROPHIC, 4067*
- HEIDENHAIN POUCH
  - ACID SECRETION, 951*
  - SECRETION, 951*
- HYPERBILIRUBINEMIA
  - NEONATE, 5842*
- ILEUM
  - ION TRANSPORT, 34
  - MOTILITY, 4529*, 5316*, 7939*
  - MUSCLES, 1853
  - PERISTALSIS, 5316*, 5317*
- INTESTINAL OBSTRUCTION
  - SIMULATION, 1118
- INTESTINE, LARGE
  - MOTILITY, 2739*
- INTESTINE, SMALL
  - MOTILITY, 924, 4529*, 7939*
  - WOUNDS AND INJURIES, 4127
- INTESTINES
  - ABSORPTION, 7919*
  - PARASITES AND PARASITIC DISEASES, 8119
  - SECRETION, 2093
  - ULCER, 8102*
- JAUNDICE
  - NEONATE, 5842*
- LIVER
  - ANGIOGRAPHY, 6393*
  - HAPTOGLOBINS, 2114
  - SYNTHESIS, 6794
- METABOLISM
  - STOMACH, 4562*
- MOTILITY
  - BRADYKININ, 936
- PANCREAS
  - SECRETION, 99, 2859, 6745*
- SERUM
  - CHOLESTEROL, 2890*
  - HAPTOGLOBINS, 2114
  - LIPIDS, 2890*
- STOMACH, 8104*
  - ACID SECRETION, 98, 99, 965, 966, 4582, 6727*, 7363
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2743*, 3707
  - ADENYL CYCLASE, 1925, 5359*
  - BLEEDING, 4564*
  - CIRCULATION, 2807
  - ELECTRICAL CONTROL, 1865
  - ELECTROPHYSIOLOGY, 2807
  - EROSIONS, 2807
  - FATTY ACIDS, 101
  - FISTULA, 951*

PROSTAGLANDINS (continued)
  STOMACH (continued)
    GUANOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 2743*
    MOTILITY, 2743*
    NUCLEOTIDES, 2743*
    OSMOLARITY, 5362*
    OSMOTIC PRESSURE, 1924
    REFLUX, 2769
    SECRETION, 100, 967, 1924, 2799,
      4563*, 5362*
    SYNTHESIS, 4561*, 5362*
    ULCER, 386, 3187
  STOMACH DISEASES, 4067*
  SYNTHESIS, 2113, 5361*, 6727*
    DRUG EFFECTS ON, 4561*
  ULCER, PEPTIC, 99, 4067*
    ACID SECRETION, 2284*
  VAGOTOMY, 3722
  VILLI
    DRUG EFFECTS ON, 2738*

PROSTHESIS
  ESOPHAGUS
    FISTULA, 4033
  VARICES
    BLEEDING, 4802

PROTEASE
  SEE PEPTIDE HYDROLASES

PROTEIN-LOSING ENTEROPATHIES
  ASCITES
    MESENTERY, 436*
  BLIND LOOP SYNDROME
    AMINO ACIDS, 1134
    BREATH TEST, 1134
    SIMULATION, 1134
  CHILD
    ATROPHY, 3257*
    HYPOPROTEINEMIA, 3257*
    JEJUNUM, 3257*
  DISEASES ASSOCIATED WITH
    NEOPLASMS, MALIGNANT, 4099*
  ETIOLOGY
    FIBRINOLYSIS, 2989*
  GASTROINTESTINAL SYSTEM
    POLYPS, 4124
  HYPOPROTEINEMIA
    VILLI, 3257*
  IMMUNITY, 6634
  INTESTINE, SMALL
    LYMPHANGIECTASIS, 6946
  INTESTINES
    BIOPSY, 1252
    ENDOSCOPY, 3065
  LIPIDS
    LIPOPROTEINS, 3550
  LYMPHANGIECTASIS
    INTESTINES, 1387
  MYCOSES
    MALABSORPTION SYNDROMES, 770
  SIMULATION
    BIOCHEMISTRY, 3861

PROTEINS
  ABSORPTION
    CHILD, 896
    DIETARY FACTORS, 896

PROTEINS (continued)
  ABSORPTION (continued)
    EMBRYOLOGY, 7309
    FETUS, 7309
    GASTROINTESTINAL SYSTEM, 20
    MARKER STUDY, 6004*
    PHYSICAL FACTORS, 896
    SURGERY, 6004*
  ACETYLCHOLINE
    PANCREAS, 2848
  ACIDS
    DIET, 5463*
    SHUNT, 5463*
  ADENOSINE TRIPHOSPHATE
    ADENOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 6059*
    GUANOSINE CYCLIC 3',5'
      MONOPHOSPHATE, 6059*
  ALCOHOLS
    EXCRETION, 1282*
    PREGNANCY, 2905
    SYNTHESIS, 2905
  AMYLASES
    ASSAY, 6065
  ANESTHESIA
    PANCREAS, 3727*
  ANTIBIOTICS
    BINDING, 8320
  ASCITES
    DIURESIS, 4346
  BACTERIAL INFECTIONS
    DIETARY FACTORS, 2646
  BILE
    BINDING, 2419
  BILIRUBIN
    TRANSPORT, 39
  CALCIUM
    BINDING, 1124, 2079, 2080, 2081,
      5447, 5451
    DUODENUM, 1124
    INTESTINES, 2080
    RADIOIMMUNOASSAY, 5447
  CHOLECYSTITIS
    SERUM, 755
  CHOLESTASIS, 3516
  COLON
    NEOPLASMS, 8243
    NEOPLASMS, MALIGNANT, 5713*
  CROHN'S DISEASE
    PLASMA, 4467*
  CYSTIC FIBROSIS
    ABSORPTION, 8268*
  DEFICIENCY
    INTESTINES, 5448
    NEONATE, 5448
  DIARRHEA
    PLASMA, 4467*
  DIET
    ALBUMINS, 3860*
    PEPTIDE HYDROLASES, 74
  DIGESTION, 6826
    ELECTROPHYSIOLOGY, 6659
    GASTROINTESTINAL SYSTEM, 20
    INTESTINES, 1089
    PANCREAS, 7933
    REVIEW, 1089
  DUMPING SYNDROME
    SERUM, 4056

PROTEINS (continued)

- DUODENUM
  - CADMIUM, 7507
  - CALCIUM, 2974
  - IRON, 5459
  - MOTILITY, 3653
  - SECRETION, 4690
  - VITAMIN D, 2079, 5447
- ECHINOCOCCOSIS
  - SERUM, 8170
- ENZYMES
  - HISTAMINE, 94
  - STOMACH, 94
- ESCHERICHIA COLI
  - DIETARY FACTORS, 2646
- FATS
  - ABSORPTION, 3603*
- FATTY LIVER
  - DEFICIENCY, 6802
  - SYNTHESIS, 1972*
- FISTULA
  - ACID SECRETION, 6040*
- GASTRECTOMY
  - BLOOD, 3151
  - METABOLISM, 6910
- GASTRIN, 6845
  - ATROPINE, 5634
  - DRUG EFFECTS ON, 5634
- GASTRITIS
  - EXCRETION, 1282*
  - SERUM, 755
- GASTRITIS, ATROPHIC
  - EXCRETION, 1282*
- GASTROINTESTINAL DISEASES
  - SERUM, 8170
- GASTROINTESTINAL SYSTEM, 2858
- HEIDENHAIN POUCH
  - ACID SECRETION, 6040*
  - GASTRIN, 6040*
- HELMINTHIASIS
  - DEFICIENCY, 5508
- HEPATITIS, CHRONIC
  - ENZYMES, 6469*
  - IMMUNITY, 1024
- HEPATITIS, INFECTIOUS
  - CHILD, 8373
  - DANE PARTICLES, 5862*
  - DIAGNOSIS, 8373
  - ENZYMES, 6469*
  - IMMUNITY, 1024
  - SYNTHESIS, 6721
- HEPATITIS, TOXIC
  - SYNTHESIS, 6721
- HEPATOCYTES, 8063
  - SYNTHESIS, 2879*, 3382, 8011*
- HYDROCARBONS
  - BINDING, 1033
- HYPOLIPEMIC AGENTS
  - BILIRUBIN, 3811
- ILEUM
  - BILE, 4688
  - CROHN'S DISEASE, 851
  - MEMBRANES, 5261*
  - PLASMA, 1773*
  - VILLI, 1773*
- INDOCYANINE GREEN
  - BINDING, 679
- INFECTION
  - INFANT, 6620

PROTEINS (continued)

- INFECTION (continued)
  - THERAPY, 6620
- INTESTINAL ABSORPTION
  - FERRITIN, 7917*
  - IMMUNOGLOBULINS, 7917*
  - TRANSMISSION, 7304*
- INTESTINE, SMALL
  - CADMIUM, 7507
  - ENZYMES, 6133
  - HELMINTHIASIS, 5508
  - MEMBRANES, 5261*
  - PARENTERAL ALIMENTATION, 3854
  - PLASMA, 1773*
  - SECRETION, 4690
  - SERUM, 2070
  - SURGERY, 1126, 2070, 2136
  - VILLI, 1773*, 4682*
  - VITAMIN D, 6839
- INTESTINES
  - FEEDING, 2081
  - LACTASE, 6130*
  - MEMBRANES, 2064
  - METABOLISM, 8200
  - TRANSPORT, 3603*
  - VITAMIN D, 2081
- INTOLERANCE
  - COLITIS, 5716*
  - DIARRHEA, 5716*
  - INFANT, 5716*
- INTRINSIC FACTOR
  - BINDING, 2062*
  - VILLI, 2062*
- IRON
  - BINDING, 5459
  - LIVER, 2011
  - PREGNANCY, 5459
  - SYNTHESIS, 2011
- JEJUNUM
  - BILE, 4688
  - FETUS, 7309
  - MEMBRANES, 5261*
  - SECRETION, 4690
- KWASHIORKOR
  - INFANT, 4146
  - NUTRITION DISORDERS, 7245
- LACTASE
  - DEFICIENCY, 6130*
- LIVER
  - AGE FACTORS, 5405*
  - ALCOHOLISM, 7442*
  - ALCOHOLS, 3761*, 7439*
  - AMINO ACIDS, 6761*
  - ANESTHESIA, 8343
  - BINDING, 1033, 2931, 3798, 7422*
  - CARBOHYDRATES, 6761*
  - CIRCADIAN RHYTHM, 3797
  - DEFICIENCY, 3917
  - DIETARY FACTORS, 2009
  - DRUG EFFECTS ON, 1015*, 6127
  - DRUG METABOLISM, 3790
  - DRUGS, 3798
  - GROWTH FACTORS, 5406*
  - IMMUNITY, 1024
  - LIPIDS, 4634*
  - LIPOGENESIS, 7417*
  - METABOLISM, 1015*, 3761*
  - METALS, 5407*
  - NEONATE, 5406*

PROTEINS (continued)
  LIVER (continued)
    REGENERATION, 2894
    RIBOSOMES, 6768*
    SURGERY, 8343
    SYNTHESIS, 2010, 2012, 5405*, 5406*, 6541*, 7387*, 7442*, 8010*
    TRANSPLANTATION, 167
    UREA, 8009*
    VITAMIN D, 6839
  LIVER CIRRHOSIS
    ASCITES, 3487
    ENZYMES, 6469*
    ERYTHROCYTES, 7812*
    ETIOLOGY, 6524*
    THYROID GLAND, 3478*
  LIVER DISEASES
    BINDING, 8283*
    DRUG METABOLISM, 8283*
    METABOLISM, 7793
  LIVER DISEASES, ALCOHOLIC
    SECRETION, 7806*
    SYNTHESIS, 7806*
  LIVER INJURY
    ISCHEMIA, 124*
    SYNTHESIS, 124*
  MALABSORPTION SYNDROMES
    COLITIS, 5716*
    DIARRHEA, 5716*
    DISEASES ASSOCIATED WITH, 7648
    ETIOLOGY, 6981*
    INFANT, 5716*
    INTOLERANCE, 4908*
    MILK, 6319
  MARASMUS
    METABOLISM, 4146
    NUTRITION DISORDERS, 7245
  MENETRIER'S DISEASE
    MALABSORPTION SYNDROMES, 3181
  METABOLISM
    SHUNT, INTESTINAL, 7630
  METALS
    BINDING, 5407*
  NEONATE
    INTESTINES, 5448
  NEOPLASMS
    SERUM, 8243
  NUTRITION
    GROWTH FACTORS, 1106
    PRIMATES, 1106
  NUTRITION DISORDERS
    BIOCHEMISTRY, 441
    CHILD, 441
    EPIDEMIOLOGY, 441
    SERUM, 7856*
  PANCREAS
    ACETYLCHOLINE, 1954
    BILE ACIDS AND SALTS, 1963
    DIGESTION, 1960
    ENZYMES, 997, 1961
    HORMONE EFFECTS ON, 3724*, 5385*, 7373*
    PARASYMPATHOMIMETICS, 4594*, 4602
    PEPTIDES, 1960
    SECRETION, 1942, 2834*, 4585*, 4602, 5385*, 7376, 7380
    SYMPATHOMIMETICS, 7369*

PROTEINS (continued)
  PANCREAS (continued)
    SYNTHESIS, 1934, 3724*, 5385*, 7987*
    TRACER STUDY, 2834*
    TRYPSIN, 1963
  PANCREATITIS, CHRONIC
    ALCOHOLS, 6385
    NERVOUS CONTROL, 6385
  PARENTERAL ALIMENTATION
    METABOLISM, 5180*
  PREGNANCY
    DEFICIENCY, 5448
  RECTUM
    NEOPLASMS, MALIGNANT, 5713*
  RIBOSOMES
    SYNTHESIS, 6768*
  SALIVARY GLANDS
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6034
    CALCIUM, 6034
    SECRETION, 6034
  SECRETIN
    SERUM, 2097*
  SECRETION
    GASTRIN, 1334*
    HORMONE CONTROL, 7376
    HYPERGLYCEMIA, 7380
    KINETICS, 2160
    PANCREAS, 2160
    SECRETIN, 7376
  SERUM
    BINDING, 2782*
    SURGERY, 2136
  SHUNT, INTESTINAL
    JEJUNUM, 2315*
  STEROIDS
    PLASMA, 1107
  STOMACH
    BINDING, 2782*
    DRUG EFFECTS ON, 3154
    MOTILITY, 3653
    NEOPLASMS, 1324
    SYNTHESIS, 952*, 1324
  SYNTHESIS
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6768*
    AFLATOXINS, 8010*
    AGE FACTORS, 5405*
    ALCOHOLISM, 7442*
    ALCOHOLS, 8011*
    DRUG EFFECTS ON, 8010*, 8011*
    HORMONE CONTROL, 6768*
    HORMONE EFFECTS ON, 952*, 2879*
    NEONATE, 5406*
    SOMATOSTATIN, 6768*
  TOXICITY
    CELL CULTURE, 8477
  TRANSMISSION
    CIRCULATION, 7304*
  TRANSPORT
    METABOLISM, 894
    PANCREAS, 894
  TRYPSIN INHIBITORS
    PANCREAS, 2863
  ULCER
    DUODENUM, 5634
    SYNTHESIS, 7979

PROTEINS (continued)
  ULCER, PEPTIC
    STOMACH, 8180*
  UREMIA
    DEFICIENCY, 6611
  VITAMIN D
    BINDING, 1115, 5458
    DIETARY FACTORS, 5451
    GROWTH FACTORS, 5451

PROTHROMBIN
  CHOLESTASIS
    METABOLISM, 8073
    PREGNANCY, 565
  LIVER DISEASES
    HEMOSTASIS, 7110*
    TECHNIQUES, 615
  METABOLISM
    DRUG EFFECTS ON, 8073

PROTOZOA
  DIARRHEA
    DIAGNOSIS, 2590*
  GNOTOBIOTICS
    DIAGNOSIS, 1719
  IMMUNOSUPPRESSION
    DIARRHEA, 393*
  PARASITES AND PARASITIC DISEASES
    DIAGNOSIS, 1719

PROTOZOAL DISEASES
  EPIDEMIOLOGY, 5226
  INTESTINES
    DIAGNOSIS, 3551
    DRUG THERAPY, 3551, 3572
    THERAPY, 3551
  LIVER
    ABSCESS, 5247

PSEUDO-OBSTRUCTION
  CECUM
    GANGRENE, 8236*
    PERFORATION, 8236*
  CHOLANGIOGRAPHY
    COMMON BILE DUCT, 7234
  COLON
    DIAGNOSIS, 6330*
    ETIOLOGY, 8236*
    GANGRENE, 8236*
    PERFORATION, 8236*
    RADIOLOGY, 6330*
  COMMON BILE DUCT
    SPHINCTER, 7234
  ESOPHAGUS
    MOTILITY, 4881*
    PERISTALSIS, 2340
  INTESTINES
    DISEASES ASSOCIATED WITH, 4122
    ELECTROPHYSIOLOGY, 6290*
    ETIOLOGY, 5215, 5652*
    FAMILIAL FACTORS, 4881*
    MOTILITY, 2340, 6290*
    MUSCLES, 5652*
    NEUROMUSCULAR DISEASES, 5215
    PATHOLOGY, 5652*
  MOTILITY
    DUODENUM, 2340
  PARENTERAL ALIMENTATION
    CHILD, 4866*

PSEUDO-OBSTRUCTION (continued)
  SHUNT, INTESTINAL
    COMPLICATIONS, 8192*

PSEUDOCYSTS
  HEMORRHAGE
    SURGERY, 6365*
  PANCREAS
    ARTERIOGRAPHY, 5521*
    ASCITES, 3325*
    BLEEDING, 1444
    COMPLICATIONS, 4217, 6366*
    DIAGNOSIS, 5521*, 6182, 6366*, 8269
    DIARRHEA, 4217
    ENDOSCOPY, 6366*
    HEMATOBILIA, 1444
    HEMORRHAGE, 6365*
    HORMONES, GASTROINTESTINAL, 4217
    INFANT, 6374
    PANCREATOGRAPHY, 6366*
    SURGERY, 6365*
    ULTRASONOGRAPHY, 6182, 6372, 8269
  PANCREATITIS, 4217
    COMPLICATIONS, 6389, 7728
    ETIOLOGY, 1447*
    SURVIVAL, 1447*
    THERAPY, 1447*
  PANCREATITIS, CHRONIC
    SURGERY, 4994

PSEUDOTUMORS
  ABDOMEN
    ABSCESS, 8505
    ASCARIASIS, 8505
  ASCARIASIS
    ABSCESS, 8505
  CECUM
    YERSINIA, 8223
  COLITIS, ULCERATIVE
    COLON, 5762*
  CROHN'S DISEASE
    COLON, 5762*
  GASTROINTESTINAL SYSTEM
    CHILD, 7569
    DIAGNOSIS, 7569
    LAPAROSCOPY, 7569
  ILEUM
    YERSINIA, 8223
  LIVER
    BACTERIAL INFECTIONS, 1509*
  MENETRIER'S DISEASE, 4828
  ULCER
    CHILD, 6279
  YERSINIA
    DISEASES ASSOCIATED WITH, 8202

PSORIASIS
  ANUS
    PROGNOSIS, 2392

PURINES
  ILEUM
    MOTILITY, 7946
    PERISTALSIS, 7946
  INTESTINE, SMALL
    ELECTRICAL CONTROL, 1854
    MOTILITY, 7946
    PERISTALSIS, 7946

- PYLOROPLASTY
  - ACID SECRETION, 3718
  - AMINO ACIDS
    - ANALYSIS, 5635
  - COMPLICATIONS
    - DIARRHEA, 6936
    - DUMPING SYNDROME, 5598*
    - HYPOGLYCEMIA, 5598*
    - NAUSEA, 6936
    - PAIN, 6936
    - THERAPY, 6936
    - VOMITING, 6936
  - DUODENITIS, 4835*
  - DUODENUM
    - ULCER, 4855
    - ULCER, PEPTIC, 4835*, 6918*
  - FATS
    - ANALYSIS, 5635
  - GASTRIN, 4835*, 4856
    - ANTRUM, 2238*
    - SEQUELAE, 2238*
    - ULTRASTRUCTURE, 8181*
  - GASTRITIS, 4835*
    - REFLUX, 3175
  - GLUCOSE
    - ANALYSIS, 5635
  - SERUM
    - GASTRIN, 3718
  - STOMACH
    - ACID SECRETION, 7364
    - GASTRIN, 7364
    - SECRETION, 1332
  - TECHNIQUES
    - ANALYSIS, 6246
    - COMPLICATIONS, 6246
    - ULCER, 5646
  - ULCER
    - DUODENUM, 8181*
    - RECURRENCE, 5646
  - ULCER, PEPTIC
    - SURGERY, 6918*
  - VAGOTOMY
    - TECHNIQUES, 6245

- PYLORUS
  - ANOMALY
    - DUPLICATION, 2277, 5616
    - OBSTRUCTION, 1305
    - RADIOLOGY, 1331, 5616
  - CELLS
    - MORPHOLOGY, 7905*
    - MUCUS, 7905*
    - SECRETION, 7905*
    - ULTRASTRUCTURE, 7905*
  - CHOLECYSTOKININ
    - REFLUX, 5632
  - DUODENUM
    - CALCULI, 427
  - HEMORRHAGE
    - EMBOLIZATION, 315*
  - INTESTINAL OBSTRUCTION
    - HYPERTROPHY, 4109*
  - INTRINSIC FACTOR, 7495*
  - MORPHOLOGY
    - ULCER, PEPTIC, 8165*
  - MOTILITY
    - CHOLECYSTOKININ, 67
    - ELECTROPHYSIOLOGY, 4541
    - GLUCAGON, 67

- PYLORUS (continued)
  - MOTILITY (continued)
    - NERVOUS CONTROL, 8120
    - SECRETIN, 67
  - NERVOUS CONTROL
    - VAGOTOMY, 8120
  - OBSTRUCTION
    - ETIOLOGY, 7113*
    - NEONATE, 7113*
  - RADIOTHERAPY
    - STRICTURE, 6225*
  - REVIEW, 7908
  - SECRETION
    - MUCUS, 7905*
  - SPHINCTER
    - ANTI-INFLAMMATORY AGENTS, 7329
    - DRUG EFFECTS ON, 7329
  - STENOSIS
    - ACID SECRETION, 5593*
    - AMINO ACIDS, 4096
    - ANTIBIOTICS, 1310
    - ANTISPASMODICS, 241
    - BLOOD, 4096
    - DIAGNOSIS, 4741*
    - ENVIRONMENTAL FACTORS, 3146*
    - FAMILIAL FACTORS, 3146*
    - GASTRIN, 5593*
    - HYPERTROPHY, 4741*, 5619
    - INFANT, 1310, 3146*, 4815*, 6242
    - MOTILITY, 349
    - RADIOLOGY, 241
    - RECURRENCE, 3146*
    - SURGERY, 6242
    - TETANY, 6231
    - ULTRASOUND, 4741*
    - ULTRASTRUCTURE, 4815*
  - ULCER
    - BIOPSY, 3993
    - DIAGNOSIS, 3993
    - DUODENUM, 5603
    - ENDOSCOPY, 3993
    - ETIOLOGY, 5603
    - RADIOLOGY, 3993
    - STOMACH, 5603

- PYROGENS
  - STOMACH
    - HORMONES, 205

- RADIATION
  - SEE ALSO IRRADIATION
  - COLITIS
    - DIAGNOSIS, 4943
  - COLON, 3005
  - GASTROINTESTINAL SYSTEM
    - SEQUELAE, 6614
  - JEJUNUM, 3005
  - PANCREAS
    - NEOPLASMS, MALIGNANT, 4216
  - RADIATION EFFECTS ON, 3005

- RADIOIMMUNOASSAY
  - ANTIDIARRHEALS
    - TECHNIQUES, 6830*
  - ANTRUM
    - CHOLECYSTOKININ, 3592
    - GASTRIN, 3592

RADIOIMMUNOASSAY (continued)
- AUSTRALIA ANTIGEN, 1533, 8379
  - ANTIBODIES, 7785*
  - TECHNIQUES, 7785*
- BILE ACIDS AND SALTS
  - TECHNIQUES, 3753*, 5426*
- CALCIUM
  - PROTEINS, 5447
- CARCINOEMBRYONIC ANTIGEN
  - NEOPLASMS, 5588*
- DUODENUM
  - CHOLECYSTOKININ, 3592
  - GASTRIN, 3592
  - SEROTONIN, 1873*
- GASTRIN
  - METABOLISM, 5384
- GLUCAGON
  - TECHNIQUES, 6032
- HEPATITIS
  - ANTIGENS, 5871*
  - SERODIAGNOSIS, 6482*
- HEPATITIS, INFECTIOUS
  - ALPHA FETOPROTEIN, 7089*
  - AUSTRALIA ANTIGEN, 5083*
  - SERODIAGNOSIS, 6482*
- HEPATITIS, SERUM
  - SERODIAGNOSIS, 6482*
- HORMONES, GASTROINTESTINAL
  - ILEUM, 5468*
  - INTESTINES, 5468*
  - JEJUNUM, 5468*
  - TECHNIQUES, 6032
- HYPERTENSION, PORTAL
  - CHOLIC ACID, 4341
- INTESTINE, SMALL
  - CHOLECYSTOKININ, 2082
- INTESTINES
  - ENKEPHALINS, 5274
- JEJUNUM
  - CHOLECYSTOKININ, 3592
  - GASTRIN, 3592
- LIVER CIRRHOSIS
  - ALPHA FETOPROTEIN, 7089*
  - BILE ACIDS AND SALTS, 2549, 6521*
  - CHENODEOXYCHOLIC ACID, 2549
  - CHOLIC ACID, 2549, 4341
- LIVER CIRRHOSIS, OBSTRUCTIVE
  - ANTIBODIES, 5101*
- NERVOUS SYSTEM
  - ENKEPHALINS, 5274
- PANCREAS
  - PEPTIDES, 1927*
- PLASMA
  - DRUGS, 5491
- REVIEW, 8127
- SECRETIN
  - PLASMA, 6062
  - SERUM, 2097*
- SERUM
  - GASTRIN, 3592
- STOMACH
  - CARCINOEMBRYONIC ANTIGEN, 3935*
  - CHOLECYSTOKININ, 2082, 3592
  - GASTRIN, 3592
  - GLYCOPROTEINS, 3935*
  - NEOPLASMS, 3935*
- ZOLLINGER-ELLISON SYNDROME
  - GASTRIN, 5225

RADIOISOTOPES
- ABSORPTION
  - AGE FACTORS, 2705*
  - TECHNIQUES, 5335
- CHOLESTEROL
  - BILE ACIDS AND SALTS, 3087
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 2705*
- LIVER
  - ANTIVIRAL AGENTS, 2921
  - RETICULOENDOTHELIAL SYSTEM, 3914
- LIVER DISEASES
  - DIAGNOSIS, 5839
- LIVER FUNCTION TESTS
  - IODINE, 3096
- PANCREAS
  - ARTERIES, 3899
  - SCANNING, SCINTILLATION, 2833*
- SCANNING, SCINTILLATION, 3946*
- STOMACH
  - ABSORPTION, 5335
  - MOTILITY, 3629*
  - SECRETION, 3629*
  - TECHNIQUES, 3629*

RADIOLOGY
- AFFERENT LOOP SYNDROME
  - RADIONUCLIDES, 5680
- AMEBIASIS
  - COLON, 6642*
- ANTRUM
  - ANOMALY, 1331
  - ULCER, 3993
- APPENDICITIS
  - CHILD, 1196, 7666
- BILE DUCTS, 4387
  - CERULEIN, 4752*
  - DIVERTICULUM, 3044*
  - NEOPLASMS, MALIGNANT, 6190
- BILIARY TRACT
  - ABSCESS, 5137*
  - ANOMALY, 5137*
  - CHOLANGIOGRAPHY, 4353*
  - CYSTS, 5137*, 7841
  - JAUNDICE, 726
  - MANOMETRY, 4748*
  - NEOPLASMS, 5137*
- BILIARY TRACT DISEASES
  - DIAGNOSIS, 6544*
- BUDD-CHIARI SYNDROME
  - ETIOLOGY, 8315
- CECUM
  - NEOPLASMS, 4175, 6294, 7702
  - TECHNIQUES, 7054
- CELIAC DISEASE, 4139
- CHOLECYSTECTOMY, 7233
- CHOLECYSTITIS
  - DIAGNOSIS, 2570*, 4379
  - TECHNIQUES, 2570*
- CHOLELITHIASIS
  - CHILD, 7208*
  - CHOLECYSTOGRAPHY, 3046*
- COLITIS, 3296
  - ISCHEMIA, 4155*
  - TUBERCULOSIS, 3277*
- COLITIS, ULCERATIVE, 7065
  - CLASSIFICATION, 3078
  - COLITIS, 4958*
  - COLON, 6355

RADIOLOGY (continued)
    COLITIS, ULCERATIVE (continued)
        DIAGNOSIS, 4969
        ENDOSCOPY, 6355
        REVIEW, 6355
    COLON
        AGE FACTORS, 4158
        ANOMALY, 2384
        ANOMALY, CONGENITAL, 7690, 7691
        CATHARTICS, 6165
        COMPLICATIONS, 2396, 4158
        CROHN'S DISEASE, 5260
        DIVERTICULUM, 3301, 7692
        ENEMA, 6165
        GASES, 2338
        GLUCAGON, 3063
        INTESTINAL OBSTRUCTION, 5740
        MALROTATION, 7690
        MYCOSES, 4393*
        NEOPLASMS, 255, 7704, 8256
        NEOPLASMS, MALIGNANT, 3291, 3297,
          4007, 4940, 8258
        PERFORATION, 2396
        POLYPS, 4194, 5538, 7544
        PSEUDO-OBSTRUCTION, 6330*
        SEX FACTORS, 4158
        TECHNIQUES, 4007, 4159, 467 , 4766,
          4768, 7864
        TUBERCULOSIS, 2341
    COLONIC DISEASES
        BLEEDING, 1201
        DIAGNOSIS, 4158, 7695
    COMMON BILE DUCT
        CYSTS, 5146*
    CROHN'S DISEASE
        DIAGNOSIS, 3932*, 4969
        ESOPHAGITIS, 4470*
    CYSTS
        LIVER, 2175*
    DIVERTICULITIS, 3297
        DIAGNOSIS, 3301
    DUMPING SYNDROME
        DIAGNOSIS, 4059, 4825
        ETIOLOGY, 4059
    DUODENUM
        ANOMALY, 7610, 7619
        BILIARY TRACT DISEASES, 6169
        CALCULI, 3512
        CRYPTS, 1352
        CYSTS, 2326
        DIAGNOSIS, 3041*
        DIVERTICULUM, 3233
        GLUCAGON, 1200
        HEMORRHAGE, 4757
        MYCOSES, 4393*
        NEOPLASMS, 1222
        OBSTRUCTION, 1195
        TECHNIQUES, 2170*
        ULCER, 4765
    ENDOSCOPY
        CHILD, 2169*
    ENTERITIS
        IRRADIATION, 417
    ENTEROCOLITIS
        DIAGNOSIS, 2313*
        MORPHOLOGY, 2313*
        YERSINIA, 2313*
    ESOPHAGEAL DISEASES
        DARIER'S DISEASE, 4390*

RADIOLOGY (continued)
    ESOPHAGEAL DISEASES (continued)
        EPIDEMIOLOGY, 6870
    ESOPHAGEAL REFLUX
        MANOMETRY, 299
    ESOPHAGUS
        ACHALASIA, 4788*
        BARRETT'S SYNDROME, 5561*
        HEMORRHAGE, 4757
        HERNIA, 6161
        INTEGUMENTARY SYSTEM, 1275
        MOTILITY, 6869
        NEOPLASMS, 1259*, 3131, 5558*,
          6870
        NEOPLASMS, MALIGNANT, 239, 1258*
        REFLUX, 4034
        SCLERODERMA, 4788*
        ULCER, PEPTIC, 3989
        VARICES, 4024*
    GALLBLADDER
        ANOMALY, CONGENITAL, 1640
        CHOLECYSTOKININ, 131, 1965*
        COMPLICATIONS, 1631, 2566*
        ENZYMES, 268
        FISTULA, 1627
        NEOPLASMS, BENIGN, 737
        NEOPLASMS, MALIGNANT, 1623
        POLYPS, 1593
        TECHNIQUES, 1216
        TOMOGRAPHY, 1216, 1631
    GASTRITIS
        DIAGNOSIS, 3993
        MORPHOLOGY, 3173
    GASTRITIS, ATROPHIC
        MORPHOLOGY, 3173
    GASTROINTESTINAL DISEASES
        DIAGNOSIS, 3052, 7538
        DRUG EFFECTS ON, 3986
        ENDOSCOPY, 7538
        MOTILITY, 1187
        REVIEW, 3039*, 7538
        TECHNIQUES, 2618
    GASTROINTESTINAL SYSTEM
        ANOMALY, 4885
        BARIUM, 49
        BLEEDING, 232, 2614, 3056, 6198*,
          6899
        CHILD, 2169*
        HEMORRHAGE, 2237*, 4757
        INFANT, 2169*
        MOTILITY, 1177*
        NEOPLASMS, MALIGNANT, 4151*
        TECHNIQUES, 1189, 8118
    HEMORRHAGE
        DIAGNOSIS, 5583
    ILEUM
        CIRCULATION, 3586*
        ELECTROPHYSIOLOGY, 2729*
        MOTILITY, 2729*
        NEOPLASMS, 6294
        TECHNIQUES, 7054
        TUBERCULOSIS, 2341
    INTESTINAL OBSTRUCTION
        CALCULI, 1613
        NEOPLASMS, MALIGNANT, 431
    INTESTINE, LARGE
        APPENDIX, 8239
        DIVERTICULITIS, 6346
        DIVERTICULUM, 6346

RADIOLOGY (continued)
  INTESTINE, LARGE (continued)
    GASES, 4745*
    INTUSSUSCEPTION, 8244
    MASSAE, 8259
    MYCOSES, 4393*
    NEOPLASM METASTASIS, 4162
    NEOPLASMS, 3288, 4175
    NEOPLASMS, MALIGNANT, 4162
    TECHNIQUES, 4162, 4925*
  INTESTINE, SMALL
    ANOMALY, 4885
    BARIUM, 6829*
    CARCINOID TUMOR, 4101*
    CHILD, 3062
    CIRCULATION, 3586*
    FISTULA, 1627
    GASES, 2338
    INTUBATION, 3996
    ISCHEMIA, 2329
    MYCOSES, 4393*
    NECROSIS, 6952
    SHUNT, 2314*
    TECHNIQUES, 3996
  INTESTINES
    COMPLICATIONS, 6858
    DISEASE, 6858
    NEOPLASMS, 7024
    PERFUSION, 4925*
    POLYPS, 4195
    TUBERCULOSIS, 2341
  JAUNDICE
    SURGERY, 4772
  JAUNDICE, OBSTRUCTIVE
    BILE DUCTS, 4772
  JEJUNUM
    CIRCULATION, 3586*
    ELECTROPHYSIOLOGY, 2729*
    MOTILITY, 2729*
  LIPODYSTROPHY, INTESTINAL
    DIAGNOSIS, 6315
  LIVER
    ABSCESS, 2172*
    ASCITES, 3043*
    CONTRAST MEDIA, 2201
    NEOPLASMS, 5013*
    REVIEW, 261
    TECHNIQUES, 3972
  LIVER CIRRHOSIS
    BIOPSY, 2540*
    COPPER, 2540*
  LIVER DISEASES
    BIOPSY, 256
    REVIEW, 261
    TECHNIQUES, 3972
  LYMPHATIC SYSTEM
    NEOPLASMS, MALIGNANT, 1667
  MALABSORPTION SYNDROMES
    COLON, 4001
  MECKEL'S DIVERTICULUM
    OBSTRUCTION, 4870*
  MEGACOLON, 3274*
  MENETRIER'S DISEASE, 3182
  NEONATE
    COLON, 2168*
    INTESTINAL OBSTRUCTION, 2168*
  NEOPLASMS
    VATER'S AMPULLA, 4359*

RADIOLOGY (continued)
  OBESITY
    SHUNT, INTESTINAL, 1359
  PAIN
    PANCREATITIS, 2429*
  PANCREAS, 3120
    ANOMALY, 2179*, 2410*
    ENDOSCOPY, 2217
    NEOPLASMS, 1222
    TECHNIQUES, 2217, 3114
  PANCREATIC DISEASES
    DIAGNOSIS, 3977
    PANCREATIC DUCT, 2216
    STATISTICAL STUDY, 3977
  PANCREATIC DUCT, 3120
    GASES, 522
  PANCREATITIS
    COMPLICATIONS, 3352
    GALLSTONES, 2445
    PANCREAS FUNCTION TESTS, 2429*
  PANCREATITIS, CHRONIC
    DIAGNOSIS, 7082, 7083
    PREOPERATIVE, 538
    SURGERY, 538
  PEUTZ-JEGHER'S SYNDROME, 3549
  PNEUMATOSIS
    DISEASES ASSOCIATED WITH, 6945
  PORTACAVAL SHUNT
    SEQUELAE, 2537*
  PYLORUS
    ANOMALY, 1331, 5616
    STENOSIS, 241
    ULCER, 3593
  RECTUM
    BARIUM, 1253
    INFLAMMATION, 1253
    NEOPLASMS, 1253
    NEOPLASMS, MALIGNANT, 3291
  REVIEW, 8129
  SALIVARY GLANDS
    REVIEW, 7254
    TECHNIQUES, 7254
  SCHISTOSOMIASIS
    REVIEW, 3287
  SHUNT, INTESTINAL
    OBESITY, 4873*
  SIGMOID
    DIVERTICULUM, 7692
  STOMACH, 6227*
    ANOMALY, 7072
    BARIUM, 4761, 6829*
    BILIARY TRACT DISEASES, 6169
    EROSIONS, 4812*
    HEMORRHAGE, 4757
    HERNIA, 3184
    INTESTINAL OBSTRUCTION, 3184
    LYMPHOMA, 5590*
    LYMPHOSARCOMA, 2241
    MORPHOLOGY, 1319
    MOTILITY, 6869
    NEOPLASMS, 330, 2222, 3165, 4977*, 5590*
    NEOPLASMS, BENIGN, 1325, 2410*
    NEOPLASMS, MALIGNANT, 327, 3161, 8174
    PANCREAS, 2179*
    POLYPS, 2260
    PRECANCEROUS CONDITIONS, 2222
    PROLAPSE, 3166

- RADIOLOGY (continued)
  - STOMACH (continued)
    - SURGERY, 1321, 3080
    - TECHNIQUES, 2170*, 6170, 6171, 6172, 7548
    - ULCER, 1234, 3993, 4076, 4812*
    - VARICES, 3147*, 3192
  - STOMACH DISEASES, 3081
    - CONTRAST MEDIA, 316
    - DIAGNOSIS, 243, 316
  - ULCER
    - STOMACH, 5640
  - ULCER, PEPTIC
    - CLASSIFICATION, 2171*
    - DIAGNOSIS, 4063
    - MORPHOLOGY, 2171*
  - VAGOTOMY
    - COMPLICATIONS, 6933
  - VATER'S AMPULLA
    - CALCULI, 3512
    - CARCINOID TUMOR, 740
  - YERSINIA
    - CROHN'S DISEASE, 3220*
    - DIAGNOSIS, 2313*
    - ENTERITIS, REGIONAL, 3220*
    - MORPHOLOGY, 2313*
  - ZOLLINGER-ELLISON SYNDROME, 7266

- RADIONUCLIDES
  - ABDOMEN
    - CHILD, 5531
    - ULTRASONOGRAPHY, 5531
  - ABSCESS
    - SCANNING, SCINTILLATION, 8448
  - AFFERENT LOOP SYNDROME
    - RADIOLOGY, 5680
  - ANEMIA, PERNICIOUS
    - VITAMIN B12, 6609, 6989
  - BILIARY TRACT
    - SCANNING, SCINTILLATION, 3944*, 3945*
  - COLON
    - HEMORRHAGE, 1182*
    - NEOPLASM METASTASIS, 6998*, 7006
    - NEOPLASMS, 5749
    - NEOPLASMS, MALIGNANT, 7658*
  - CYSTIC FIBROSIS
    - ABSORPTION, 8268*
  - FATTY LIVER
    - DIAGNOSIS, 6514*
  - GASTROINTESTINAL DISEASES
    - DIAGNOSIS, 4753
  - GASTROINTESTINAL SYSTEM, 6852*
    - HEMORRHAGE, 1182*
  - INTESTINE, SMALL
    - INFARCTION, 4763
  - INTESTINES
    - INFARCTION, 4763
  - LIVER
    - CHROMATOGRAPHY, 7386*
    - CLEARANCE STUDY, 7386*
    - NEOPLASM METASTASIS, 6998*, 7658*
    - SCANNING, SCINTILLATION, 3944*, 3945*, 5801*, 7421*
    - TOLERANCE, 7386*
    - TRANSPORT, 7386*
  - LIVER FUNCTION TESTS
    - HEPATITIS, INFECTIOUS, 1512*
    - JAUNDICE, 1512*

- RADIONUCLIDES (continued)
  - METALS
    - BODY COMPOSITION, 5547
  - NEOPLASM METASTASIS
    - BONES, 6998*
  - PANCREAS
    - NEOPLASMS, 3050*
  - PANCREATITIS
    - DIAGNOSIS, 3050*
    - RETROPERITONEAL SPACE, 6386
  - PLASMA
    - DIAGNOSIS, 6828*
  - RECTUM
    - NEOPLASM METASTASIS, 7006
  - SALIVA
    - DIAGNOSIS, 6828*
  - URINE
    - DIAGNOSIS, 6828*

- RADIOPROTECTIVE AGENTS
  - ABSORPTION
    - MARKER STUDY, 1786
  - EXCRETION
    - MARKER STUDY, 1786
    - PLASMA, 1786
  - LIVER
    - BILE, 1786

- RADIOTELEMETRY
  - GASTROINTESTINAL SYSTEM
    - MOTILITY, 7935*
    - TECHNIQUES, 7935*

- RADIOTHERAPY
  - COLON
    - NEOPLASMS, MALIGNANT, 5711*, 5712*
  - COMPLICATIONS
    - GASTRITIS, 6225*
    - STOMACH, 6225*
    - THERAPY, 6636
    - ULCER, PEPTIC, 6225*
  - DIARRHEA
    - ETIOLOGY, 5648*
  - ESOPHAGUS
    - NEOPLASMS, 4021*
    - NEOPLASMS, MALIGNANT, 7564
  - GASTROINTESTINAL SYSTEM
    - NEOPLASMS, MALIGNANT, 7859
    - REVIEW, 7859
  - HODGKIN'S DISEASE
    - COMPLICATIONS, 6225*
  - ILEUM
    - BREATH TEST, 5648*
  - LIVER
    - NEOPLASMS, 7099*
    - NEOPLASMS, BENIGN, 5813*
  - LYMPHOMA
    - COMPLICATIONS, 6225*
  - MOUTH
    - NEOPLASMS, MALIGNANT, 2632, 2633
  - NEOPLASM METASTASIS
    - LIVER, 5019*
  - NEOPLASMS
    - PROGNOSIS, 4021*
  - NUTRITION
    - RADIATION EFFECTS ON, 6599
  - PANCREAS
    - NEOPLASMS, 6373

RADIOTHERAPY (continued)
- PERITONEUM
  - NEOPLASMS, 3553
- PYLORUS
  - STRICTURE, 6225*
- RECTUM
  - NEOPLASMS, 4152*
  - NEOPLASMS, MALIGNANT, 5712*
- SALIVARY GLANDS
  - NEOPLASMS, 6632
- STOMACH
  - NEOPLASMS, MALIGNANT, 5575

RECTUM
- SEE ALSO ANORECTUM, ANUS, INTESTINE, LARGE
- ABSORPTION
  - ANTIEMETICS, 2740*
  - FATTY ACIDS, 3624
- AMEBIASIS
  - EPIDEMIOLOGY, 6667
- ANOMALY
  - HERNIA, 5725
  - SIMULATION, 5725
- BARIUM
  - PERITONITIS, 7039
  - RADIOLOGY, 1253
  - TECHNIQUES, 1253
- BIOPSY
  - AGE FACTORS, 3042*
  - CHILD, 8133
  - ENDOSCOPY, 3042*
  - INFANT, 3042*, 8133
  - INFLAMMATORY BOWEL DISEASES, 7551
  - TECHNIQUES, 8133
- BLEEDING
  - ANGIOGRAPHY, 4149*
  - ANOMALY, 6322*
  - DIAGNOSIS, 5230
  - ENDOSCOPY, 4006
  - POLYPECTOMY, 4150*
  - SURGERY, 4150*
  - THERAPY, 4150*, 5230
- CARCINOID TUMOR
  - RESPIRATORY SYSTEM, 3272*
  - THERAPY, 3272*
- CELLS
  - GLYCOPROTEINS, 8090*
  - SECRETION, 3591
  - ULTRASTRUCTURE, 3591
- COLITIS, ULCERATIVE
  - AMINES, 5759*
  - BIOPSY, 5759*
  - DRUG EFFECTS ON, 7064*
  - MORPHOLOGY, 7031
  - NERVOUS CONTROL, 5759*
- COLON
  - ANOMALY, 6322*
  - DISEASE, 5732
  - GARDNER'S SYNDROME. 6999*
  - NEOPLASMS, 6326*, 6999*, 7009, 7040, 7051, 8233*, 8252
  - SEX FACTORS, 5732
- CROHN'S DISEASE
  - BIOPSY, 5983*
  - DIAGNOSIS, 8513
  - DRUG THERAPY, 8517
  - HORMONES, ADRENAL CORTEX, 8517
  - MORPHOLOGY, 5982*

RECTUM (continued)
- CROHN'S DISEASE (continued)
  - PROGNOSIS, 1742
  - STEROIDS, 8517
- DIAGNOSIS
  - COMPLICATIONS, 5550
- DILATATION
  - MORPHOLOGY, 1434
- DISEASE
  - DIAGNOSIS, 4006
  - ENDOSCOPY, 4006
- ELECTROPHYSIOLOGY
  - DIURETICS, 2756
  - DRUG EFFECTS ON, 2756, 7955
  - NERVOUS CONTROL, 7955
  - PARASYMPATHOMIMETICS, 7955
  - STEROIDS, 2756
  - TECHNIQUES, 2756
- ENDOSCOPY
  - AGE FACTORS, 3042*
  - INFANT, 3042*
- ENTERECTOMY
  - COMPLICATIONS, 7714
- FISTULA
  - COLITIS, 490
  - IATROGENESIS, 7713
- GARDNER'S SYNDROME
  - AMINES, 6999*
- GASTROINTESTINAL SYSTEM
  - SURGERY, 8247
- GLYCOPROTEINS
  - COLITIS, ULCERATIVE, 4971
  - CYSTIC FIBROSIS, 8090*
  - SYNTHESIS, 8090*
- HEMORRHAGE
  - THERAPY, 6874*
- HEMORRHOIDS
  - CIRCULATION, 3587*
- HERNIA
  - ANOMALY, 5725
- HIRSCHSPRUNG'S DISEASE
  - BIOPSY, 1427
- INCONTINENCE
  - DEFECATION, 1430
  - MORPHOLOGY, 1432
  - REVIEW, 1433
- INFLAMMATION
  - BIOPSY, 3307
  - CYTOLOGY, 8238
  - DIAGNOSIS, 8238
  - ENDOSCOPY, 3307
  - RADIOLOGY, 1253
- INFLAMMATORY BOWEL DISEASES
  - SPHINCTER, 5736
  - ULTRASTRUCTURE, 4926*
- INTUSSUSCEPTION
  - ETIOLOGY, 7708
  - NEOPLASMS, 7708
  - PROLAPSE, 497
- ION TRANSPORT
  - DIURETICS, 2756
  - DRUG EFFECTS ON, 2756
  - STEROIDS, 2756
  - TECHNIQUES, 2756
- IRRADIATION
  - SURVIVAL, 4152*
- IRRITABLE COLON
  - AMINES, 5759*
  - BIOPSY, 5759*

- RECTUM (continued)
  - IRRITABLE COLON (continued)
    - NERVOUS CONTROL, 5759*
  - LYMPHATIC SYSTEM
    - POLYPS, 1666
  - MANOMETRY
    - CHILD, 7698
    - DISEASE, 252
    - NEONATE, 7698
  - MORPHOLOGY
    - CATHARTICS, 4148*
    - DRUG EFFECTS ON, 4148*
    - ENEMA, 4148*
  - MOTILITY
    - DRUG EFFECTS ON, 7955
    - DRUGS, 939
    - HYPERACTIVITY, 4927*
    - MANGANESE, 7954
    - NERVOUS CONTROL, 7955
    - PARASYMPATHOMIMETICS, 7955
  - MUCOPOLYSACCHARIDES
    - DISEASE, 251
    - ULTRASTRUCTURE, 251
  - MUCUS
    - HISTOCHEMISTRY, 4485*
    - ULTRASTRUCTURE, 4485*
  - MUSCLES
    - NEOPLASMS, 7018
  - NEONATE
    - ANOMALY, 5725
  - NEOPLASM METASTASIS
    - BONES, 7006
    - CARCINOEMBRYONIC ANTIGEN, 5549
    - RADIONUCLIDES, 7006
    - SCANNING, SCINTILLATION, 5549
  - NEOPLASMS
    - AGE FACTORS, 6339
    - AMINES, 6999*
    - BIOPSY, 3293
    - CARCINOEMBRYONIC ANTIGEN, 8252
    - COLITIS, ULCERATIVE, 7008
    - DIAGNOSIS, 4006, 4928*, 5743, 6326*, 6339, 6345
    - DIARRHEA, 7040
    - DIETARY FACTORS, 5600
    - DRUG THERAPY, 8233*
    - ENDOSCOPY, 4006
    - ENZYMES, 4930*
    - EPIDEMIOLOGY, 3292
    - HEMORRHAGE, 7040
    - IMMUNOLOGY, 7003, 7051
    - IRRADIATION, 4152*
    - MORPHOLOGY, 6345
    - NUTRITION, 5600
    - OBSTRUCTION, 7021
    - OCCUPATIONAL FACTORS, 6375
    - PROGNOSIS, 3293, 5739, 7051
    - RADIOLOGY, 1253
    - RADIOTHERAPY, 4152*
    - REVIEW, 5743
    - SCANNING, SCINTILLATION, 5752
    - SURGERY, 479, 7009, 8248
    - SURVIVAL, 6375
    - THERAPY, 6339
    - ULTRASTRUCTURE, 3293
  - NEOPLASMS, BENIGN
    - DIAGNOSIS, 4177
    - MUSCLES, 8245
    - PATHOLOGY, 4177
- RECTUM (continued)
  - NEOPLASMS, BENIGN (continued)
    - THERAPY, 4177
  - NEOPLASMS, MALIGNANT, 4172, 4176
    - ADOLESCENCE, 478
    - AUTORADIOGRAPHY, 4929*
    - BACTERIAL INFECTIONS, 1426
    - BREATH TEST, 6323*
    - CARCINOEMBRYONIC ANTIGEN, 5713*
    - COLOSTOMY, 7523
    - DIETARY FACTORS, 4696
    - DISEASES ASSOCIATED WITH, 7667
    - DRUG-INDUCED, 4696
    - DRUG THERAPY, 5711*, 7703, 7715
    - ENZYMES, 5713*
    - EPIDEMIOLOGY, 2400, 5711*
    - ETIOLOGY, 5711*
    - IMMUNITY, 5714*
    - IRRADIATION, 3294
    - MARKER STUDY, 5713*
    - NEOPLASM METASTASIS, 8241
    - PROGNOSIS, 2382, 4941
    - PROTEINS, 5713*
    - RADIOLOGY, 3291
    - RADIOTHERAPY, 5711*, 5712*
    - SEQUELAE, 471
    - SURGERY, 471, 472, 5711*, 5712*
    - TECHNIQUES, 472
    - THERAPY, 471, 3294
  - NEUROMUSCULAR DISEASES, 4950
  - PHOSPHOLIPIDS
    - DISEASE, 251
    - ULTRASTRUCTURE, 251
  - POLYPS
    - CLASSIFICATION, 3313
    - DIAGNOSIS, 4196
    - DISEASES ASSOCIATED WITH, 4197
    - EPIDEMIOLOGY, 2400, 6334*
    - NEOPLASMS, 3311
    - NEOPLASMS, MALIGNANT, 4197
    - SCHISTOSOMIASIS, 3560*
    - THERAPY, 3313, 4196, 5726
  - PRECANCEROUS CONDITIONS, 479
  - PROLAPSE
    - AGE FACTORS, 2402
    - REVIEW, 8254
    - SALMONELLOSIS, 2402
    - SEX FACTORS, 2402
    - STATISTICAL STUDY, 8254
    - SURGERY, 8253
    - THERAPY, 8254
  - SCHISTOSOMIASIS
    - PATHOLOGY, 1727
  - SECRETION
    - GLYCOPROTEINS, 8090*
  - SEPSIS
    - ANTIBIOTICS, 5719*
  - SIGMOID
    - CONSTIPATION, 4927*
    - SURGERY, 8247
  - SPHINCTER
    - SURGERY, 5736, 7041
  - SURGERY, 7716
    - AGE FACTORS, 1742
    - ANTIBIOTICS, 5719*, 7662*
    - COMPLICATIONS, 4937, 8250
    - INFECTION, 7046
    - NERVOUS SYSTEM, 4937
    - SEPSIS, 5719*

- RECTUM (continued)
  - SURGERY (continued)
    - TECHNIQUES, 5736, 7664*, 8248
    - UROGENITAL SYSTEM, 4937
  - SYPHILIS
    - DIAGNOSIS, 6335*
  - TRANSPORT
    - GLYCOPROTEINS, 8090*
  - UROGENITAL SYSTEM
    - COMPLICATIONS, 8250
    - FISTULA, 5730
  - VILLI
    - NEOPLASMS, 7676
  - WOUNDS AND INJURIES
    - IATROGENESIS, 7713

- REFLUX
  - ACIDS
    - POSTURAL FACTORS, 1263*
  - ANTRUM
    - DUODENUM, 2278
  - BILE
    - PROSTAGLANDINS, 4564*
    - THERAPY, 4564*
  - DIAGNOSIS
    - TECHNIQUES, 4795*
  - DUODENUM
    - ETIOLOGY, 4061
    - ULCER, 4811*
  - DYSPEPSIA
    - BILE, 2248
  - ESOPHAGITIS, 3127*
    - BILE, 3134
    - ENDOSCOPY, 238
    - ETIOLOGY, 2697*
    - SURGERY, 5599
  - ESOPHAGUS
    - ACID SECRETION, 4550*
    - ACIDITY, 3127*, 4550*
    - ANOMALY, 306
    - ANTIEMETICS, 5309*
    - CHILD, 4034, 4795*
    - DIAGNOSIS, 294*, 4035, 4795*
    - DISEASES ASSOCIATED WITH, 4034
    - DRUG EFFECTS ON, 6708
    - DRUG THERAPY, 2749, 5309*
    - ENDOSCOPY, 294*
    - GASTRIN, 3532
    - HYPOGLYCEMIA, 4550*
    - MANOMETRY, 1260*, 2223*, 4523*, 4550*
    - MOTILITY, 6708
    - PAIN, 3127*
    - PARASYMPATHOMIMETICS, 4794*
    - POSTURAL FACTORS, 4036
    - PRESSURE STUDY, 4523*, 4550*, 4794*
    - RADIOLOGY, 4034
    - REVIEW, 4035
    - SCANNING, SCINTILLATION, 1260*
    - SPHINCTER, 51, 2229
    - STOMACH, 51, 2223*
    - SURGERY, 3126*
    - THERAPY, 1270, 4035
  - GASTRITIS
    - ALKALINE, 2246
    - BILE, 3134
    - DIAGNOSIS, 2247
    - EPIDEMIOLOGY, 2247

- REFLUX (continued)
  - GASTRITIS (continued)
    - PYLOROPLASTY, 3175
    - SURGERY, 1294, 5607, 6250
    - THERAPY, 2247, 3175, 4810*
    - ULCER, PEPTIC, 2246
  - HIATAL HERNIA
    - DISEASES ASSOCIATED WITH, 4034
  - JAUNDICE, OBSTRUCTIVE
    - BILE, 2054
  - LIVER
    - BILE ACIDS AND SALTS, 1991
  - MANOMETRY
    - POSTURAL FACTORS, 1263*
  - PANCREATIC DUCT
    - MANOMETRY, 7199*
  - PANCREATITIS
    - BILE, 2444
    - DIVERTICULUM, 2447
    - MANOMETRY, 7075*
  - PANCREATITIS, CHRONIC
    - MANOMETRY, 7075*
  - PANCREOZYMIN
    - HORMONE EFFECTS ON, 1333*
  - SECRETIN
    - HORMONE EFFECTS ON, 1333*
  - STOMACH
    - ANTI-INFLAMMATORY AGENTS, 7329
    - ASPIRIN, 2730*
    - DIAGNOSIS, 294*
    - DRUG EFFECTS ON, 7329
    - DUODENOSTOMY, 3716
    - DUODENUM, 943, 2278
    - ENDOSCOPY, 294*
    - EPIDEMIOLOGY, 2261
    - ETIOLOGY, 2261
    - GASTROSTOMY, 3716
    - MANOMETRY, 1260*
    - PROSTAGLANDINS, 2769
    - STATISTICAL STUDY, 2261
    - SURGERY, 1294, 4810*
    - THERAPY, 1270
    - ULCER, 4811*, 5599
  - STOMACH DISEASES
    - BILE ACIDS AND SALTS, 6054
    - DISEASES ASSOCIATED WITH, 6054
    - DUODENUM, 5618
  - ULCER
    - BILE, 1878*
    - STRESS, 3897
    - SURGERY, 6250
  - ULCER, PEPTIC
    - ETIOLOGY, 2819
    - PANCREOZYMIN, 1333*
    - SECRETIN, 1333*

- REGIONAL ENTERITIS
  - SEE ENTERITIS, REGIONAL

- RENIN
  - LIVER CIRRHOSIS, 3489
    - ADRENERGIC RECEPTOR BLOCKADERS, 2553
    - PLASMA, 2554, 5122*
    - SODIUM, 5122*
  - LIVER DISEASES, ALCOHOLIC
    - DRUG THERAPY, 1549

- RESPIRATORY SYSTEM
  - ALCOHOLISM
    - REVIEW, 7810
  - AMYLASES
    - DISEASE, 4247*
  - BILE
    - EXCRETION, 2954
  - CARBOHYDRATES
    - ALCOHOLISM, 4546
  - CARCINOID TUMOR
    - PROGNOSIS, 3272*
    - RECTUM, 3272*
  - CELIAC DISEASE
    - HYPERSENSITIVITY, 449
    - INFLAMMATION, 449
    - PATHOLOGY, 2359
  - CHOLELITHIASIS
    - ADOLESCENCE, 7221
    - CHILD, 7221
  - ESOPHAGUS
    - FISTULA, 307, 6203
    - NEOPLASMS, 2235
  - FISTULA
    - DISEASES ASSOCIATED WITH, 5837
    - GENETIC FACTORS, 4798
    - LIVER, 5837
    - NEOPLASMS, MALIGNANT, 2243
  - HERNIA
    - SURGERY, 6215
  - LIVER
    - ABSCESS, 5837
  - LIVER CIRRHOSIS
    - DISEASES ASSOCIATED WITH, 7183*
    - EPIDEMIOLOGY, 2555
  - MALLORY-WEISS SYNDROME
    - DISEASES ASSOCIATED WITH, 8149
  - METABOLISM
    - CARBOHYDRATES, 4546
  - NEOPLASM METASTASIS
    - LIVER, 8329
    - SCANNING, SCINTILLATION, 8329
  - NEOPLASMS
    - CERULOPLASMIN, 5613
    - COPPER, 5613
  - PANCREATITIS
    - COMPLICATIONS, 4236
  - SURGERY
    - CHOLELITHIASIS, 7221

- RETICULOENDOTHELIAL SYSTEM
  - DRUG METABOLISM
    - ENZYMES, 2959
  - HEPATECTOMY
    - REGENERATION, 2895
  - LIVER
    - ALBUMINS, 3914
    - METABOLISM, 139
    - RADIOISOTOPES, 3914
    - REGENERATION, 139, 2895
  - LIVER CIRRHOSIS
    - LIVER FUNCTION TESTS, 3093

- RETROPERITONEAL SPACE
  - CYSTS
    - INTESTINAL OBSTRUCTION, 6298
  - FATS
    - CYSTS, 6298
  - PANCREATITIS
    - RADIONUCLIDES, 6386

- REYE'S SYNDROME
  - DIAGNOSIS, 7760
  - ENZYMES
    - DEFICIENCY, 3373*
  - ETIOLOGY, 588, 3373*
  - HEMATEMESIS
    - THERAPY, 2462*
  - HEPATITIS
    - REVIEW, 5026*
  - HEPATOMEGALY
    - THERAPY, 2462*
  - HYPERBILIRUBINEMIA
    - NEONATE, 8286*
  - KERNICTERUS
    - HEPATITIS, 5026*
    - REVIEW, 5026*
  - LIVER
    - ULTRASTRUCTURE, 1499, 8301*
  - MELENA
    - THERAPY, 2462*
  - NERVOUS SYSTEM
    - ULTRASTRUCTURE, 3403
  - THERAPY, 7760
  - UREA
    - ENZYMES, 1501
    - METABOLISM, 588
  - VIRUSES
    - ETIOLOGY, 1500
    - PARTICLES, 1500

- RIBOFLAVIN
  - SEE VITAMIN B2

- RIBOSOMES
  - HEPATITIS, INFECTIOUS, 6721
  - HEPATITIS, TOXIC, 6721
  - LIVER
    - PROTEINS, 6768*
  - PROTEINS
    - SYNTHESIS, 6768*

- ROTOR'S SYNDROME
  - KINETICS
    - DYES, 1508
  - LIVER
    - TRANSPORT, 1508
  - SULFOBROMOPHTHALEIN
    - KINETICS, 1507
    - METABOLISM, 1507

- RUPTURE
  - ABSCESS
    - LIVER, 634
    - PERITONITIS, 634
  - AMEBIASIS
    - LIVER, 6655
  - ANEURYSM
    - ARTERIES, 5832
  - DUODENUM
    - CHILD, 6306
  - ESOPHAGUS, 7566
    - DIAGNOSIS, 1271
    - HYPERTROPHY, 8148*
    - PROGNOSIS, 2231
    - THERAPY, 1271
  - ILEUM
    - HEMANGIOMA, 430
  - INTESTINE, SMALL
    - CHILD, 6306

RUPTURE (continued)
- INTESTINES
  - WOUNDS AND INJURIES, 6903
- LIVER
  - CYSTS, 1724
  - DISEASES ASSOCIATED WITH, 6421*
- MESENTERY
  - HEMANGIOMA, 430
- NEOPLASMS, MALIGNANT
  - BLEEDING, 1480
  - LIVER, 1480
  - SURGERY, 1480
- STOMACH, 5594*
  - NEONATE, 2142, 2262
  - WOUNDS AND INJURIES, 6903

SALICYLATES
- ABSORPTION
  - ANTIMETABOLITES, 1808
  - INTESTINE, SMALL, 1808
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 3180
- METABOLISM, 7512*
- STOMACH, 3698
  - DRUG EFFECTS ON, 2786*

SALIVA
- CHEMICAL COMPOSITION
  - ADRENERGIC RECEPTOR BLOCKADERS, 2777
- ENZYMES, 5354
- HEPATITIS, INFECTIOUS
  - AUSTRALIA ANTIGEN, 660
  - TRANSMISSION, 8360*
- LIVER DISEASES
  - ANALGESICS AND ANTIPYRETICS, 2467
- RADIONUCLIDES
  - DIAGNOSIS, 6828*

SALIVARY GLANDS
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - CALCIUM, 6034
  - ENZYMES, 1868
  - MEMBRANES, 75
- ADENOSINE TRIPHOSPHATASE, 7296
- ALKALINE PHOSPHATASE, 7296
- AMYLASES
  - ACETYLCHOLINE, 1869
  - DENTISTRY, 6716*
  - DIAGNOSIS, 5788*
  - DISEASE, 4247*
  - HYDROLYSIS, 6064
  - PANCREATIC DISEASES, 5788*
  - SYMPATHOMIMETICS, 1869
- ATROPHY
  - MORPHOLOGY, 3597
  - ULTRASTRUCTURE, 3597
- CALCIUM
  - ADRENERGIC RECEPTOR AGONISTS, 7340
  - ENZYMES, 1868
  - IONOPHORES, 7341
  - MEMBRANES, 75
  - METABOLISM, 948
- CARBOHYDRATES
  - CYTOLOGY, 6717*
  - HISTOCHEMISTRY, 6717*
  - SECRETION, 6717*
  - ULTRASTRUCTURE, 6717*

SALIVARY GLANDS (continued)
- CELLS
  - GROWTH FACTORS, 7295
  - MORPHOLOGY, 7295
  - SECRETION, 6718, 6719
  - ULTRASTRUCTURE, 6719
- CHILD
  - NEOPLASMS, 6600
- CIRCULATION
  - NERVOUS CONTROL, 1109
- CYSTS
  - REVIEW, 5952
- DISEASE
  - CHILD, 7882
  - CLASSIFICATION, 7259
  - REVIEW, 7241
- DRUG-INDUCED, 5348
- DUCTS
  - INFLAMMATORY CELLS, 3000
  - SURGERY, 3000
- ELECTROLYTES
  - SECRETION, 946*
- ENDOSCOPY
  - COMPLICATIONS, 1648, 5617
- EPINEPHRINE
  - METABOLISM, 948
- FATTY ACIDS
  - DEFICIENCY, 6720
- HEPATITIS, CHRONIC
  - AMYLASES, 3370*, 5107
- HORMONE EFFECTS ON
  - HORMONES, ADRENAL CORTEX, 6719
- IMMUNOGLOBULINS
  - VIRUSES, 1110
- IMMUNOLOGY
  - DISEASE, 5953
- INFANT
  - NEOPLASMS, 6600
- INFLAMMATION
  - DIAGNOSIS, 7246
  - THERAPY, 7246
  - ULTRASONOGRAPHY, 6635
  - ULTRASTRUCTURE, 7269
- ION TRANSPORT
  - CALCIUM, 7340
- KALLIKREIN
  - NERVOUS CONTROL, 5345
  - SECRETION, 5350
- LIPIDS
  - BIOCHEMISTRY, 2121, 6720
  - DIETARY FACTORS, 6720
- LIVER DISEASES
  - AMYLASES, 3370*, 5107
- MORPHOLOGY, 5995
- MUCUS
  - MEMBRANES, 867
- NEONATE
  - NERVOUS CONTROL, 5346
- NEOPLASM METASTASIS
  - LYMPH, 6615
- NEOPLASMS, 3554
  - CHILD, 8485
  - ETIOLOGY, 7240
  - PATHOLOGY, 6639
  - RADIOTHERAPY, 6632
  - REVIEW, 7241, 8485
  - THERAPY, 6613
- NEOPLASMS, BENIGN, 7256
  - ADENOSINE TRIPHOSPHATASE, 7296

- SALIVARY GLANDS (continued)
  - NEOPLASMS, BENIGN (continued)
    - ALKALINE PHOSPHATASE, 7296
    - DIAGNOSIS, 8463
    - IRRADIATION, 5954
    - NEOPLASMS, MALIGNANT, 6594
    - ULTRASTRUCTURE, 7296
  - NEOPLASMS, MALIGNANT, 5234
    - DIAGNOSIS, 8468
    - DRUG THERAPY, 8452*
    - EPIDEMIOLOGY, 2629
    - IRRADIATION, 5236, 5954
    - MORPHOLOGY, 1664
    - REVIEW, 8452*
    - THERAPY, 773, 5236, 7249
    - ULTRASONOGRAPHY, 6635
    - ULTRASTRUCTURE, 1664, 8487
  - NUTRITION DISORDERS
    - ULTRASTRUCTURE, 3596
  - OBSTRUCTION
    - MORPHOLOGY, 5
  - PANCREATIC DISEASES
    - SURGERY, 5777
  - PATHOLOGY
    - CLASSIFICATION, 5235
    - HORMONE EFFECTS ON, 6035
    - METABOLISM, 6035
    - REVIEW, 6035
  - PERMEABILITY
    - CALCIUM, 7340
    - MEMBRANES, 75
  - PROTEINS
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6034
    - CALCIUM, 6034
    - SECRETION, 6034
  - RADIOLOGY
    - REVIEW, 7254
    - TECHNIQUES, 7254
  - SECRETION, 5344, 5351
    - AMYLASES, 7341
    - BIOCHEMISTRY, 7958
    - CALCIUM, 7341
    - HORMONE EFFECTS ON, 6719
    - MEMBRANES, 73
    - POTASSIUM, 2120, 7336*, 7337*
    - SYMPATHOMIMETICS, 73
    - ULTRASTRUCTURE, 5349
  - SJOGREN'S SYNDROME
    - ETIOLOGY, 5953
    - PATHOLOGY, 5953
    - REVIEW, 5953
  - SYMPATHOMIMETICS
    - ENZYMES, 1868
  - THYMUS GLAND
    - WASTING SYNDROME, 5355
  - THYROID GLAND
    - HORMONES, 2111
  - TRANSPORT
    - CALCIUM, 7340
    - POTASSIUM, 2120
  - ULTRASTRUCTURE, 5994, 7296
    - ADRENERGIC RECEPTOR AGONISTS, 5269
    - DRUG EFFECTS ON, 5269
    - PARASYMPATHOLYTICS, 5269
  - WASTING SYNDROME
    - SIMULATION, 5355

- SALMONELLOSIS
  - ANTIBIOTICS, 2650
    - THERAPY, 1674
  - BACTERIA, 7522
  - BACTERIAL INFECTIONS
    - DIAGNOSIS, 6630
  - CECUM
    - BACTERIA, 2132
    - GNOTOBIOTICS, 2132
    - PATHOLOGY, 2132
  - CHILD
    - EPIDEMIOLOGY, 1699
    - TRANSMISSION, 4448
  - COLON
    - PROLAPSE, 2402
  - DIAGNOSIS, 4394*, 4447
    - TECHNIQUES, 5543
  - DRUG THERAPY
    - ANTIBIOTICS, 8474, 8475
    - CARRIER STATE, 1700
  - EPIDEMIOLOGY, 2654, 4394*, 5216, 7865
  - GASTROENTERITIS, 5217
  - HEPATITIS, CHRONIC, 5884
  - IMMUNITY, 3869*, 8116
    - ESCHERICHIA COLI, 2652
    - SIMULATION, 2651, 2652
  - INFANT
    - TRANSMISSION, 2653
  - INTESTINES
    - DRUG EFFECTS ON, 7921*
    - PERFORATION, 6633
  - LIVER
    - ENDOTOXINS, 8039*
    - LIPOPOLYSACCHARIDES, 2041
  - LIVER CIRRHOSIS, 5884
  - LIVER INJURY
    - ZINC, 8040*
  - MORPHOLOGY
    - PATHOLOGY, 3574
  - PERFORATION
    - CHILD, 170
    - ILEUM, 2655
    - SURGERY, 170
    - SURVIVAL, 2655
  - RECTUM
    - PROLAPSE, 2402
  - REVIEW, 5218
  - SOCIOECONOMIC FACTORS
    - EPIDEMIOLOGY, 2668
  - TRANSMISSION, 5216
  - TRANSPORT
    - WATER, 7921*
  - VACCINES
    - SIMULATION, 1701

- SARCOIDOSIS
  - GASTROINTESTINAL SYSTEM
    - REVIEW, 2656
  - LIPODYSTROPHY, INTESTINAL
    - REVIEW, 4136*
  - LIVER
    - CHOLESTASIS, 1462*

- SCANNING, SCINTILLATION
  - ABDOMEN
    - WOUNDS AND INJURIES, 1215
  - ABSCESS
    - RADIONUCLIDES, 8448

SCANNING, SCINTILLATION (continued)
- BILE DUCTS
  - DIVERTICULUM, 3044*
- BILIARY TRACT
  - FOOD, 7844
  - RADIONUCLIDES, 3944*, 3945*
  - SULFOBROMOPHTHALEIN, 4245*
- BILIARY TRACT DISEASES
  - BIOPSY, 3095
- COLON
  - CATHARTICS, 7687
  - NEOPLASM METASTASIS, 6998*
  - NEOPLASMS, 5749, 5752
  - NEOPLASMS, MALIGNANT, 7658*
  - TECHNIQUES, 7687
- COMMON BILE DUCT
  - CYSTS, 5146*
- CYSTS
  - LIVER, 2175*
- ECHINOCOCCOSIS
  - CHILD, 2212
  - LIVER, 2212
- ESOPHAGEAL DISEASES
  - DIAGNOSIS, 3128
- ESOPHAGUS
  - REFLUX, 1260*
- GALLBLADDER
  - ADRENAL GLANDS, 3101
  - CYSTS, 7235
- GASTROINTESTINAL SYSTEM
  - COMPLICATIONS, 1101
- HEPATITIS, CHRONIC
  - LIVER FUNCTION TESTS, 4245*
- HEPATOMA
  - RADIOISOTOPES, 3946*
- HEPATOMEGALY
  - HEPATIC VEIN THROMBOSIS, 593
- HYPERBILIRUBINEMIA
  - LIVER FUNCTION TESTS, 4245*
- HYPERTENSION, PORTAL
  - CHILD, 7094*
- INTESTINE, SMALL
  - BLEEDING, 6959
  - INFARCTION, 4763
- INTESTINES
  - INFARCTION, 4763
  - ISCHEMIA, 5537
- JAUNDICE
  - DIAGNOSIS, 3111
- JAUNDICE, OBSTRUCTIVE
  - CHILD, 7094*
  - INFANT, 7094*
- LIVER, 5554, 5838, 6853*
  - ABSCESS, 1244, 2173*, 3045*
  - AMYLOIDOSIS, 3103
  - ANOMALY, 2176*
  - ANTIBIOTICS, 5809*
  - BILIARY TRACT DISEASES, 264
  - BIOPSY, 3095
  - CYSTS, 3045*
  - DIAGNOSIS, 1244, 1279
  - FATS, 3970
  - FISSURE, 7130
  - GALLBLADDER, 4771
  - HAMARTOMA, 3108
  - HEMATOMA, 3110
  - HERNIA, 1491
  - HILUS, 3100

SCANNING, SCINTILLATION (continued)
- LIVER (continued)
  - NEOPLASM METASTASIS, 1476, 2209, 5549, 6998*, 7658*, 7667
  - NEOPLASMS, 1244, 3100, 6196
  - NEOPLASMS, MALIGNANT, 3045*, 5809*
  - RADIONUCLIDES, 3944*, 3945*, 5801*, 7421*
  - REVIEW, 6517*, 8332
  - TECHNIQUES, 3045*, 3965, 5809*, 6517*
  - ULTRASOUND, 3970
  - WOUNDS AND INJURIES, 1215, 7530*
- LIVER CIRRHOSIS
  - CHILD, 7094*
  - CIRCULATION, 5118*
  - DIAGNOSIS, 4749*
  - DYES, 2213
  - LIVER FUNCTION TESTS, 4245*
  - REVIEW, 6517*
- LIVER DISEASES, 1214
  - CHILD, 7094*
  - DIAGNOSIS, 1244, 1454*, 3966, 4749*
  - INFANT, 7094*
- LIVER FUNCTION TESTS
  - COMPUTERS, 3964
  - SULFOBROMOPHTHALEIN, 4245*
- LIVER INJURY
  - CHILD, 8324
  - DIAGNOSIS, 7530*
- NEOPLASM METASTASIS
  - BONES, 6998*
- PANCREAS, 1217, 6853*
  - ARTERIES, 3899
  - CYSTS, 1442
  - DYES, 2833*
  - NEOPLASMS, 6183
  - RADIOISOTOPES, 2833*
  - REVIEW, 8332
  - TECHNIQUES, 3978, 5540
  - THERAPY, 1226
- PANCREAS FUNCTION TESTS, 4212*
  - TECHNIQUES, 6148
- PANCREATIC DISEASES
  - DIAGNOSIS, 287
  - LIVER, 287
  - TECHNIQUES, 3983
- PANCREATITIS
  - DIAGNOSIS, 3345
  - PANCREAS, 1225
- PANCREATITIS, CHRONIC
  - DIAGNOSIS, 3345, 7082
- RECTUM
  - NEOPLASM METASTASIS, 5549
  - NEOPLASMS, 5752
- RESPIRATORY SYSTEM
  - NEOPLASM METASTASIS, 8329
- SPLEEN
  - REVIEW, 8332
  - WOUNDS AND INJURIES, 1215, 7530*
- STOMACH
  - NEOPLASMS, 3084

SCHISTOSOMIASIS
- AMINO ACIDS
  - METABOLISM, 8048, 8049
- ANTIGENS, 5507
- APPENDICITIS, 3287

SCHISTOSOMIASIS (continued)
- CELL CULTURE
  - TECHNIQUES, 6661
- COLON
  - POLYPS, 3560*
- COMPLICATIONS, 5245*
- DIAGNOSIS
  - BIOPSY, 3573
  - FECES, 3573
  - IMMUNOLOGY, 3573
  - URINE, 3573
- DRUG THERAPY
  - ANALYSIS, 6669
  - CHILD, 1726
  - TECHNIQUES, 6661
- ENDOSCOPY
  - REVIEW, 3287
- ENZYMES
  - ANTIBODIES, 5968
  - IMMUNOLOGY, 5968
- EPIDEMIOLOGY, 840, 5245*, 5969, 8502
  - REVIEW, 5970
- GASTROINTESTINAL SYSTEM
  - EPIDEMIOLOGY, 2669
  - GRANULOMA, 2669
- HYPERTENSION
  - LIVER, 1709*
- IMMUNITY
  - EOSINOPHILS, 2670
  - FASCIOLIASIS, 7467
  - PRIMATES, 1729
  - SIMULATION, 6790
- IMMUNOGLOBULINS
  - KIDNEYS, 6670
- IMMUNOLOGY, 8112
  - ANTIBODIES, 6645*
  - HYPERSENSITIVITY, 6645*
  - IMMUNOGLOBULINS, 6645*
- IMMUNOSUPPRESSION, 6150
- INTESTINE, LARGE
  - NEOPLASMS, 1728
- KIDNEYS
  - PATHOLOGY, 5506
- LIVER
  - AMINO ACIDS, 8048, 8049
  - COLLAGEN, 3823
  - DRUG METABOLISM, 2958, 4674
  - ENZYMES, 8048, 8049
  - FIBROSIS, 5972
  - IMMUNOGLOBULINS, 6646*
  - PATHOLOGY, 1727
  - PRESSURE STUDY, 1709*
  - ULTRASTRUCTURE, 6646*
- LIVER DISEASES
  - HELMINTHIASIS, 820
- LYMPHATIC SYSTEM
  - HYPERTENSION, PORTAL, 841
- PATHOLOGY, 3561, 5964
- RADIOLOGY
  - REVIEW, 3287
- RECTUM
  - PATHOLOGY, 1727
  - POLYPS, 3560*
- SERUM
  - ENZYMES, 8048
- THERAPY
  - REVIEW, 3287
- TRANSMISSION
  - SIMULATION, 5967

SCHISTOSOMIASIS (continued)
- ULTRASTRUCTURE
  - TECHNIQUES, 6661

SCLERODERMA
- ABSORPTION
  - AMINO ACIDS, 5219
- BARIUM
  - COMPLICATIONS, 4417
  - GASTROINTESTINAL SYSTEM, 4417
- DISEASES ASSOCIATED WITH
  - HEPATITIS, CHRONIC, 3556
  - SJOGREN'S SYNDROME, 3556
- ESOPHAGUS
  - DIAGNOSIS, 4029
  - MOTILITY, 2236
  - RADIOLOGY, 4788*
  - THERAPY, 4029
- HEPATOCYTES
  - ULTRASTRUCTURE, 7115*
- INTESTINE, SMALL
  - ABSORPTION, 5219
- INTESTINES
  - FAMILIAL FACTORS, 6598
- LIVER CIRRHOSIS
  - AUTOIMMUNE DISEASES, 2544*
  - THYROID GLAND, 2544*
- PANCREAS
  - SECRETION, 3327*
- SJOGREN'S SYNDROME
  - DIGESTION, 3327*

SCLEROSIS
- CHOLANGITIS
  - DIAGNOSIS, 6562*, 7204*
  - DRUG THERAPY, 6562*
  - SURGERY, 6562*, 7204*
  - THERAPY, 6562*
- ESOPHAGUS, 3137
  - BLEEDING, 4025*
  - VARICES, 4037
- INTESTINE, SMALL
  - ANTIGENS, 7891
  - MALABSORPTION SYNDROMES, 5674
  - VIRUSES, 7877, 7891
- JEJUNUM
  - ANTIGENS, 7891
  - VIRUSES, 7877, 7891
- LIVER
  - CYSTS, 1460*
- PERITONITIS
  - DRUG-INDUCED, 4110*
- PRESSURE STUDY
  - MANOMETRY, 5569

SECRETIN
- ACHLORHYDRIA
  - ETIOLOGY, 2594*
- ALCOHOLS
  - SECRETION, 1956
- BICARBONATE SECRETION
  - DUODENUM, 2287*
  - TECHNIQUES, 3725*
  - ULCER, 2287*
- BILE ACIDS AND SALTS
  - VAGOTOMY, 8108*
- BILIARY TRACT
  - SECRETION, 127

- SECRETIN (continued)
  - CELIAC DISEASE, 4140
  - CERULEIN
    - AMYLASES, 3938*
    - BICARBONATE SECRETION, 3938*
    - ENZYMES, 3938*
  - CHOLERESIS
    - TECHNIQUES, 3725*
  - CYSTIC FIBROSIS
    - FATS, 2414*
    - NITROGEN, 2414*
  - DIABETES
    - PLASMA, 5945
  - DRUG EFFECTS ON
    - ALCOHOLS, 4683*
  - DUMPING SYNDROME
    - THERAPY, 4057
  - DUODENUM
    - ACIDITY, 6819*
    - ACIDS, 953*
    - DRUG EFFECTS ON, 3209
    - ENZYMES, 3999, 5511*
    - GASTRIN, 953*
    - HORMONE EFFECTS ON, 953*
    - HORMONES, GASTROINTESTINAL, 953*
  - ENDOSCOPY
    - PANCREAS, 2843
  - GALLBLADDER
    - HORMONE EFFECTS ON, 3650
    - HORMONES, GASTROINTESTINAL, 3650
  - GASTROINTESTINAL SYSTEM
    - MOTILITY, 819
  - GIARDIASIS
    - DIAGNOSIS, 6658
  - HORMONES, GASTROINTESTINAL, 2748
  - IMMUNOLOGY, 4545*
  - INTESTINE, SMALL
    - CIRCULATION, 208
  - INTESTINES
    - ATROPINE, 2978
    - PARASYMPATHOMIMETICS, 2978
  - JEJUNUM
    - MARKER STUDY, 177
  - LIVER CIRRHOSIS
    - PANCREAS, 8401*
  - MOTILIN
    - HORMONE EFFECTS ON, 6746*
  - NUTRITION DISORDERS
    - PANCREAS FUNCTION TESTS, 2416*
  - PANCREAS, 4999, 7983*
    - ACIDITY, 1949, 5387*
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 986, 1947, 2845
    - ADENYL CYCLASE, 118, 2853
    - ALCOHOLS, 1956
    - AMYLASES, 3724*
    - BICARBONATE SECRETION, 986, 3860, 4593*, 5386*, 5388*
    - BIOASSAY, 5394
    - CHYMOTRYPSIN, 2840
    - DIETARY FACTORS, 5387*
    - ENZYMES, 2840
    - GROWTH FACTORS, 1138
    - HORMONE EFFECTS ON, 1946, 6060*
    - METABOLISM, 7381
    - NICOTINE, 982*
    - PLASMA, 7374*
    - PROTEINS, 2834*

- SECRETIN (continued)
  - PANCREAS (continued)
    - SECRETION, 117, 984, 998, 1944, 1945, 2855, 3731, 5387*, 5388*, 7374*
    - SOMATOSTATIN, 1949, 6060*
    - TECHNIQUES, 7374*
  - PANCREAS FUNCTION TESTS
    - DIETARY FACTORS, 2416*
    - PANCREOZYMIN, 1228
  - PANCREATITIS, 4999
  - PANCREATITIS, CHRONIC, 4999
    - BICARBONATE SECRETION, 2850
    - DIAGNOSIS, 1227, 1229
    - EXCRETION, 4240
    - SECRETION, 4240
  - PLASMA, 6819*
    - ACIDITY, 1939
    - FOOD, 1939
    - HORMONE EFFECTS ON, 5386*
  - PYLORUS
    - MOTILITY, 67
  - RADIOIMMUNOASSAY
    - PLASMA, 6062
    - SERUM, 2097*
  - REFLUX
    - HORMONE EFFECTS ON, 1333*
  - REVIEW, 207
  - SECRETION
    - FATS, 5358*
    - PROTEINS, 7376
    - SIMULATION, 2094
  - SERUM
    - ACIDITY, 2097*
    - ANESTHETICS, 7372*
    - DRUG EFFECTS ON, 7372*
    - NICOTINE, 982*
    - PROTEINS, 2097*
    - SMOKING, 2308
  - STOMACH
    - ACID SECRETION, 2794*, 3671*
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 3707
    - ALPHA FETOPROTEIN, 4803*
    - AMINO ACIDS, 952*
    - DRUG EFFECTS ON, 3209
    - GROWTH FACTORS, 1138, 2115, 3672*
    - HORMONES, 3672*
    - MOTILITY, 67, 3648
    - PEPSIN, 79*
    - SECRETION, 998, 1874*, 2794*, 3738
  - ULCER
    - DUODENUM, 4070*
    - HEALING, 4070*
    - THERAPY, 3876
  - ULCER, PEPTIC
    - ACIDITY, 1336*
    - REFLUX, 1333*
    - SMOKING, 2308
    - STRESS, 2832
    - THERAPY, 1342*, 6929
  - VAGOTOMY
    - SECRETION, 3738
  - ZOLLINGER-ELLISON SYNDROME
    - DIAGNOSIS, 5941*

- SECRETION
  - SEE ALSO ACID SECRETION, BICARBONATE, SECRETION, HYPERCHLORHYDRIA

SECRETION (continued)
- ACIDITY
  - DUODENUM, 1337*
  - PANCREAS, 1337*
- ALCOHOLS
  - SECRETIN, 1956
- AMYLASES
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7985*
  - CALCIUM, 4547
  - DRUG EFFECTS ON, 7370*
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 7985*
  - HORMONE CONTROL, 7985*
- ANTRUM
  - BILE, 3701
  - GASTRIN, 1334*, 4554*, 4556*, 6261*, 7349*, 7350*
  - MORPHOLOGY, 2274
  - SURGERY, 2274
  - ULCER, PEPTIC, 6261*
- BILE
  - ADENOSINE TRIPHOSPHATASE, 4645, 5427*
  - ALCOHOLS, 1017*
  - BILE ACIDS AND SALTS, 2866*
  - CALCIUM, 1990
  - CERULEIN, 6095
  - CHOLAGOGUES AND CHOLERETICS, 4633*, 6092, 6096
  - CHOLESTEROL, 2866*
  - COPPER, 4621*
  - DIETARY FACTORS, 1076
  - DIURETICS, 4628*
  - DRUG EFFECTS ON, 4628*, 4633*, 4647, 6092, 6095, 6096, 6099
  - DUODENUM, 141
  - FEEDING, 605
  - INSULIN, 6092
  - LIPIDS, 2866*
  - LIVER, 1990
  - MARKER STUDY, 248
  - MICELLES, 2866*
  - MORPHOLOGY, 1989
  - OBSTRUCTION, 5419*
  - PHOSPHOLIPIDS, 2866*
  - PROSTAGLANDINS, 6745*
  - SEROTONIN, 6099
  - TECHNIQUES, 3725*
- BILE ACIDS AND SALTS
  - DRUG EFFECTS ON, 4646, 4647
  - ESTROGENS, 8004*
  - HORMONE EFFECTS ON, 8004*
  - OBSTRUCTION, 5419*
  - REVIEW, 6784
- BILE CANALICULI
  - BILE ACIDS AND SALTS, 2925
- BILIARY TRACT, 8113
  - AMINO ACIDS, 4677*
  - BILE, 2887*, 7390*
  - BILE ACIDS AND SALTS, 1069, 2887*, 2926, 5420*, 8004*
  - CHENODEOXYCHOLIC ACID, 2926
  - CHOLESTEROL, 8004*
  - CHOLIC ACID, 2926
  - CONTRAST MEDIA, 4644
  - DIETARY FACTORS, 144
  - DIURETICS, 3814

SECRETION (continued)
- BILIARY TRACT (continued)
  - DRUG EFFECTS ON, 3794, 3814, 4644, 4646
  - FATS, 7390*
  - HYPERALIMENTATION, 989, 2844
  - LIPIDS, 144, 2926, 4661
  - OBSTRUCTION, 5419*
  - PHOSPHOLIPIDS, 7398*
  - SECRETIN, 127
  - STEROIDS, 3794
- BILIRUBIN, 6147
- CALCIUM
  - ACIDITY, 950*
- CARCINOID TUMOR
  - APPENDIX, 6327*
- CELIAC DISEASE
  - BICARBONATE SECRETION, 2357
  - PANCREAS, 2357
- CHOLERA
  - SODIUM, 1086*
- CHOLESTEROL
  - ESTROGENS, 8004*
  - HORMONE EFFECTS ON, 8004*
  - INTESTINES, 1005*
- COLON
  - ACIDS, 7483*
  - ANTIGENS, 2063
  - CATHARTICS, 3825*
  - CELLS, 3591, 7693
  - CHLORIDES, 5441*
  - DRUG EFFECTS ON, 3825*
  - GLUCOSE, 6132
  - POTASSIUM, 3833*
- DIARRHEA
  - CATHARTICS, 1685
- DUODENUM
  - ALKALINE PHOSPHATASE, 4690
  - CELLS, 7288*
  - ENTEROKINASE, 4690
  - ENZYMES, 5442*
  - GASTRIN, 189
  - HORMONE EFFECTS ON, 5442*
  - PROTEINS, 4690
  - ULCER, 384, 387, 1343*
  - ULCER, PEPTIC, 7594
- ENDOSCOPY
  - PANCREAS, 2843
- ENTEROTOXINS
  - CHOLERA, 186
- FEEDING
  - GASTRIN, 1334*
  - TRYPSINOGEN, 2809
- FISTULA
  - PROSTAGLANDINS, 951*
- GALLBLADDER
  - CERULEIN, 69
- GASTRECTOMY
  - GASTRIN, 4560*
- GASTRIN
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4555*, 7350*
  - ANTRUM, 3668*
  - ATROPINE, 7967*
  - DRUG EFFECTS ON, 4068*
  - ENTERECTOMY, 4573*
  - FATS, 5358*
  - FEEDING, 959, 7364
  - GASTRODUODENOSTOMY, 3638*

- SECRETION (continued)
  - GASTRIN (continued)
    - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 4555*
    - NERVOUS CONTROL, 3668*, 7967*
    - PANCREAS, 959
    - PYLOROPLASTY, 7364
    - STOMACH, 959
    - ULCER, 385
    - VAGOTOMY, 3638*, 4573*, 7364
  - GASTRITIS
    - DEFICIENCY, 6228
    - DRUG THERAPY, 6228
    - GLYCOPROTEINS, 4576
  - GASTROINTESTINAL DISEASES
    - REVIEW, 1661
  - GASTROINTESTINAL SYSTEM
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 7957
    - CONTRAST MEDIA, 1101
  - GLUCAGON
    - PANCREAS, 2855
  - GLYCOPROTEINS
    - CYSTIC FIBROSIS, 8090*
  - H2 RECEPTOR ANTAGONISTS
    - STOMACH, 2784*
  - HEIDENHAIN POUCH
    - PROSTAGLANDINS, 951*
  - HEPATOCYTES
    - HEPATECTOMY, 2886*
  - HORMONE CONTROL
    - INTESTINES, 5453
  - HORMONES
    - GALLBLADDER, 6061
    - PANCREAS, 6061
  - HORMONES, GASTROINTESTINAL
    - FATS, 5358*
    - PANCREAS, 1950, 2849
    - ULCER, 4836*
  - ILEUM
    - CALCIUM, 2078
    - ELECTROLYTES, 4499*
    - GLUCOSE, 6132
    - LYMPH, 7498*
    - WATER, 4499*
  - INSULIN
    - STOMACH, 1233
    - ULCER, 1233
  - INTESTINE, LARGE
    - POTASSIUM, 7271
  - INTESTINE, SMALL
    - ALKALINE PHOSPHATASE, 4690
    - AMYLASES, 6822
    - CAFFEINE, 4684*
    - CALCIUM, 2078, 2084
    - CATHARTICS, 3825*
    - CELLS, 6827, 7288*
    - CHOLERA, 2084, 3840
    - CHYLOMICRONS, 3827*, 5439*
    - DEFICIENCY, 7290*
    - DILATATION, 7290*
    - DISTENTION, 2963*
    - DRUG EFFECTS ON, 3825*
    - ENTEROKINASE, 4690
    - ENZYMES, 3838, 5433*
    - GALLBLADDER, 2851
    - GLYCOPROTEINS, 3850
    - HORMONE EFFECTS ON, 2961*
    - HORMONES, GASTROINTESTINAL, 2961*

- SECRETION (continued)
  - INTESTINE, SMALL (continued)
    - HYPERTROPHY, 7290*
    - IMMUNOLOGY, 6128*
    - LIPASE, 6822
    - LYMPH, 7498*
    - MORPHOLOGY, 7290*
    - MUCUS, 6128*
    - PANCREAS, 2851, 2980, 3585*, 5293*
    - PANCREATECTOMY, 3838
    - PHYSICAL FACTORS, 2068
    - PRESSURE STUDY, 2058*
    - PROTEINS, 4690
    - REGENERATION, 1759
    - SHIGELLOSIS, 3840
    - SODIUM, 2961*
    - TERPENES, 6827
    - TOXINS, 3840
    - VEINS, 2058*
    - WATER, 2961*
  - INTESTINES
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2060*
    - CALCIUM, 5453
    - CATHARTICS, 1685, 3825*
    - CELLS, 5273
    - CHOLERA, 2083
    - DRUG EFFECTS ON, 2083, 3825*
    - ENTEROTOXINS, 2083
    - HORMONES, 2128
    - INTESTINE, SMALL, 2083
    - LIPOPROTEINS, 3857
    - PANCREAS, 5457
    - PROSTAGLANDINS, 2093
  - JEJUNUM
    - ALKALINE PHOSPHATASE, 4690
    - CHOLESTEROL, 2087
    - CHYLOMICRONS, 5439*
    - DISTENTION, 2963*
    - ENTEROKINASE, 4690
    - FATTY ACIDS, 2087
    - GLUCOSE, 6132
    - PANCREAS, 4688
    - POTASSIUM, 3833*
    - PROTEINS, 4690
    - SODIUM, 2961*
    - WATER, 2961*
  - KINETICS
    - AMYLASES, 1938
  - LIPASE
    - ULCER, PEPTIC, 7594
  - LIPOPROTEINS, 2727
  - LIVER
    - ACYLTRANSFERASES, 8000*
    - BILIRUBIN, 6094
    - DYES, 6094
    - FEEDING, 605
    - HEME, 3796
    - PHYSICAL FACTORS, 2022
  - LIVER CIRRHOSIS, 6112
    - BILE ACIDS AND SALTS, 2550, 8398*
    - HORMONES, ADRENAL CORTEX, 2553
  - LIVER DISEASES, ALCOHOLIC
    - BILE ACIDS AND SALTS, 8398*
    - PROTEINS, 7806*
  - MICROSOMES
    - CALCIUM, 1800
  - NEOPLASMS
    - HORMONES, ADRENAL CORTEX, 8291*

- SECRETION (continued)
  - NEOPLASMS (continued)
    - THYROCALCITONIN, 8291*
  - OBESITY
    - SHUNT, INTESTINAL, 1307
  - ODDI'S SPHINCTER
    - BILE, 2021
    - BILE ACIDS AND SALTS, 2021
  - PANCREAS, 3728, 5000, 6754, 7068
    - ACETYLCHOLINE, 1954
    - ACIDS, 1942
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 987, 2853, 4585*
    - ADENYL CYCLASE, 2853
    - ADRENERGIC RECEPTOR AGONISTS, 4586*
    - ADRENERGIC RECEPTOR BLOCKADERS, 2856, 4586*
    - AGE FACTORS, 2846, 6748, 7988
    - ALCOHOLISM, 3743
    - ALCOHOLS, 112, 1931*, 1957, 4601, 4683*, 7368*
    - AMINO ACIDS, 4677*
    - AMYLASES, 1936, 2837*, 3735, 4603, 5389*, 5442*, 7370*, 7984*, 7985*
    - ANESTHETICS, 7372*
    - ANTIHORMONES, 1942
    - ANTRUM, 3729
    - CALCIUM, 112, 113, 988
    - CARBOXYPEPTIDASES, 1959
    - CATECHOLAMINES, 3730
    - CHOLANGIOGRAPHY, 8267*
    - CHOLECYSTOKININ, 981, 1937, 1944, 2852
    - CHYMOTRYPSIN, 1936, 5442*, 7982*
    - CHYMOTRYPSINOGEN, 1930*
    - CIRCADIAN RHYTHM, 6750
    - DEFICIENCY, 6371
    - DIABETES, 5168*
    - DIAGNOSIS, 8267*
    - DIET, 1932, 5392
    - DIETARY FACTORS, 991, 3735
    - DIGESTION, 1932
    - DIURETICS, 4590*
    - DOPAMINE, 3730, 4587*
    - DRUG EFFECTS ON, 994, 2847, 3749*, 4590*, 4604, 4683*, 5389*, 5390*, 6683*, 6752, 7368*, 7370*, 7371*, 7372*, 7570, 7731
    - ELECTROLYTES, 992, 1951, 4590*
    - ENDOSCOPY, 3117
    - ENTERECTOMY, 3741, 5443*
    - ENZYMES, 985, 991, 1935, 1961, 2836*, 3729, 3735, 3739, 4599, 4602, 5389*, 5390*, 5433*, 5442*, 6751, 7371*, 7723*, 7731, 7984*
    - EPINEPHRINE, 3730
    - FATTY ACIDS, 3743
    - FEEDING, 3735
    - FETUS, 6747*
    - FISTULA, 5392
    - GASTRECTOMY, 7571
    - GASTRIN, 4591*
    - GLUCOSE, 2856
    - GLYCOPROTEINS, 2835*
    - HORMONE CONTROL, 2969, 7985*
    - HORMONE EFFECTS ON, 1936, 3724*, 4588*, 4999, 5442*, 7375*

- SECRETION (continued)
  - PANCREAS (continued)
    - HORMONES, 117
    - HORMONES, ADRENAL CORTEX, 6752
    - HORMONES, GASTROINTESTINAL, 5388*
    - HYPERALIMENTATION, 989, 2844
    - HYPERGLYCEMIA, 7380
    - IMMUNOGLOBULINS, 2857, 6067
    - KINETICS, 1938
    - LIPASE, 1936, 3735, 5389*, 5442*
    - MAGNESIUM, 113
    - MARKER STUDY, 248
    - MORPHOLOGY, 109, 7366*
    - MUSCLE RELAXANTS, 5390*
    - NEONATE, 6747*
    - NEOPLASMS, 8267*
    - NEOPLASMS, MALIGNANT, 5773*
    - NERVOUS CONTROL, 1937, 2847, 3730, 3731, 6747*
    - NICOTINE, 982*
    - NOREPINEPHRINE, 3730, 4586*
    - PANCREATITIS, 531
    - PANCREOZYMIN, 981, 1937, 2852
    - PARASYMPATHOMIMETICS, 6747*
    - PENTAGASTRIN, 1944
    - PEPTIDES, 1927*, 1928*, 4592*
    - PERFUSION, 984
    - PROSTAGLANDINS, 6745*
    - PROTEINS, 1942, 4585*, 4602, 5385*, 7376, 7380
    - RADIATION EFFECTS ON, 983*
    - REVIEW, 2847, 3987, 8125
    - SECRETIN, 117, 984, 998, 1944, 1945, 2855, 3731, 5387*, 5388*, 7374*
    - SHUNT, INTESTINAL, 521
    - SIMULATION, 992, 1926*, 1951
    - STEROIDS, 2862
    - SULFATES, 4583*
    - SYMPATHOMIMETICS, 1948, 3730
    - TECHNIQUES, 989, 3976
    - THYROCALCITONIN, 4588*
    - TRANSPLANTATION, 5393
    - TRYPSIN, 2863, 3735, 7723*, 7982*
    - TRYPSIN INHIBITORS, 521
    - TRYPSINOGEN, 1930*
    - ULCER, 1348
    - ULCER, PEPTIC, 6929
    - ULTRASTRUCTURE, 4492*
    - VAGOTOMY, 1746*
    - VASOCONSTRICTOR AGENTS, 4586*
    - VASODILATOR AGENTS, 4586*
    - WATER, 4590*
    - WATER, ELECTROLYTE BALANCE, 1926*
  - PANCREAS FUNCTION TESTS
    - ANESTHESIA, 2861
    - HORMONE EFFECTS ON, 2861
  - PANCREATIC DISEASES
    - CHOLERA, 4391*
    - ELECTROLYTES, 4391*
    - IMMUNOGLOBULINS, 2857
    - STOMACH, 2415*
    - WATER, 4391*
  - PANCREATIC DUCT
    - CELLS, 1757
    - HORMONE EFFECTS ON, 1757
    - OBSTRUCTION, 3748
  - PANCREATITIS
    - CERULEIN, 289

- SECRETION (continued)
  - PANCREATITIS (continued)
    - DIET, 529
    - HORMONE EFFECTS ON, 4999
    - HORMONES, 289
    - IMMUNOGLOBULINS, 2857
    - PANCREAS, 1225, 5481*
  - PANCREATITIS, CHRONIC, 7730
    - DRUG EFFECTS ON, 7731
    - ENZYMES, 7731
    - HORMONE EFFECTS ON, 4999
    - IMMUNOGLOBULINS, 2857
    - PANCREAS, 2221
    - SECRETIN, 4240
  - PENTAGASTRIN
    - ULCER, 1233
  - PEPSIN
    - CATECHOLAMINES, 8171
    - EPINEPHRINE, 8171
    - NOREPINEPHRINE, 8171
    - ULCER, PEPTIC, 6925, 7594
  - PEPTIDES
    - PANCREAS, 2849
  - POTASSIUM
    - CATECHOLAMINES, 7336*
  - POUCH STUDY
    - REVIEW, 2137
    - STOMACH, 2137
  - PROSTAGLANDINS
    - PANCREAS, 99, 2859
  - PROTEINS
    - GASTRIN, 1334*
    - HORMONE CONTROL, 7376
    - HYPERGLYCEMIA, 7380
    - KINETICS, 2160
    - PANCREAS, 2160
    - SECRETIN, 7376
  - PYLORUS
    - CELLS, 7905*
    - MUCUS, 7905*
  - RECTUM
    - CELLS, 3591
    - GLYCOPROTEINS, 8090*
  - RECURRENCE
    - ULCER, 1233
  - SALIVARY GLANDS, 5344, 5351
    - AMYLASES, 7341
    - BIOCHEMISTRY, 7958
    - CALCIUM, 7341
    - CARBOHYDRATES, 6717*
    - CELLS, 6718, 6719
    - ELECTROLYTES, 946*
    - HORMONE EFFECTS ON, 6719
    - KALLIKREIN, 5350
    - MEMBRANES, 73
    - POTASSIUM, 2120, 7336*, 7337*
    - PROTEINS, 6034
    - SYMPATHOMIMETICS, 73
    - ULTRASTRUCTURE, 5349
  - SCLERODERMA
    - PANCREAS, 3327*
  - SECRETIN
    - FATS, 5358*
    - SIMULATION, 2094
  - SJOGREN'S SYNDROME
    - PANCREAS, 3327*
  - SODIUM
    - ILEUM, 1086*

- SECRETION (continued)
  - SOMATOSTATIN
    - PANCREAS, 3038
  - STOMACH, 2797, 3709
    - ACID SECRETION, 6739
    - ACIDS, 3140*
    - ADENYL CYCLASE, 967, 6735
    - ADRENERGIC RECEPTOR BLOCKADERS, 6046
    - AMINO ACIDS, 3700, 7969*
    - ANESTHESIA, 1296
    - ANTIBODIES, 321
    - ANTIGENS, 3058
    - ANTIHORMONES, 3689
    - ANTIHYPERTENSIVE AGENTS, 3713
    - ANTRUM, 104
    - ATROPINE, 1296, 2787*, 6729*
    - BILE, 3701
    - CARBOHYDRATES, 7969*
    - CARBONATES, 7360
    - CARCINOEMBRYONIC ANTIGEN, 3058
    - CATECHOLAMINES, 976
    - CELLS, 5263*, 7905*, 7978
    - CHEMICAL COMPOSITION, 1752*
    - CHILD, 383, 1296
    - CHOLECYSTOKININ, 2794*, 2852, 3738
    - CIRCULATION, 83
    - DISTENTION, 4579
    - DRUG EFFECTS ON, 1296, 2415*, 2787*, 2799, 2808, 3713, 3714, 4068*, 4083, 7360
    - DRUGS, 96
    - DUODENUM, 104, 1751*, 1874*
    - ELECTRICAL CONTROL, 1875*
    - EPITHELIUM, 949*
    - FETUS, 3002
    - GASTRIN, 95, 103, 971, 1236, 3693, 4556*, 4579, 6261*, 7349*, 7350*, 7364, 7972
    - GASTROSTOMY, 6037*
    - GLUCAGON, 2794*
    - GLUCOSE, 6053
    - GLYCOPROTEINS, 1752*, 2792*, 4576, 7969*
    - H2 RECEPTOR ANTAGONISTS, 1882*, 2415*, 2789*, 2799, 6046
    - HIATAL HERNIA, 7559
    - HISTAMINE, 95, 96, 1907, 3703, 6053, 6735, 7969*
    - HISTOCHEMISTRY, 7978
    - HORMONE EFFECTS ON, 249, 2264, 2794*, 3671*, 6727*, 7347*, 7375*, 7977
    - HORMONES, GASTROINTESTINAL, 971, 3738, 5262*
    - HUMORAL FACTORS, 4093
    - HYPOCHOLESTEREMIC AGENTS, 1316
    - ILEUM, 5367*
    - IMMUNOGLOBULINS, 85
    - INFANT, 3002
    - INSULIN, 103
    - INTESTINE, SMALL, 5367*
    - INTRINSIC FACTOR, 3711
    - ION TRANSPORT, 949*, 1875*, 1907
    - JEJUNUM, 5367*
    - MORPHOMETRY, 7978
    - MOTILIN, 1898
    - MUCUS, 4566*, 7905*, 7969*
    - NEONATE, 3002

SECRETION (continued)
    STOMACH (continued)
        NEOPLASMS, MALIGNANT, 6256
        NERVOUS CONTROL, 104, 950*, 976, 2264, 3712, 4093, 4551*, 5263*, 5364*
        PAIN, 7980
        PANCREOZYMIN, 2852
        PARASITES AND PARASITIC DISEASES, 8162*
        PARASYMPATHOLYTICS, 2789*
        PARENTERAL ALIMENTATION, 4551*
        PENTAGASTRIN, 383, 384, 2787*, 3085, 7969*
        PEPSIN, 2787*, 2789*, 2792*, 3616, 3671*, 3677, 3858, 4068*, 5364*, 6925, 7362, 7977, 8171
        PEPTIDES, 4592*
        PERFUSION, 6053
        POTASSIUM, 6017
        POUCH STUDY, 100, 2138, 4551*
        PROSTAGLANDINS, 100, 967, 1924, 2799, 4563*, 5362*
        PYLOROPLASTY, 1332
        RADIOISOTOPES, 3629*
        REVIEW, 3987
        SECRETIN, 998, 1874*, 2794*, 3738
        SEROTONIN, 6729*
        SHUNT, INTESTINAL, 1307
        SIMULATION, 971
        SODIUM, 3678
        SOMATOSTATIN, 103
        SOUND, 970
        SURGERY, 5494
        SYMPATHOMIMETICS, 1948
        TECHNIQUES, 3629*, 3676, 6037*
        THYROID GLAND, 7969*
        ULCER, 1343*, 4093, 4831
        ULCER, PEPTIC, 383, 2264, 4861, 6261*
        VAGOTOMY, 1332, 2805, 3140*, 3717, 3723, 6935
        WATER, ELECTROLYTE BALANCE, 2787*
        WOUNDS AND INJURIES, 1874*
    TEMPERATURE
        PEPSIN, 7965*
    TRANQUILIZING AGENTS
        BILE, 7414*
    TRANSPORT
        TECHNIQUES, 5420*
    ULCER
        DUODENUM, 3207
        GASTRIN, 2305
        GLUCAGON, 2309
        GLUCOSE INTOLERANCE, 2309
        HEALING, 4849
        INSULIN, 2309
        TECHNIQUES, 3207
    ULCER, PEPTIC
        ACIDITY, 1337*
        CHLORIDES, 3207
        DRUG THERAPY, 2292
        ETIOLOGY, 3203
        GLYCOPROTEINS, 4576
        HORMONE EFFECTS ON, 2264
        NERVOUS CONTROL, 2264
        PENTAGASTRIN, 8180*
        PEPSIN, 4092
        STOMACH, 3203

SECRETION (continued)
    ULCER, PEPTIC (continued)
        TECHNIQUES, 3207
        VAGOTOMY, 1332
    VAGOTOMY
        CHOLECYSTOKININ, 3738
        GASTRIN, 1335*
        HORMONES, GASTROINTESTINAL, 3738
        PANCREAS, 5494
        SECRETIN, 3738
        STOMACH, 5494
    VITAMIN B12
        PANCREAS, 1779*
    WOUNDS AND INJURIES
        DUODENUM, 1751*
    ZOLLINGER-ELLISON SYNDROME
        GASTRIN, 5175*, 5940*

SEDATIVES
    BILIARY TRACT
        OBSTRUCTION, 2003
    CHOLESTASIS
        DRUG METABOLISM, 5025*
    JAUNDICE, CHOLESTATIC
        DRUG-INDUCED, 8346
    LIVER
        ALCOHOLS, 2002
        DIETARY FACTORS, 2036
        METABOLISM, 2036
    LIVER DISEASES
        DRUG METABOLISM, 8325
    LIVER INJURY
        DRUG-INDUCED, 8346

SEPSIS
    BACTERIAL INFECTIONS
        YERSINIA, 3245
    CHOLECYSTECTOMY
        COMPLICATIONS, 8430*
        PREVENTION, 8430*
    COLON
        ANTIBIOTICS, 5719*, 7017
        SURGERY, 5719*, 7017
    ENTERECTOMY
        COMPLICATIONS, 7686
    ESOPHAGUS
        ENDOSCOPY, 4388*
    GASTROINTESTINAL SYSTEM
        ENDOSCOPY, 4388*
    INTESTINE, LARGE
        ANEURYSM, 7686
    JAUNDICE
        ETIOLOGY, 5237
    RECTUM
        ANTIBIOTICS, 5719*
        SURGERY, 5719*
    STOMACH
        ENDOSCOPY, 4388*

SERODIAGNOSIS
    GASTROINTESTINAL DISEASES
        VIBRIO, 805
    HEPATITIS
        RADIOIMMUNOASSAY, 6482*
    HEPATITIS, INFECTIOUS
        ANTIBODIES, 6472*
        ANTIGENS, 6472*
        EPIDEMIOLOGY, 648
        RADIOIMMUNOASSAY, 6482*

- SERODIAGNOSIS (continued)
  - HEPATITIS, SERUM
    - RADIOIMMUNOASSAY, 6482*

- SEROTONIN
  - ACIDS
    - VEINS, 2116
  - BILE
    - BILIRUBIN, 6099
    - SECRETION, 6099
  - CELIAC DISEASE
    - EXCRETION, 6996
    - URINE, 6996
  - DUODENUM
    - ACIDS, 1873*
    - RADIOIMMUNOASSAY, 1873*
  - HEPATITIS, CHRONIC
    - METABOLISM, 705
  - INTESTINAL ABSORPTION
    - DRUG EFFECTS ON, 2968
  - INTESTINE, SMALL
    - HISTOCHEMISTRY, 7513*
    - INTESTINAL OBSTRUCTION, 4120
    - NERVOUS CONTROL, 7513*
  - LIVER
    - VEINS, 2116
  - LIVER CIRRHOSIS
    - CHILD, 706
    - METABOLISM, 705
    - URINE, 706
  - LIVER COMA, 572
    - NERVOUS SYSTEM, 4665
  - PANCREATITIS, CHRONIC
    - SERUM, 4241
  - SERUM
    - DIETARY FACTORS, 5381
  - STOMACH
    - ACID SECRETION, 1873*, 4571*, 6729*
    - ANESTHESIA, 6728*
    - DIET, 6728*
    - FEEDING, 6728*
    - FISTULA, 6728*
    - PEPSIN, 6729*
    - SECRETION, 6729*
  - WATER, ELECTROLYTE BALANCE
    - INTESTINE, SMALL, 1781*

- SERUM
  - ACHLORHYDRIA
    - GASTRIN, 4804*
    - HORMONES, GASTROINTESTINAL, 2594*
  - ACID SECRETION
    - CALCIUM, 6047
  - ALCOHOLISM
    - ALKALINE PHOSPHATASE, 8391
    - AMINO TRANSFERASES, 8391
    - AMYLASES, 6505*
    - BILIRUBIN, 6505*
    - ENZYMES, 8391
    - IMMUNOGLOBULINS, 8391
  - ALKALINE PHOSPHATASE
    - SOLVENTS, 2901
  - ALPHA FETOPROTEIN
    - LIVER INJURY, 3030
  - AMEBIASIS
    - ANTIBODIES, 5806*
  - AMINO ACIDS, 6069*

- SERUM (continued)
  - AMYLASES, 5179*
    - ACIDOSIS, 5932*
    - AGE FACTORS, 6744*
    - ALCOHOLISM, 5110*
    - CHILD, 6744*
    - INFANT, 6744*
    - LIVER DISEASES, 4247*
    - NEOPLASMS, 2411*
    - PANCREATITIS, CHRONIC, 2411*
    - TECHNIQUES, 7550
  - ANTRUM
    - GASTRIN, 3139*
  - ATROPINE
    - GASTRIN, 2307
  - BILE ACIDS AND SALTS
    - ANALGESICS AND ANTIPYRETICS, 8339*
    - ASSAY, 3088
    - CHOLESTASIS, 3362*
    - DRUG EFFECTS ON, 8339*
    - FEEDING, 635
    - ISOLATION, 7520
    - SULFATES, 3362*
    - TECHNIQUES, 7997*
  - BILIARY TRACT DISEASES
    - BILE ACIDS AND SALTS, 606
    - ENZYMES, 1575*
  - BILIRUBIN
    - ALCOHOLISM, 5110*
  - BINDING
    - PROTEINS, 2782*
  - CARCINOEMBRYONIC ANTIGEN
    - ANTIGENS, 5006*
  - CATHARTICS
    - CHOLESTEROL, 2403
  - CHILD
    - ACID SECRETION, 1890
    - GASTRIN, 1890, 5372
  - CHOLECYSTITIS
    - ENZYMES, 4378
    - PROTEINS, 755
  - CHOLECYSTOKININ
    - RADIOIMMUNOASSAY, 3592
  - CHOLELITHIASIS
    - ENZYMES, 1457*
    - FATTY ACIDS, 3501*
    - LIPIDS, 3501*
    - TRIGLYCERIDES, 3501*
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 7105*
    - CHOLESTEROL, 1581*
  - CHOLESTEROL
    - PHOSPHOLIPIDS, 7398*
    - PROSTAGLANDINS, 2890*
  - COLECTOMY
    - GASTRIN, 3690
  - COLITIS, ULCERATIVE
    - IMMUNOGLOBULINS, 5513*
    - LYSOZYMES, 1745, 3076, 3077
  - CROHN'S DISEASE
    - AMINO ACIDS, 2673
    - IMMUNOGLOBULINS, 5513*
    - LYSOZYMES, 1731*, 1745, 3076, 3077
  - DIET
    - ACID SECRETION, 1902
    - GASTRIN, 1902
  - DUMPING SYNDROME
    - PROTEINS, 4056

- SERUM (continued)
  - ECHINOCOCCOSIS
    - PROTEINS, 8170
  - ENTERECTOMY
    - GASTRIN, 3690, 3718
  - ENZYMES
    - SCHISTOSOMIASIS, 8048
  - FATTY ACIDS
    - STRESS, 1919
  - GALLBLADDER
    - HORMONES, GASTROINTESTINAL, 3650
  - GALLBLADDER DISEASES
    - ENZYMES, 1575*
  - GASTRECTOMY
    - GASTRIN, 3532
  - GASTRIN, 2693, 2783*, 3679
    - ACID SECRETION, 7970
    - ACIDITY, 5387*
    - ANTACIDS, 1876*
    - ATROPINE, 5623*
    - CALCIUM, 3669*, 5357*
    - CIRCADIAN RHYTHM, 7178*, 7575
    - DIETARY FACTORS, 5387*
    - DRUG EFFECTS ON, 3197*
    - DRUG THERAPY, 2294
    - ENTERECTOMY, 5370*
    - FATS, 3696
    - FEEDING, 6177
    - H2 RECEPTOR ANTAGONISTS, 1882*, 2294, 3197*
    - HORMONE EFFECTS ON, 2788*, 4581, 7347*
    - HORMONES, ADRENAL CORTEX, 4581
    - HYPERCALCEMIA, 6591*
    - INFANT, 6038*
    - MOTILIN, 1898, 7347*
    - NEONATE, 4553*
    - NERVOUS CONTROL, 4551*, 7970
    - PARENTERAL ALIMENTATION, 3854, 4551*
    - RADIOIMMUNOASSAY, 3592
    - SMOKING, 2308
    - SURGERY, 3670*
    - TECHNIQUES, 4762
    - THYROCALCITONIN, 2788*
    - VAGOTOMY, 5623*, 7603
    - ZOLLINGER-ELLISON SYNDROME, 2624
  - GASTRITIS
    - GASTRIN, 3532
    - PROTEINS, 755
  - GASTRITIS, ATROPHIC
    - GASTRIN, 3143*
  - GASTROENTERITIS
    - CHOLERA, 7243
    - MAGNESIUM, 7243
  - GASTROINTESTINAL DISEASES
    - GASTRIN, 3532
    - PROTEINS, 8170
  - GLUCOSE
    - STRESS, 1919
  - HAPTOGLOBINS
    - PROSTAGLANDINS, 2114
  - HEPATITIS
    - ANTIGENS, 3439
    - AUSTRALIA ANTIGEN, 3439, 6470*
    - BILE ACIDS AND SALTS, 7105*
    - GLYCOPROTEINS, 7263, 7790*
  - HEPATITIS, CHRONIC
    - AMYLASES, 3370*

- SERUM (continued)
  - HEPATITIS, CHRONIC (continued)
    - ANTIBODIES, 3430*
    - ANTIGENS, 3430*, 3439
    - AUSTRALIA ANTIGEN, 3430*, 3439, 6470*
    - CHEMICAL COMPOSITION, 4331*
    - GLYCOPROTEINS, 6468*
    - IMMUNOGLOBULINS, 5888
    - LYMPHOCYTES, 4292
    - VITAMIN B12, 5890
  - HEPATITIS, INFECTIOUS
    - ANTIGENS, 3439
    - AUSTRALIA ANTIGEN, 3439, 6470*
    - CHOLINESTERASES, 8371
    - ENZYMES, 6469*
    - GLYCOPROTEINS, 6468*
    - LYMPHOCYTES, 4292
  - HIATAL HERNIA
    - GASTRIN, 3532
  - IMMUNOGLOBULINS
    - DEFICIENCY, 5174*
    - HYPOGAMMAGLOBULINEMIA, 5174*
  - INFANT
    - ACID SECRETION, 1890
    - GASTRIN, 1890, 5372
  - INFLAMMATORY BOWEL DISEASES
    - IMMUNITY, 5987
    - LYSOZYMES, 3076, 3077, 5548
  - INSULIN
    - PARENTERAL ALIMENTATION, 3854
  - INTESTINE, SMALL
    - PROTEINS, 2070
  - JAUNDICE
    - ENZYMES, 1457*
  - KIDNEY DISEASES
    - GASTRIN, 8499
  - KWASHIORKOR
    - CALCIUM, 6316
  - LIPASE
    - CHOLANGIOGRAPHY, 3947*
    - ENDOSCOPY, 3947*
    - PANCREATOGRAPHY, 3947*
  - LIPIDS
    - PROSTAGLANDINS, 2890*
  - LIPOPROTEINS
    - LIVER FUNCTION TESTS, 1022*
  - LIVER
    - GROWTH SUBSTANCES, 1169
    - LIPOPROTEINS, 1022*
    - NEOPLASMS, 4331*
  - LIVER CIRRHOSIS
    - ALBUMINS, 3480*
    - AMINO ACIDS, 2548
    - AUSTRALIA ANTIGEN, 6470*
    - BILE ACIDS AND SALTS, 2549, 6521*
    - CHEMICAL COMPOSITION, 4331*
    - CHENODEOXYCHOLIC ACID, 2549
    - CHOLESTEROL, 7097*
    - CHOLIC ACID, 2549
    - FIBRINOGEN, 3473*
    - GASTRIN, 8418
    - GLYCOPROTEINS, 7263
    - HORMONES, 3478*
    - IMMUNOGLOBULINS, 4321*
    - LIPIDS, 7097*
    - TRIGLYCERIDES, 5111*
    - ZINC, 3480*

SERUM (continued)
- LIVER DISEASES
  - ALPHA FETOPROTEIN, 2454*
  - AMYLASES, 3370*
  - ANTIGENS, 3439
  - AUSTRALIA ANTIGEN, 3439, 6470*
  - BILE ACIDS AND SALTS, 606, 7528*, 7743*
  - COMPLEMENT, 1207
  - GLYCOPROTEINS, 2941
  - LIPIDS, 6433
- LIVER DISEASES, ALCOHOLIC
  - CARCINOEMBRYONIC ANTIGEN, 5113*
  - IMMUNOGLOBULINS, 4321*
  - TRIGLYCERIDES, 5111*
- LIVER INJURY
  - COMPLEMENT, 1207
  - ENZYMES, 5414*
  - LIPIDS, 5414*
  - LIPOPROTEINS, 1160, 5414*
- MALABSORPTION SYNDROMES
  - CALCIUM, 6316
- MARASMUS
  - CALCIUM, 6316
- MENETRIER'S DISEASE
  - GASTRIN, 3532
- NEONATE
  - GASTRIN, 1890
- NEOPLASMS
  - CERULOPLASMIN, 5613
  - COPPER, 5613
  - GLYCOPROTEINS, 7263
  - PROTEINS, 8243
- NEOPLASMS, MALIGNANT
  - ENZYMES, 1459*
- NUCLEIC ACIDS
  - SYNTHESIS, 6091*
- NUTRITION DISORDERS
  - PROTEINS, 7856*
- PANCREATIC DISEASES
  - GLUCURONIDASE, 527
- PANCREATITIS
  - ALBUMINS, 5789*
  - AMYLASES, 6381
  - CALCIUM, 5789*
  - GLUCURONIDASE, 527
  - PANCREAS, 5481*
  - SIMULATION, 195*
- PANCREATITIS, CHRONIC
  - GASTRIN, 3532
  - GLUCURONIDASE, 527
  - HISTAMINE, 4241
  - SEROTONIN, 4241
  - VITAMIN B12, 3358
- PANCREATOGRAPHY
  - AMYLASES, 5529
- PARASITES AND PARASITIC DISEASES
  - GASTRIN, 2829
- PEPSINOGEN
  - DRUG EFFECTS ON, 3141*
- PROTEINS
  - SURGERY, 2136
- PYLOROPLASTY
  - GASTRIN, 3718
- SECRETIN
  - ACIDITY, 2097*
  - ANESTHETICS, 7372*
  - DRUG EFFECTS ON, 7372*
  - NICOTINE, 982*

SERUM (continued)
- SECRETIN (continued)
  - PROTEINS, 2097*
  - RADIOIMMUNOASSAY, 2097*
  - SMOKING, 2308
- SEROTONIN
  - DIETARY FACTORS, 5381
- SHUNT, INTESTINAL
  - ELECTROLYTES, 7625
- SOMATOSTATIN
  - TRIGLYCERIDES, 3038
- STOMACH
  - ALPHA FETOPROTEIN, 4803*
- THYROCALCITONIN
  - GASTRIN, 3001
- TRYPSIN INHIBITORS
  - MILK, 217
- ULCER, PEPTIC
  - FIBRINOGEN, 7597
  - GASTRIN, 4861, 5221, 7575, 7598
  - HORMONES, 7598
  - INSULIN, 7598
  - KININS, 7597
  - PEPSINOGEN, 3186
  - TRYPSIN, 7597
- VAGOTOMY
  - GASTRIN, 3718, 3719
- VITAMIN B12
  - BINDING, 2782*
- ZOLLINGER-ELLISON SYNDROME
  - GASTRIN, 3532

SHIGELLOSIS
- CHILD
  - ANTIBIOTICS, 803
- COLITIS
  - MEGACOLON, 6605
- DIARRHEA
  - ETIOLOGY, 5171*
  - TOXINS, 5171*
- EPIDEMIOLOGY, 8470
- INFANT
  - ANTIBIOTICS, 803
- INTESTINE, SMALL
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 3840
  - SECRETION, 3840
- INTESTINES
  - SIMULATION, 1696
- MORPHOLOGY
  - PATHOLOGY, 3574
- NEONATE
  - DIET, 1697
  - THERAPY, 1697
- PRIMATES, 1660
- TRANSMISSION, 8473
  - REVIEW, 8472
- WATER
  - TRANSMISSION, 789

SHOCK
- BRADYKININ
  - INTESTINES, 5454
- CIRCULATION
  - BLEEDING, 2119
  - GASTROINTESTINAL SYSTEM, 2119
- INTESTINE, SMALL
  - ENZYMES, 3877
  - HYPOTENSION, 6832*

SHOCK (continued)
- INTESTINE, SMALL (continued)
  - HYPOXIA, 3877
  - NERVOUS SYSTEM, 4727, 6832*
  - ULCER, 4727
- INTESTINES
  - ALBUMINS, 3872*
  - LYSOSOMES, 3872*
  - NERVOUS SYSTEM, 4727
  - PREVENTION, 3872*
  - ULCER, 4727
- LIVER INJURY
  - HEMORRHAGE, 4632*
- STOMACH
  - ACID SECRETION, 5368*
  - CIRCULATION, 5368*
  - GASES, 3895

SHORT BOWEL SYNDROME
- ANTISPASMODICS
  - DIARRHEA, 4125
- ENTERECTOMY
  - CHILD, 4891
  - INFANT, 4891
  - OSTEOMALACIA, 7641
- HYPERALIMENTATION
  - REVIEW, 1734
- INTEGUMENTARY SYSTEM
  - KWASHIORKOR, 6951
- INTESTINAL OBSTRUCTION
  - GENETICS, 4109*
- METABOLISM, 3153
- MORPHOLOGY, 3153
- OSTEOMALACIA
  - THERAPY, 7641
  - VITAMIN D, 7641
- PARENTERAL ALIMENTATION
  - CHILD, 4866*
- SURGERY
  - PROGNOSIS, 2101*
  - TECHNIQUES, 2101*
- THERAPY
  - DIET, 4891

SHUNT
- ACIDS
  - PROTEINS, 5463*
- ASCITES
  - THERAPY, 7180*
- BILIARY TRACT
  - TECHNIQUES, 5955
- CIRCULATION
  - LIVER DISEASES, ALCOHOLIC, 2543*
  - MARKER STUDY, 6143*
  - TECHNIQUES, 6143*
- ESOPHAGUS
  - VARICES, 574
- GASTROINTESTINAL SYSTEM
  - BILIARY TRACT, 5955
  - TECHNIQUES, 5955
- HYPERTENSION, PORTAL
  - AGE FACTORS, 2565
  - CHILD, 2565
  - HEME, 8400*
- INTESTINE, SMALL
  - COMPLICATIONS, 2314*
  - ION TRANSPORT, 1803
  - RADIOLOGY, 2314*

SHUNT (continued)
- LIVER
  - DISEASES ASSOCIATED WITH, 7128
  - HYPERPLASIA, 8035*
  - NEOPLASMS, 5811*
  - REGENERATION, 8035*
- LIVER CIRRHOSIS
  - CIRCULATION, 2543*, 5909
  - COMPLICATIONS, 2560
  - KERNICTERUS, 5904*
  - PRESSURE STUDY, 2543*
- LIVER DISEASES
  - HYPOXIA, 2474
- LIVER DISEASES, ALCOHOLIC
  - ASCITES, 7180*
  - PRESSURE STUDY, 2543*
- MITOCHONDRIA
  - NERVOUS SYSTEM, 5479*
- OBESITY
  - STOMACH, 1308, 5693
  - TECHNIQUES, 5693
- PANCREATIC DUCT
  - MORPHOLOGY, 3350
- VEINS
  - CRYOPROBE, 6076*
  - TECHNIQUES, 6076*

SHUNT, INTESTINAL
- AMINO ACIDS
  - ABSORPTION, 2315*
  - PSYCHOLOGICAL FACTORS, 4874*
- BILE ACIDS AND SALTS
  - METABOLISM, 1652, 4108*, 4878*
- CARBOHYDRATES
  - METABOLISM, 7630
- CELLS
  - MORPHOLOGY, 3868*
- CHOLESTEROL
  - SYNTHESIS, 5484
- COLON
  - PNEUMATOSIS, 3219*
- COMPLICATIONS
  - ARTHRITIS, 5650*
  - CYSTS, 5651*
  - FATTY LIVER, 7630
  - HEMOLYSIS, 4875*
  - INFLAMMATION, 8193*
  - LIVER CIRRHOSIS, 4876*
  - LIVER DISEASES, 4876*
  - LIVER INJURY, 4876*, 6293*, 6783*, 7637*
  - MALABSORPTION SYNDROMES, 7630
  - PNEUMATOSIS, 5651*
  - PSEUDO-OBSTRUCTION, 8192*
  - REVIEW, 7630
  - THERAPY, 6964
- DRUGS
  - ABSORPTION, 5673
- ENZYMES, 3868*
- FATS
  - METABOLISM, 7630
- GLUCOSE
  - ABSORPTION, 2315*
- HYPERLIPEMIA
  - MORPHOMETRY, 5692
  - THERAPY, 8217
- INTESTINE, SMALL
  - BIOCHEMISTRY, 6944
  - COMPLICATIONS, 3226

SHUNT, INTESTINAL (continued)
- INTESTINE, SMALL (continued)
  - HYPERTROPHY, 3888
  - LIVER FUNCTION TESTS, 4732
  - MORPHOLOGY, 6944, 8194*
  - MORPHOMETRY, 5692
  - OBESITY, 6944
  - PARENTERAL ALIMENTATION, 3888
  - PREGNANCY, 3226
- INTESTINES
  - METABOLISM, 3222*
  - PATHOLOGY, 3222*
  - PNEUMATOSIS, 3219*
- KIDNEY DISEASES
  - OXALATES, 4112
- LIPIDS
  - METABOLISM, 4894
- LIVER
  - CHOLESTEROL, 5484
  - LIPIDS, 623
  - METABOLISM, 404
  - MORPHOLOGY, 4106*
- LIVER FUNCTION TESTS, 6783*
- LIVER INJURY
  - AMINO ACIDS, 7637*
  - ETIOLOGY, 6783*
- NUTRITION DISORDERS
  - METABOLISM, 403
  - THERAPY, 403
- OBESITY, 1358, 1652, 4897, 5669, 5693, 8216
  - ABSORPTION, 4107*
  - ALKALINE PHOSPHATASE, 7625
  - AMINO ACIDS, 4874*, 5661
  - ARTHRITIS, 7629
  - BILE ACIDS AND SALTS, 4108*, 4878*
  - COMPLICATIONS, 405, 2316*, 3226, 4893, 4896, 5650*, 7629, 7630
  - DRUG METABOLISM, 5673
  - DRUGS, 5673
  - ELECTROLYTES, 4895
  - FATTY ACIDS, 444
  - IMMUNOLOGY, 6958
  - INTESTINE, SMALL, 5692
  - LIPIDS, 623, 4894
  - LIVER, 622, 2316*, 4106*
  - LIVER FUNCTION TESTS, 4106*, 4895, 6293*, 7625
  - METABOLISM, 404
  - MORPHOLOGY, 8098
  - PROGNOSIS, 5677, 7622
  - RADIOLOGY, 1359, 4873*
  - REVIEW, 2330
  - SECRETION, 1307
  - SEQUELAE, 2619
  - SURGERY, 7623, 7624
  - SURVIVAL, 4893, 6965
  - TECHNIQUES, 406, 4893, 5672
  - THERAPY, 6963, 7623, 7624, 7630
  - TUBERCULOSIS, 433
  - VILLI, 4107*
  - VITAMIN D, 3223*
- OXALATES
  - CALCULI, 8227*
  - RENAL FAILURE, 5689
- PANCREAS
  - SECRETION, 521
- PROTEINS
  - JEJUNUM, 2315*

SHUNT, INTESTINAL (continued)
- PROTEINS (continued)
  - METABOLISM, 7630
- PSEUDO-OBSTRUCTION
  - ETIOLOGY, 8192*
- PSYCHOLOGICAL FACTORS
  - THERAPY, 6964
- SERUM
  - ELECTROLYTES, 7625
- STOMACH
  - ACID SECRETION, 1307
  - SECRETION, 1307
- VILLI
  - MORPHOLOGY, 3868*
- VITAMIN D
  - CIRCULATION, 3223*

SIDEROSIS
- HEPATOCYTES
  - IRON, 8389*
- LIVER
  - ALCOHOLISM, 8389*

SIGMOID
- SEE ALSO COLON
- ANOMALY
  - FAMILIAL FACTORS, 8260
- COLON
  - ANOMALY, 8260
  - DUPLICATION, 8260
- DIVERTICULITIS, 6343
- DIVERTICULUM
  - RADIOLOGY, 7692
- DUPLICATION
  - FAMILIAL FACTORS, 8260
- ENTERECTOMY
  - COMPLICATIONS, 7686
- FISTULA
  - IATROGENESIS, 7713
  - UROGENITAL SYSTEM, 7705
- GASTROINTESTINAL SYSTEM
  - SURGERY, 8247
- ILEUM
  - FISTULA, 7898
- INFLAMMATION
  - CYTOLOGY, 8238
  - DIAGNOSIS, 8238
- INTESTINAL OBSTRUCTION
  - CONSTIPATION, 5724*
  - SURGERY, 5724*, 8240
  - THERAPY, 5724*
- INTUSSUSCEPTION
  - ETIOLOGY, 7708
  - NEOPLASMS, 7708
- MOTILITY
  - HYPERACTIVITY, 4927*
  - PRESSURE STUDY, 4927*
- NEOPLASMS, MALIGNANT
  - COMPLICATIONS, 7705
  - DRUG THERAPY, 7715
- PERFORATION
  - ENDOMETRIOSIS, 7001*
  - PREGNANCY, 7001*
  - UROGENITAL SYSTEM, 7705
- POLYPS
  - INFANT, 7710
- RECTUM
  - CONSTIPATION, 4927*
  - SURGERY, 8247

SIGMOID (continued)
- STRICTURE
  - NEOPLASMS, MALIGNANT, 499
- SURGERY
  - COMPLICATIONS, 7686
- WOUNDS AND INJURIES
  - IATROGENESIS, 7713

SIGMOIDITIS
- SURGERY, 8257

SJOGREN'S SYNDROME
- DIGESTION
  - SCLERODERMA, 3327*
- LIVER
  - AUTOIMMUNE DISEASES, 590
- PANCREAS
  - SECRETION, 3327*
- SALIVARY GLANDS
  - ETIOLOGY, 5953
  - PATHOLOGY, 5953
  - REVIEW, 5953
- SCLERODERMA
  - DISEASES ASSOCIATED WITH, 3556

SLEEP
- BILIARY TRACT
  - OBSTRUCTION, 2003
- DUODENUM
  - ULCER, 358*
- LIVER COMA
  - PORTACAVAL SHUNT, 6779*
- STOMACH
  - ACID SECRETION, 358*
- ULCER
  - ACIDITY, 5630
  - DUODENUM, 5630
  - STOMACH, 5630
- ULCER, PEPTIC
  - ACIDITY, 5630

SMALL INTESTINE
- SEE INTESTINE, SMALL

SMOKING
- DUODENUM
  - ULCER, 4092
- ESOPHAGUS
  - SPHINCTER, 4538
- HYDROGEN
  - BREATH TEST, 8136
- INTESTINE, SMALL
  - INFARCTION, 5656*
  - ISCHEMIA, 5656*
- SERUM
  - GASTRIN, 2308
  - SECRETIN, 2308
- STOMACH
  - ULCER, PEPTIC, 4847
- ULCER
  - DUODENUM, 2291
- ULCER, PEPTIC, 4092
  - GASTRIN, 2308
  - SECRETIN, 2308

SODIUM
- ABSORPTION
  - CIRCULATION, 4503*

SODIUM (continued)
- BILE
  - HORMONES, ADRENAL CORTEX, 1070
- BILE ACIDS AND SALTS
  - TRANSPORT, 908, 909
- BINDING
  - PSYCHOTOMIMETICS, 8088*
  - SUCRASE, 8088*
- CHOLERA
  - SECRETION, 1086*
  - TOXINS, 1086*
  - TRANSPORT, 1086*
- COLON
  - ABSORPTION, 4506*, 6816*
  - ION TRANSPORT, 6013
  - TRANSPORT, 3608*, 4505*, 4506*
- DEFICIENCY
  - ANTIBIOTICS, 6532*
  - DRUG THERAPY, 6532*
- DIARRHEA
  - ABSORPTION, 6816*
- DIURETICS
  - ELECTRICAL CONTROL, 1812
  - TRANSPORT, 1812
- GALLBLADDER
  - ION TRANSPORT, 1769*
- GASTROENTERITIS
  - CHILD, 5202
  - TRANSPORT, 2962*
- GASTROINTESTINAL SYSTEM
  - EXCRETION, 2095
- GLUCOSE
  - ELECTRICAL CONTROL, 1812
  - TRANSPORT, 1812
- ILEOSTOMY
  - ION TRANSPORT, 3224
- ILEUM
  - POTASSIUM, 6001*
  - SECRETION, 1086*
  - SULFATES, 2728
  - TRANSPORT, 32, 4507*, 6001*
- INTESTINE, SMALL
  - BINDING, 8088*
  - SECRETION, 2961*
  - SULFATES, 2728
  - TRANSPORT, 4507*, 4513, 6009
- INTESTINES
  - ABSORPTION, 3622, 4503*
- ION TRANSPORT
  - ILEUM, 5284*
  - JEJUNUM, 5284*
- JEJUNUM
  - ION TRANSPORT, 3607*
  - SECRETION, 2961*
  - SULFATES, 2728
  - TRANSPORT, 33, 5286*
- LIVER, 864
  - TRANSPORT, 5408*
- LIVER CIRRHOSIS
  - ASCITES, 3481*
  - CELLS, 4345
  - DEFICIENCY, 6532*
  - HORMONES, ADRENAL CORTEX, 715
  - HORMONE EFFECTS ON, 4345
  - RENIN, 5122*
- NUTRITION DISORDERS
  - CHILD, 5947
  - TRANSPORT, 5947

- SODIUM (continued)
  - STOMACH
    - SECRETION, 3678
  - TRANSPORT
    - DIURETICS, 883
    - JEJUNUM, 883
    - MEMBRANES, 18*

- SOLVENTS
  - CHOLELITHIASIS
    - DRUG THERAPY, 5144*, 5145*
  - COMMON BILE DUCT CALCULI
    - DRUG THERAPY, 5144*, 5145*
  - GALLSTONES
    - DRUG THERAPY, 5144*, 5145*
    - TECHNIQUES, 5920*
    - THERAPY, 5920*
  - ILEUM
    - MOTILITY, 7948
  - INTESTINE, SMALL
    - MOTILITY, 7948
  - LIVER
    - CYTOCHROMES, 5401*

- SOMATOSTATIN
  - ACID SECRETION
    - HORMONE EFFECTS ON, 1886*
    - PENTAGASTRIN, 1886*
  - ANTRUM, 4863
  - DUODENECTOMY
    - GASTRIN, 3225
  - DUODENUM, 3875, 4863
    - ULCER, 4863, 7519
  - ESOPHAGUS
    - HORMONE EFFECTS ON, 7936*
    - MOTILITY, 7936*
    - SPHINCTER, 1845, 7936*
  - FATS
    - METABOLISM, 5445*
  - GALLBLADDER
    - MOTILITY, 7375*
  - GASTROINTESTINAL SYSTEM
    - CELLS, 3744
    - FETUS, 814
  - GLUCAGON
    - IMMUNOLOGY, 3832*
  - HEMOSTASIS
    - MORPHOLOGY, 2995
  - INTESTINE, SMALL
    - ELECTROPHYSIOLOGY, 6711
  - INTESTINES
    - IMMUNOLOGY, 3832*
  - NEOPLASMS
    - STEATORRHEA, 5445*
  - PANCREAS
    - BICARBONATE SECRETION, 1949, 6060*
    - CELLS, 3744
    - SECRETIN, 1949, 6060*
    - SECRETION, 3038
  - PANCREATECTOMY
    - GASTRIN, 3225
  - PANCREATITIS
    - THERAPY, 2437
  - PANCREATITIS, CHRONIC
    - HYPOGLYCEMIA, 6378*
  - PITUITARY GLAND
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 5363*
  - PROTEINS
    - SYNTHESIS, 6768*

- SOMATOSTATIN (continued)
  - SERUM
    - TRIGLYCERIDES, 3038
  - STOMACH, 3660*, 3875, 4863
    - ACID SECRETION, 1886*, 1899, 3705, 5363*, 7375*
    - CIRCULATION, 7375*
    - MOTILITY, 66
    - SECRETION, 103
  - TRIGLYCERIDES
    - PANCREAS, 3038
  - ULCER
    - PREVENTION, 2108*
    - STRESS, 3706

- SPASM
  - COLON
    - DRUG THERAPY, 4721
  - ESOPHAGEAL DISEASES
    - CLASSIFICATION, 5567*
    - DRUG EFFECTS ON, 5567*
    - MANOMETRY, 5567*
    - PARASYMPATHOMIMETICS, 5567*
  - ESOPHAGUS
    - CHOLECYSTITIS, 4380
    - DIAGNOSIS, 4029
    - DRUG THERAPY, 1264*
    - FAMILIAL FACTORS, 2232
    - GASTRIN, 4031
    - NERVOUS CONTROL, 2225
    - NITRITES, 1264*
    - SPHINCTER, 8150
    - THERAPY, 4029

- SPHINCTER
  - ANESTHESIA
    - ESOPHAGUS, 5582
  - ANORECTUM
    - ACHALASIA, 3536
  - ANUS
    - DEFECATION, 861
    - INFLAMMATION, 4954
    - MANOMETRY, 5930*
    - MORPHOLOGY, 861
    - MOTILITY, 5930*
    - PARAPLEGIA, 5930*
    - PRESSURE STUDY, 5930*
    - SURGERY, 7033
  - COLON, 2746
  - COMMON BILE DUCT
    - CONTRACTION, 7234
    - PSEUDO-OBSTRUCTION, 7234
  - DISTENTION
    - NERVOUS CONTROL, 1838
  - ESOPHAGEAL REFLUX
    - ACHALASIA, 6205
    - PRESSURE STUDY, 4801
    - SURGERY, 6205
  - ESOPHAGITIS
    - PENTAGASTRIN, 1832*
    - PRESSURE STUDY, 1832*
  - ESOPHAGUS
    - ACIDITY, 1831*
    - AMINES, 6707
    - ANTIEMETICS, 2224*, 5327
    - ATROPINE, 1841
    - BARIUM, 914*
    - CHOLAGOGUES AND CHOLERETICS, 1830*
    - CHOLECYSTOKININ, 4519*

SPHINCTER (continued)
- ESOPHAGUS (continued)
  - CONTRACEPTIVES, ORAL, 1840
  - DEGLUTITION, 3643
  - DISTENTION, 1838
  - DRUG EFFECTS ON, 1829*, 1846, 2224*, 2749, 4538, 5309*, 6707
  - ELECTRICAL CONTROL, 1828*
  - ELECTROPHYSIOLOGY, 1837
  - ESOPHAGEAL REFLUX, 7358, 7554*
  - ESOPHAGITIS, 7554*
  - GASTRIN, 915*, 1832*, 1841, 2734*, 4396*, 4540, 5559*, 6709, 7936*
  - GLUCAGON, 1842
  - H1 RECEPTOR ANTAGONISTS, 1843, 2750
  - H2 RECEPTOR ANTAGONISTS, 929, 1829*, 2732*, 2750
  - HISTAMINE, 1843
  - HORMONE EFFECTS ON, 1830*, 4396*, 4522*, 6709, 7936*
  - IMMUNOLOGY, 5267
  - MANOMETRY, 1830*, 4523*, 4537, 5569, 7554*
  - MORPHOLOGY, 5268
  - MOTILIN, 1830*, 1831*, 2735*, 4522*
  - MOTILITY, 50, 927, 2731*, 2733*, 4449, 5309*
  - NERVOUS CONTROL, 930, 1839, 4519*, 6707
  - PARASYMPATHOMIMETICS, 4789*
  - PENTAGASTRIN, 1832*, 1844
  - PEPSINOGEN, 5267
  - PRESSURE STUDY, 1832*, 1837, 2224*, 2230, 2731*, 2733*, 2749, 3474*, 3625*, 4030, 4396*, 4518*, 4519*, 4521*, 4522*, 4523*, 4524*, 4537, 4538, 4539, 4550*, 4687, 4789*, 5309*, 5327, 5559*, 5569, 6031, 7936*
  - REFLUX, 51, 2229
  - SMOKING, 4538
  - SOMATOSTATIN, 1845, 7936*
  - SPASM, 8150
  - VAGOTOMY, 7574*
- GALLBLADDER
  - PRESSURE STUDY, 1866
- INFLAMMATORY BOWEL DISEASES
  - RECTUM, 5736
- MOTILITY
  - H2 RECEPTOR ANTAGONISTS, 929
- NERVOUS CONTROL
  - INTESTINES, 64
  - REVIEW, 64
- PRESSURE STUDY
  - ESOPHAGEAL REFLUX, 2230
- PYLORUS
  - ANTI-INFLAMMATORY AGENTS, 7329
  - DRUG EFFECTS ON, 7329
- RECTUM
  - SURGERY, 5736, 7041
- STOMACH
  - BARIUM, 914*
  - ELECTROPHYSIOLOGY, 6882
  - PATHOLOGY, 6882
  - PHYSICAL PROPERTIES, 6882

SPLEEN
- CIRCULATION
  - HORMONE EFFECTS ON, 4700*
  - HORMONES, GASTROINTESTINAL, 4700*

SPLEEN (continued)
- CYTOCHROMES
  - COBALT, 1012*
- ERYTHROCYTES
  - IMMUNOLOGY, 2985*
- GRANULOMA
  - TUBERCULOSIS, 589
- HYPERTENSION, PORTAL
  - ARTERIES, 6534*
  - SURGERY, 6534*, 6535*
- LIPIDS
  - DIETARY FACTORS, 4653
- LIVER DISEASES
  - ANTIGENS, 1011*
- MORPHOLOGY
  - DIETARY FACTORS, 4653
- PATHOLOGY
  - LEUKEMIA, 5036*
- SCANNING, SCINTILLATION
  - REVIEW, 8332
- TRANSPLANTATION, 3533
- WOUNDS AND INJURIES
  - DIAGNOSIS, 7530*
  - SCANNING, SCINTILLATION, 1215, 7530*

SPLENECTOMY
- DISEASES ASSOCIATED WITH, 7188
- HEME
  - METABOLISM, 8400*
- HYPERTENSION, PORTAL
  - HEME, 8400*

SPLENOMEGALY
- CROHN'S DISEASE
  - COMPLICATIONS, 6674*

SPLENORENAL SHUNT
- ESOPHAGUS
  - VARICES, 8158

SPRUE
- ABSORPTION
  - OXALATES, 5704*
- ANEMIA, PERNICIOUS
  - DIAGNOSIS, 4901*
- INTESTINE, SMALL
  - MORPHOLOGY, 4695
- MEGACOLON
  - DISEASES ASSOCIATED WITH, 2346*
- OXALATES
  - URINE, 4258*
- PARENTERAL ALIMENTATION
  - CHILD, 4866*
- TRANSPORT
  - OXALATES, 5704*

SPRUE, TROPICAL
- ANEMIA
  - EPIDEMIOLOGY, 4134*
- DIARRHEA
  - EPIDEMIOLOGY, 4134*
- ELECTROLYTES
  - TRANSPORT, 6982*
- ENVIRONMENTAL FACTORS, 4135
- EPIDEMIOLOGY
  - ENVIRONMENTAL FACTORS, 4134*
  - GEOGRAPHICAL FACTORS, 442

SPRUE, TROPICAL (continued)
- FOLIC ACID
  - ETIOLOGY, 443
  - METABOLISM, 443
- ION TRANSPORT, 6982*
- JEJUNUM
  - BIOPSY, 4133*
  - MORPHOLOGY, 4133*
- MALABSORPTION SYNDROMES
  - DISEASES ASSOCIATED WITH, 7644
- SOCIOECONOMIC FACTORS, 4135
- WATER
  - TRANSPORT, 6982*

STAPHYLOCOCCUS
- ENTEROTOXINS
  - FOOD, 804

STARCH
- AMYLASES
  - HYDROLYSIS, 6064
- DUODENUM
  - IRON, 1771*
- INTESTINE, SMALL
  - IRON, 1771*
- IRON
  - ABSORPTION, 1771*
- STOMACH
  - ULCER, 231

STARVATION
- AMYLASES
  - PANCREAS, 4595*
- BILE DUCTS
  - BILE ACIDS AND SALTS, 7394*
- CECUM
  - BILE ACIDS AND SALTS, 7394*
  - TRANSPORT, 1788
- CHOLECYSTECTOMY
  - BILE ACIDS AND SALTS, 7394*
- COLON
  - MITOSIS, 2986*
  - TRANSPORT, 1788
- FATTY ACIDS
  - LIVER, 1027
  - METABOLISM, 1027
- ILEUM
  - MITOSIS, 2986*
- INTESTINE, SMALL
  - BILE ACIDS AND SALTS, 7394*
- JEJUNUM
  - MITOSIS, 2986*
- LIVER
  - BILE ACIDS AND SALTS, 7394*
- TRANSPORT
  - CALCIUM, 1788

STASIS
- BILIARY TRACT
  - ETIOLOGY, 4651
- GALLBLADDER
  - ETIOLOGY, 4651
  - GALLSTONES, 1620
- GASES
  - VAGOTOMY, 6933
- STOMACH
  - DRUG THERAPY, 3145*
- VAGOTOMY
  - DRUG THERAPY, 3145*
  - STOMACH, 3145*

STASIS SYNDROME
- MALABSORPTION SYNDROMES
  - VITAMIN B12, 2367

STEATORRHEA
- BREATH TEST
  - TECHNIQUES, 5510*
- CARCINOID TUMOR, 4100*
- CELIAC DISEASE
  - AGE FACTORS, 6311*
  - DIAGNOSIS, 6311*
- DIAGNOSIS
  - BREATH TEST, 5510*
  - CHILD, 2197
- DRUG THERAPY
  - NEOPLASMS, MALIGNANT, 4911*
- ETIOLOGY
  - AGE FACTORS, 6311*
  - DIAGNOSIS, 6311*
- FECES
  - LIPIDS, 2197
- GASTRECTOMY
  - PANCREAS FUNCTION TESTS, 2288*
- GIARDIASIS
  - BACTERIA, 5242*
  - ETIOLOGY, 5242*
- INTESTINE, SMALL
  - GIARDIASIS, 3559
- LYMPHANGIECTASIS
  - ASCITES, 4105*
- MALABSORPTION SYNDROMES
  - BILE ACIDS AND SALTS, 3249*
- NEOPLASMS
  - CHOLECYSTOKININ, 5445*
  - PANCREOZYMIN, 5445*
  - SOMATOSTATIN, 5445*
- NEOPLASMS, MALIGNANT
  - THERAPY, 4911*
- PANCREATIC DISEASES
  - AGE FACTORS, 6311*
  - ETIOLOGY, 6311*
- THERAPY
  - DIET, 7074

STEATOSIS
- SEE FATTY LIVER

STENOSIS
- ABDOMEN
  - ARTERIES, 1707, 1708
- ARTERIES
  - ANGIOGRAPHY, 1209
  - LIVER, 1209
- BILIARY TRACT
  - SURGERY, 5153*
- COLITIS, ULCERATIVE
  - URINARY SYSTEM, 4967*
- COLON, 3352
  - COMPLICATIONS, 7709
  - DISEASES ASSOCIATED WITH, 4993
  - PANCREATITIS, 4993
- COMMON BILE DUCT
  - BILIARY TRACT, 5153*
  - COMPLICATIONS, 4017
  - IATROGENESIS, 8434*
  - THERAPY, 8434*
- ENDOSCOPY
  - TECHNIQUES, 7201*
  - THERAPY, 7201*

STENOSIS (continued)
- ENTEROCOLITIS, NECROTIZING
  - COLON, 2374
- ESOPHAGUS, 5584
  - BLEEDING, 7556
  - BURNS, CHEMICAL, 8152
  - DIAGNOSIS, 7556
  - DISEASES ASSOCIATED WITH, 7557
  - ELECTROLYTES, 8152
  - ETIOLOGY, 7556
  - POTASSIUM, 8152
  - SURGERY, 8151
  - ULCER, PEPTIC, 8151
- FAMILIAL FACTORS
  - ENVIRONMENTAL FACTORS, 3146*
- HIATAL HERNIA
  - SURGERY, 5584
- ILEUM
  - ENDOMETRIOSIS, 5653*
- INTESTINE, LARGE
  - ISCHEMIA, 5722*
- INTESTINE, SMALL
  - ISCHEMIA, 432
  - PATHOLOGY, 432
- NEONATE
  - INTESTINE, SMALL, 4867*
- ODDI'S SPHINCTER
  - DIAGNOSIS, 5774*
  - ENDOSCOPY, 5774*
  - SURGERY, 7838
- PANCREATITIS
  - COLON, 4223*
- PANCREATITIS, CHRONIC
  - COLON, 4223*
- PYLORUS
  - ACID SECRETION, 5593*
  - AMINO ACIDS, 4096
  - ANTIBIOTICS, 1310
  - ANTISPASMODICS, 241
  - BLOOD, 4096
  - DIAGNOSIS, 4741*
  - ENVIRONMENTAL FACTORS, 3146*
  - FAMILIAL FACTORS, 3146*
  - GASTRIN, 5593*
  - HYPERTROPHY, 4741*, 5619
  - INFANT, 1310, 3146*, 4815*, 6242
  - MOTILITY, 349
  - RADIOLOGY, 241
  - RECURRENCE, 3146*
  - SURGERY, 6242
  - TETANY, 6231
  - ULTRASOUND, 4741*
  - ULTRASTRUCTURE, 4815*
- VATER'S AMPULLA
  - ASCARIASIS, 7894
  - HORMONE EFFECTS ON, 2748
  - PANCREATIC DUCT, 4982

STEROIDS
- ABSORPTION
  - ANTACIDS, 7359
  - ENEMA, 509*
- ALBUMINS
  - HEPATECTOMY, 151
  - METABOLISM, 151
  - SYNTHESIS, 151
- ANDROGENS
  - LIVER, 129
  - METABOLISM, 129

STEROIDS (continued)
- ANDROGENS (continued)
  - NEONATE, 129
- BILE ACIDS AND SALTS
  - CIRCULATION, 1968*
- BILIARY TRACT
  - SECRETION, 3794
- BLOOD
  - SOUND, 970
- BURNS, CHEMICAL
  - THERAPY, 4724
- CHOLAGOGUES AND CHOLERETICS
  - METABOLISM, 2952
- CHOLESTASIS
  - PREGNANCY, 568
- CIRCADIAN RHYTHM
  - MICROSOMES, 1980
- COLITIS
  - ENEMA, 509*
- COLON
  - CROHN'S DISEASE, 8517
  - ION TRANSPORT, 7922
  - NEOPLASMS, 8234*
- CROHN'S DISEASE
  - DRUG THERAPY, 8517
- DIARRHEA
  - DRUG THERAPY, 2642
- DRUG METABOLISM
  - MICROSOMES, 1980
- DUODENUM
  - ULCER, PEPTIC, 7582
- ENTEROCOLITIS, NECROTIZING
  - DRUG-INDUCED, 483
- GASTROENTERITIS
  - CHILD, 669
- HEPATITIS
  - CHILD, 669
- INTESTINE, LARGE
  - ION TRANSPORT, 7922
- KETOSIS
  - CHILD, 669
- LIVER
  - AGE FACTORS, 125
  - ANDROGENS, 2950
  - CELL CULTURE, 1068
  - ENDOTOXINS, 6123
  - ENZYMES, 2030, 6807
  - ESTROGENS, 2950
  - FLUOROCARBONS, 1072
  - METABOLISM, 1067, 1072, 2950, 2952
  - MICROSOMES, 1980
  - PORPHYRINS, 7435*
- LIVER DISEASES
  - CHILD, 691
  - HYPERBILIRUBINEMIA, 5844
  - IMMUNOGLOBULINS, 691
  - THERAPY, 5844
- METABOLISM, 6527*
  - LIVER CIRRHOSIS, 6527*
- OXIDOREDUCTASES
  - ADRENAL GLANDS, 1651
  - LIVER, 1651
- PANCREAS
  - INFLAMMATION, 2427, 7736*
  - SECRETION, 2862
  - PROTEINS
    - PLASMA, 1107
  - RECTUM
    - CROHN'S DISEASE, 8517

STEROIDS (continued)
  RECTUM (continued)
    ELECTROPHYSIOLOGY, 2756
    ION TRANSPORT, 2756
  STOMACH
    ACID SECRETION, 92
  THERAPY
    COMPLICATIONS, 5844

STEROLS
  ABSORPTION
    DRUG EFFECTS ON, 3762*
  DIETARY FACTORS
    FATS, 7998*
  INTESTINES
    FECES, 3799
    MOTILITY, 3799
  METABOLISM
    DRUG EFFECTS ON, 3762*
    HEPATITIS, 6478*
  OBESITY
    SURGERY, 6942*
  PLASMA
    CHOLESTEROL, 6478*
    METABOLISM, 6478*
  SYNTHESIS
    DRUG EFFECTS ON, 3762*

STOMACH
  ABSCESS
    THERAPY, 1322
  ABSORPTION
    ALCOHOLS, 3623
    CARCINOGENS, 5336, 6022
    GLUCOSE, 3148
    H2 RECEPTOR ANTAGONISTS, 7357
    MARKER STUDY, 1772*
    POTASSIUM, 4502*
    RADIOISOTOPES, 5335
    TRACER STUDY, 5335
  ACHALASIA
    SURGERY, 303
  ACID SECRETION, 2818, 3675*, 3677, 3688, 4575, 4577, 4855, 6017, 7343*, 7360
    ACID PHOSPHATASE, 6039*
    ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2282*, 2800, 4567*, 6738, 7961*
    ADENYL CYCLASE, 4567*
    ALCOHOLS, 1913, 3664*
    AMINO ACIDS, 6055, 6740
    ANESTHESIA, 6049, 7962*
    ANTIDEPRESSIVE AGENTS, 5382
    ANTISPASMODICS, 102, 1145
    ANTRECTOMY, 5366*
    ANTRUM, 956, 1892
    ATROPINE, 1893, 2785*, 2787*, 5624*, 6729*, 7962*, 7967*, 8183
    BARIUM, 6731
    BILE, 7390*
    CALCIUM, 3669*, 5357*
    CATECHOLAMINES, 8171
    CELLS, 6738, 7978
    CHILD, 6176, 8171
    CHOLECYSTOKININ, 2794*
    CIRCULATION, 4572*
    DIETARY FACTORS, 87
    DISTENTION, 3682, 4579, 5369*

STOMACH (continued)
  ACID SECRETION (continued)
    DOPAMINE, 3740
    DRUG EFFECTS ON, 92, 2785*, 2786*, 2789*, 2792*, 2802, 2806, 2828, 3141*, 3740, 4068*, 4552*, 4557*, 4572*, 5624*, 6737, 6915*, 7345*, 7357, 7363, 7959*, 7962*, 7963*, 7966*, 8183
    DRUGS, 4088
    DUODENUM, 7600
    ENTERECTOMY, 5370*
    ENZYMES, 108, 4558*
    EPINEPHRINE, 8171
    EROSIONS, 365
    ESOPHAGEAL REFLUX, 7358
    FATS, 3696, 5358*, 7390*
    FEEDING, 92, 7364
    FOOD, 7968*
    GASTRIN, 1906, 1922, 4580, 5366*
    GLUCAGON, 1899, 2794*
    GLUCOSE, 3702, 6055, 6057
    H2 RECEPTOR ANTAGONISTS, 1881*, 1893, 1899, 2778, 2789*, 6048, 6283, 6915*, 7357, 7963*
    HEMORRHAGE, 5368*
    HISTAMINE, 106, 1906, 1908, 2778, 4567*, 5361*, 5366*, 6056, 7964*
    HISTOCHEMISTRY, 7978
    HORMONE CONTROL, 7342*
    HORMONE EFFECTS ON, 1886*, 2788*, 2794*, 2802, 3671*, 4580, 5363*, 5369*, 6727*, 6740, 6743, 7347*, 7375*, 7977
    HYPERGLYCEMIA, 4572*
    HYPOTHALAMUS, 106, 1896
    ILEUM, 5367*
    INFANT, 6038*
    INSULIN, 4862
    INTESTINE, SMALL, 5367*
    JEJUNUM, 5367*
    LYSOZYMES, 3710
    MORPHOMETRY, 7978
    MOTILIN, 7347*
    NERVOUS CONTROL, 71*, 2806, 3681, 3695, 4551*, 5364*, 5366*, 7342*, 7967*, 7968*
    NICOTINE, 7348*
    NOREPINEPHRINE, 7342*, 8171
    NUTRITION DISORDERS, 7873
    PAIN, 7980
    PARASYMPATHOLYTICS, 2789*, 6737
    PARASYMPATHOMIMETICS, 964
    PARENTERAL ALIMENTATION, 4551*
    PATHOLOGY, 365
    PENTAGASTRIN, 964, 965, 969, 2140, 2787*, 5369*, 6743, 7962*
    PEPSIN, 6044
    PEPTIDES, 969, 4549, 4592*
    PHOSPHODIESTERASES, 2800
    POTASSIUM, 4502*
    POUCH STUDY, 71*, 106, 4551*, 4571*
    PRIMATES, 958
    PROSTAGLANDINS, 98, 965, 966, 4582, 6727*, 7363
    PYLOROPLASTY, 7364
    REVIEW, 84, 957, 3616

STOMACH (continued)
- ACID SECRETION (continued)
  - SECRETAGOGUES, 1893, 1904, 1923, 3685, 4558*
  - SECRETIN, 2794*, 3671*
  - SECRETION, 6739
  - SEROTONIN, 4571*, 6729*
  - SHOCK, 5368*
  - SHUNT, INTESTINAL, 1307
  - SIMULATION, 1893, 1912
  - SLEEP, 358*
  - SOMATOSTATIN, 1886*, 1899, 3705, 5363*, 7375*
  - STEROIDS, 92
  - STRESS, 6052
  - SURGERY, 1912
  - TECHNIQUES, 1904, 2791*, 2798
  - THIOCYANATES, 2785*
  - THYROCALCITONIN, 2788*, 4559*
  - TRANQUILIZING AGENTS, 2272
  - TRANSPORT, 776
  - ULCER, 385
  - ULCER, PEPTIC, 365, 6261*
  - ULTRASTRUCTURE, 6039*
  - VAGOTOMY, 4854, 5624*, 6271, 6743, 7364, 7603
  - VASOPRESSIN, 4572*
- ACIDITY
  - ANESTHESIA, 6051
  - PREGNANCY, 6051
  - SURGERY, 1140, 2821
- ACIDS
  - DRUG EFFECTS ON, 3154
  - DUODENUM, 3140*
- ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
  - ADRENERGIC RECEPTOR AGONISTS, 6723*
  - ADRENERGIC RECEPTOR BLOCKADERS, 6723*
  - DRUG EFFECTS ON, 3707
  - METABOLISM, 3707
  - PROSTAGLANDINS, 2743*, 3707
  - SECRETIN, 3707
- ADENOSINE TRIPHOSPHATASE
  - ANTIBODIES, 1910
  - FEEDING, 108
  - HISTAMINE, 108
- ADENOSINE TRIPHOSPHATE, 2827
  - DRUG EFFECTS ON, 4557*
  - WOUNDS AND INJURIES, 1909
- ADENYL CYCLASE
  - DRUG EFFECTS ON, 3708
  - H2 RECEPTOR ANTAGONISTS, 1883*, 2790*
  - HISTAMINE, 1883*, 2790*, 5359*
  - PROSTAGLANDINS, 5359*
- AFFERENT LOOP SYNDROME
  - MOTILITY, 5322*
- ALCOHOLISM
  - MORPHOMETRY, 4488*
- ALCOHOLS, 3531
  - ABSORPTION, 5282*
  - HISTAMINE, 78*
- ALKALOIDS
  - TOXICOLOGY, 2148
- AMINO ACIDS
  - ACID SECRETION, 1901
  - GASTRIN, 1901
  - HORMONE EFFECTS ON, 952*

STOMACH (continued)
- AMINO ACIDS (continued)
  - METABOLISM, 4821
  - MOTILIN, 952*
  - PENTAGASTRIN, 952*
  - SECRETIN, 952*
- ANALGESICS AND ANTIPYRETICS
  - DRUG EFFECTS ON, 6045
  - WOUNDS AND INJURIES, 1884*
- ANEMIA, 4414
  - IRON, 325
  - PATHOLOGY, 325
- ANEMIA, PERNICIOUS
  - PATHOLOGY, 334
- ANESTHESIA
  - PRESSURE STUDY, 5582
- ANGIOGRAPHY
  - HEMORRHAGE, 2252
- ANOMALY
  - ENDOSCOPY, 1219, 7072
  - HEMORRHAGE, 344
  - HIATAL HERNIA, 2233
  - OBSTRUCTION, 1305
  - PANCREAS, 4977*
  - RADIOLOGY, 7072
  - SURGERY, 7072
- ANTACIDS
  - ENDOSCOPY, 7973
  - HYPERPLASIA, 1914
- ANTI-INFLAMMATORY AGENTS
  - MORPHOLOGY, 8164*
- ANTRECTOMY
  - ACID SECRETION, 2683*
  - ULTRASTRUCTURE, 2683*
- ANTRUM
  - GASTRIN, 3139*
  - ORGAN CULTURE, 4554*
- ARTERIES
  - PARASYMPATHOMIMETICS, 1139
- ASPIRIN
  - ABSORPTION, 1772*
  - ACIDITY, 1772*
  - ANALGESICS AND ANTIPYRETICS, 6045
  - DRUG EFFECTS ON, 1281*, 6045
  - DYSPLASIA, 1915
  - ENZYMES, 6042*
  - GLUCAGON, 2269
  - NUCLEOTIDES, 3663*
  - PHOSPHOLIPIDS, 3663*
  - TOXICITY, 1309
  - WOUNDS AND INJURIES, 1281*, 1877*, 1916
- BACTERIA
  - TEMPERATURE, 211
- BARIUM
  - COMPLICATIONS, 4761
  - PERITONITIS, 7039
  - PRESSURE STUDY, 914*
  - RADIOLOGY, 4761, 5536
  - SPHINCTER, 914*
  - TECHNIQUES, 2193
- BEZOARS, 6237
  - DIAGNOSIS, 347
  - JAUNDICE, OBSTRUCTIVE, 3159
  - THERAPY, 346
- BICARBONATE SECRETION
  - REVIEW, 3616

STOMACH (continued)
- BILE
  - MOTILITY, 1076
  - TOXICITY, 3701
- BILE ACIDS AND SALTS, 8104*
  - PATHOLOGY, 975
- BINDING
  - PROTEINS, 2782*
- BIOPSY
  - TECHNIQUES, 4817
- BLEEDING
  - ACIDS, 4564*
  - ANGIOGRAPHY, 8128
  - BILE ACIDS AND SALTS, 4564*
  - CLOTTING, 6146*
  - DIAGNOSIS, 3985, 8128
  - DRUG-INDUCED, 2141
  - ENDOSCOPY, 3985
  - EROSIONS, 82
  - HYPERALIMENTATION, 5502
  - INFANT, 8128
  - LASER, 6146*
  - PREVENTION, 5502
  - PROSTAGLANDINS, 4564*
  - STRESS, 343
  - THERAPY, 6146*, 6733
  - TISSUE ADHESIVES, 6733
- CALCIUM
  - ACID SECRETION, 3086
- CARBONIC ANHYDRASE
  - FEEDING, 108
  - HISTAMINE, 108
  - HISTOCHEMISTRY, 3588*
- CARBOXYLASES
  - H2 RECEPTOR ANTAGONISTS, 1881*
- CARCINOEMBRYONIC ANTIGEN, 6883
  - ESOPHAGUS, 5557*
  - NEOPLASMS, 5557*, 5588*
  - RADIOIMMUNOASSAY, 3935*
- CARCINOGENS
  - ULTRASTRUCTURE, 1298
- CARCINOID TUMOR
  - HORMONES, ADRENAL CORTEX, 2239
  - SURGERY, 2239
- CELLS
  - ACID SECRETION, 3685, 4552*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 3684, 3707
  - ALCOHOLISM, 4488*
  - CARBOHYDRATES, 2682*
  - DRUG EFFECTS ON, 4552*, 7959*
  - GASTRIN, 3687, 3720
  - HISTOCHEMISTRY, 2682*
  - MORPHOLOGY, 5262*, 5263*, 7905*
  - MORPHOMETRY, 3595
  - MUCUS, 7905*
  - OXYGEN, 3684
  - SECRETION, 7905*
  - STRESS, 4487*
  - ULTRASTRUCTURE, 2682*, 3595, 4487*, 5262*, 5263*, 7905*
- CERULEIN
  - ELECTROPHYSIOLOGY, 3632*
  - MANOMETRY, 3632*
- CHEMORECEPTORS
  - NEOPLASMS, 314*
- CHOLECYSTITIS
  - ION TRANSPORT, 754

STOMACH (continued)
- CHOLECYSTOKININ
  - ELECTROPHYSIOLOGY, 3632*
  - MANOMETRY, 3632*
  - RADIOIMMUNOASSAY, 2082, 3592
- CIRCULATION
  - ANTI-INFLAMMATORY AGENTS, 1880*
  - BILE ACIDS AND SALTS, 2807
  - CATECHOLAMINES, 976
  - CLEARANCE STUDY, 2139, 3892
  - ENDOTOXINS, 6006*
  - HEMORRHAGE, 4703*, 4704*, 5368*
  - HORMONE CONTROL, 7342*
  - HORMONE EFFECTS ON, 7347*, 7375*
  - HYPOXIA, 1141
  - MORPHOMETRY, 7901*
  - MOTILIN, 1898, 7347*
  - NERVOUS CONTROL, 976, 7342*
  - NOREPINEPHRINE, 7342*
  - PENTAGASTRIN, 965, 2140, 2991*
  - PRIMATES, 83
  - PROSTAGLANDINS, 2807
  - SECRETION, 83
  - SHOCK, 5368*
  - SOMATOSTATIN, 7375*
  - STRESS, 1141, 4703*
  - TECHNIQUES, 3003
  - VASOCONSTRICTOR AGENTS, 1142
- COMPLICATIONS
  - PREVENTION, 2275
- COMPUTERS
  - MORPHOLOGY, 242
- CONTRAST MEDIA
  - HEMORRHAGE, 1295
  - TECHNIQUES, 5552
- CROHN'S DISEASE, 4472*, 5604
  - COMPLICATIONS, 3932*
  - DUODENUM, 4473*
- CYSTS, 4813*
- CYTOCHROMES
  - MORPHOLOGY, 1911
- DIAGNOSIS
  - DIAPHRAGM, 2279
  - ULTRASONOGRAPHY, 4814*
- DIAPHRAGM
  - AGE FACTORS, 2279
  - HERNIA, 1304
- DIGESTION, 2796
  - PATHOLOGY, 6043
- DISTENTION
  - ACID SECRETION, 3673*, 5624*
  - COMPLICATIONS, 4841
  - GASTRIN, 7971
  - HYPERCHLORHYDRIA, 3673*
  - VAGOTOMY, 6933
- DIVERTICULUM
  - REVIEW, 4043*
- DRUG EFFECTS ON, 8104*
  - ACID SECRETION, 2787*
  - ASPIRIN, 2786*
  - H2 RECEPTOR ANTAGONISTS, 2806, 7360
  - SALICYLATES, 2786*
  - SECRETIN, 3209
- DRUGS
  - COMPLICATIONS, 1918
  - EROSIONS, 1918
- DUODENUM
  - FISTULA, 351

STOMACH (continued)

- DUODENUM (continued)
    - HETEROTOPIA, 1375
    - MUCOPOLYSACCHARIDES, 375
    - REFLUX, 2278
    - SECRETION, 1751*
    - ULCER, PEPTIC, 356*
    - WOUNDS AND INJURIES, 2107*
- DYSPEPSIA
    - BARIUM, 6260
    - CONTRAST MEDIA, 6260
    - ENDOSCOPY, 6260
    - ULCER, 2610
- DYSTROPHY, 6843
    - DRUG THERAPY, 3893
    - SIMULATION, 3893
- ELECTRICAL CONTROL
    - ACIDS, 1862
    - ANALGESICS AND ANTIPYRETICS, 1884*
    - BICARBONATES, 1862
    - DRUG EFFECTS ON, 1884*
    - GLUCAGON, 1864
    - PENTAGASTRIN, 1862, 1864
    - PROSTAGLANDINS, 1865
- ELECTROLYTES
    - DRUG EFFECTS ON, 3154
    - REVIEW, 3616
- ELECTROPHYSIOLOGY, 3138*
    - ACID SECRETION, 5325*
    - ACIDS, 7940*
    - ANALGESICS AND ANTIPYRETICS, 6552*, 7333
    - ANESTHESIA, 6552*
    - ANESTHETICS, 7315
    - ANOXIA, 2992*
    - ANTIEMETICS, 47*
    - ASPIRIN, 3699, 7333, 7334
    - BICARBONATES, 3699
    - CALCIUM, 5306*
    - CHOLECYSTECTOMY, 6552*
    - DRUG EFFECTS ON, 2761, 2786*, 3699, 7315, 7333, 7334
    - DUODENUM, 3004, 7940*
    - FATS, 7940*
    - FOOD, 3636*
    - GLUCAGON, 3636*
    - GLUCOSE, 7940*
    - H2 RECEPTOR ANTAGONISTS, 7334
    - HORMONE CONTROL, 1895
    - MOTILIN, 944
    - MOTILITY, 1833*
    - PHOSPHOLIPIDS, 6726*
    - PROSTAGLANDINS, 2807
    - SURGERY, 5190
    - TECHNIQUES, 3991
    - ULCER, PEPTIC, 6909
    - VAGOTOMY, 2765, 3636*, 5324*, 6909
- EMBOLIZATION
    - BLEEDING, 2255
- ENDOCRINE GLANDS
    - ULTRASTRUCTURE, 10
- ENDOCRINE SYSTEM
    - DISEASE, 6036
    - HORMONES, GASTROINTESTINAL, 6036
    - REVIEW, 6036
- ENDOSCOPY, 237, 6174
    - ANEMIA, PERNICIOUS, 6173
    - BACTERIAL INFECTIONS, 4388*
    - BIOPSY, 3040*, 4817

STOMACH (continued)

- ENDOSCOPY (continued)
    - CHILD, 1237
    - COMPLICATIONS, 3053, 3931*, 3984, 4388*, 4760, 6158
    - CONTRAST MEDIA, 6859
    - DIAGNOSIS, 3079
    - NEOPLASMS, 3992
    - POLYPS, 3992
    - SEPSIS, 4388*
    - SURVIVAL, 3053
    - TECHNIQUES, 3040*, 5221
    - THERAPY, 4027
- ENTERITIS, REGIONAL
    - CROHN'S DISEASE, 4473*
    - DUODENUM, 4473*
- ENZYMES, 3666, 3683
    - ALCOHOLS, 3665*
    - CARBONIC ANHYDRASE, 3588*
    - CHILD, 621
    - DRUG EFFECTS ON, 3665*
- EPITHELIUM
    - ANTACIDS, 7346*
    - AUTORADIOGRAPHY, 1102*
    - ELECTROPHYSIOLOGY, 9
    - HISTOCHEMISTRY, 954
    - ION TRANSPORT, 949*
    - KINETICS, 1102*
    - MITOSIS, 1102*, 3008
    - NERVOUS CONTROL, 9
    - PENTAGASTRIN, 1343*
    - SECRETION, 949*
    - STRESS, 1763
    - WOUNDS AND INJURIES, 1751*, 2269
- EROSIONS
    - ASPIRIN, 1315, 2144
    - BILE ACIDS AND SALTS, 2807
    - DRUG-INDUCED, 1497
    - DUODENUM, 6844
    - ENDOSCOPY, 4812*
    - HEALING, 1315
    - POLYPS, 2259
    - PREGNANCY, 3009
    - PROSTAGLANDINS, 2807
    - PSYCHOLOGICAL FACTORS, 2817
    - RADIOLOGY, 4812*
    - SIMULATION, 2817
    - STRESS, 1317, 1919
    - THERAPY, 4812*
    - ULTRASTRUCTURE, 1315
    - VAGOTOMY, 4812*
- ESCHERICHIA COLI
    - MORPHOLOGY, 2685*
    - ULTRASTRUCTURE, 2685*
- ESOPHAGEAL REFLUX
    - CHILD, 4801
- ESOPHAGUS
    - ANOMALY, 4797
    - BEZOARS, 2235
    - CIRCULATION, 7901*
    - ENDOSCOPY, 3931*
    - MUSCULOSKELETAL SYSTEM, 7
    - NEOPLASMS, MALIGNANT, 5575
    - REFLUX, 51, 2223*
    - SURGERY, 1272, 5575
    - SURVIVAL, 5575
- ESOPHAGUS, ARTIFICIAL
    - CIRCULATION, 3873

STOMACH (continued)
- FEEDING
  - ACID SECRETION, 374
- FETUS, 866
- FISSURE
  - ATRESIA, 7015
- FISTULA, 7584
  - ACID SECRETION, 1901, 5501, 6040*, 6058
  - GASTRIN, 1901, 6040*
  - PROSTAGLANDINS, 951*
- GALLBLADDER
  - FISTULA, 1628
- GASES
  - ANALYSIS, 1290
  - DISTENTION, 6933
  - HEMORRHAGE, 3895
  - SHOCK, 3895
- GASTRECTOMY
  - ELECTROPHYSIOLOGY, 2763
  - ENDOSCOPY, 5601
- GASTRIN
  - ACID SECRETION, 1232
  - ACIDS, 3140*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 4556*
  - ATROPINE, 7967*
  - CELLS, 3593, 4496
  - EPINEPHRINE, 7972
  - ESOPHAGITIS, 5177*
  - FEEDING, 7364
  - GASTRITIS, 5177*
  - GASTROINTESTINAL DISEASES, 5177*
  - GROWTH FACTORS, 2115
  - GUANOSINE CYCLIC 3',5' MONOPHOSPHATE, 4556*
  - HEMODIALYSIS, 4047*
  - HYPERPLASIA, 1236
  - INSULIN, 4862
  - NEOPLASMS, 1236
  - NEOPLASMS, MALIGNANT, 2602
  - NERVOUS CONTROL, 1897, 3660*, 7967*
  - PATHOLOGY, 323
  - PYLOROPLASTY, 7364
  - RADIOIMMUNOASSAY, 3592
  - SECRETION, 1236
  - SYNTHESIS, 7972
  - THYROCALCITONIN, 4559*
  - ULCER, 2602
  - ULCER, PEPTIC, 6261*
  - VAGOTOMY, 3594, 4074*, 7364
  - ZOLLINGER-ELLISON SYNDROME, 5177*
- GASTRITIS
  - EMPHYSEMA, 1257
- GASTROINTESTINAL DISEASES
  - ENDOSCOPY, 244
  - HORMONES, GASTROINTESTINAL, 6685
- GLUCAGON
  - CELLS, 2684*
  - ELECTROPHYSIOLOGY, 4536
  - SURGERY, 190
  - ULTRASTRUCTURE, 4536
- GLUCOSE
  - OSMOTIC PRESSURE, 4568*
- GLUTAMINE
  - WOUNDS AND INJURIES, 2270
- GLYCEROGLUCOLIPIDS
  - CHROMATOGRAPHY, 3661*

STOMACH (continued)
- GLYCOLIPIDS, 6725*
  - CHEMICAL COMPOSITION, 7351*
  - CHROMATOGRAPHY, 1887, 3661*
  - HAPTENS, 7356
  - ISOLATION, 7351*
- GLYCOPROTEINS
  - DRUG EFFECTS ON, 2792*
  - DRUGS, 89
  - RADIOIMMUNOASSAY, 3935*
  - SYNTHESIS, 89
- GLYCOSIDES
  - METABOLISM, 3599*
- GRANULOMA
  - DIAGNOSIS, 6585*
- GUANOSINE CYCLIC 3',5' MONOPHOSPHATE
  - ADRENERGIC RECEPTOR AGONISTS, 6723*
  - ADRENERGIC RECEPTOR BLOCKADERS, 6723*
  - PROSTAGLANDINS, 2743*
- GUANYL CYCLASE
  - ALCOHOLS, 7338*
- H1 RECEPTOR ANTAGONISTS
  - PATHOLOGY, 975
- H2 RECEPTOR ANTAGONISTS
  - ELECTROPHYSIOLOGY, 91
  - PATHOLOGY, 975
  - REVIEW, 7357
  - SECRETION, 2784*
- HAMARTOMA
  - CHILD, 1301
  - REVIEW, 1301
- HEALING
  - DRUG EFFECTS ON, 4729
  - MORPHOLOGY, 7960*
  - NOREPINEPHRINE, 4729
  - ULTRASTRUCTURE, 7960*
- HEMATOPOIESIS
  - DIAGNOSIS, 2251
- HEMODIALYSIS
  - ACID SECRETION, 4047*
- HEMOGLOBINS
  - TECHNIQUES, 3995
- HEMORRHAGE
  - BURNS, 5229
  - DIAGNOSIS, 6897
  - DISEASES ASSOCIATED WITH, 4453
  - DRUG-INDUCED, 3547
  - ENDOSCOPY, 4757, 6897
  - ETIOLOGY, 3213, 3546
  - RADIOLOGY, 4757
  - SURGERY, 3213
  - THERAPY, 5228, 5942
- HERNIA
  - OBSTRUCTION, 1306
  - UROGENITAL SYSTEM, 5611
- HIATAL HERNIA
  - ACID SECRETION, 8146*
- HISTAMINE, 4855
  - ACID SECRETION, 973
  - AGE FACTORS, 3704
  - DRUG EFFECTS ON, 5360*
  - H2 RECEPTOR ANTAGONISTS, 1881*, 2790*
  - METABOLISM, 3704
  - PATHOLOGY, 975
  - SECRETION, 1907
  - ULCER, PEPTIC, 3193*

STOMACH (continued)
- HISTOCHEMISTRY, 3683
- HODGKIN'S DISEASE, 6236, 6889
- HORMONES
  - ELECTROPHYSIOLOGY, 206
  - ENZYMES, 205
  - MORPHOLOGY, 1888
  - PEPTIDES, 1144
  - PYROGENS, 205
  - REVIEW, 1144
  - SECRETIN, 3672*
- HORMONES, GASTROINTESTINAL
  - DRUG EFFECTS ON, 3738
  - FATS, 3696
  - NERVOUS CONTROL, 1897
- HYPERCHLORHYDRIA
  - CALCIUM, 3669*
- HYPERPLASIA
  - SURGERY, 860
- HYPERTROPHY
  - MORPHOLOGY, 2234
- HYPOTHALAMUS
  - ACID SECRETION, 2781*
  - PATHOLOGY, 2822
- ILEUM
  - HETEROTOPIA, 424
- INFLAMMATION
  - ASPIRIN, 2143
  - DUODENUM, 354
  - EOSINOPHILS, 6235
  - SIMULATION, 2143
- INTESTINAL OBSTRUCTION
  - HIATAL HERNIA, 5562*
- INTESTINE, SMALL
  - SURGERY, 2965*
- INTESTINES
  - FEEDING, 1137
- INTRINSIC FACTOR, 7495*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 3711
  - NUCLEOTIDES, 3711
  - PARASYMPATHOMIMETICS, 964
  - PENTAGASTRIN, 964
  - VITAMIN B12, 963
- ION TRANSPORT, 1871*, 6017, 7354, 7928
  - ACID-BASE BALANCE, 1875*
  - ACIDITY, 4570*
  - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 1907
  - ALCOHOLS, 36
  - ANALGESICS AND ANTIPYRETICS, 1884*
  - ANESTHETICS, 7315
  - BILE ACIDS AND SALTS, 974
  - DRUG EFFECTS ON, 1884*, 7315
  - ENDOTOXINS, 6006*
  - ENZYMES, 1768*
  - H2 RECEPTOR ANTAGONISTS, 974
  - HISTAMINE, 974
  - LIVER CIRRHOSIS, 1551*
  - PERMEABILITY, 1551*
  - SECRETION, 949*, 1907
  - WOUNDS AND INJURIES, 1551*
- IRON
  - DEFICIENCY, 7909
- ISCHEMIA
  - ELECTROPHYSIOLOGY, 4569*
  - PATHOLOGY, 4720
- KIDNEYS
  - DISEASE, 8172

STOMACH (continued)
- LACTATES
  - METABOLISM, 7339*
  - SYNTHESIS, 7339*
- LIVER CIRRHOSIS
  - ACID SECRETION, 5128*
  - MORPHOLOGY, 5128*
  - ULCER, 5130*
- LYMPH
  - DRAINAGE, 7365
- LYMPHATIC SYSTEM, 7365
  - HYPERPLASIA, 1330
- LYMPHOMA
  - DIAGNOSIS, 5590*
  - ENDOSCOPY, 4041*
  - NEOPLASMS, 5590*
  - PROGNOSIS, 5591*
  - RADIOLOGY, 5590*
- LYMPHOSARCOMA
  - RADIOLOGY, 2241
- METABOLISM
  - CARBOHYDRATES, 6264
  - HISTAMINE, 3707
  - OSMOTIC PRESSURE, 4568*
- MITOCHONDRIA
  - DRUG EFFECTS ON, 7981
  - OXIDATIVE PHOSPHORYLATION, 1879*
- MITOSIS, 4495, 4576
  - ADRENALECTOMY, 3008
  - DRUG EFFECTS ON, 3008
  - HORMONES, ADRENAL CORTEX, 3008
- MORPHOLOGY, 7909
  - ACID SECRETION, 8169
  - ANALGESICS AND ANTIPYRETICS, 6884
  - ANTI-INFLAMMATORY AGENTS, 6724*
  - ANTIHYPERTENSIVE AGENTS, 3713
  - ASPIRIN, 6884
  - DRUG EFFECTS ON, 3713, 6884, 7959*
  - FETUS, 3002
  - HEMODIALYSIS, 8172
  - INFANT, 3002
  - MOTILITY, 1833*
  - NEONATE, 3002
  - PHOSPHOLIPIDS, 6726*
  - ULCER, PEPTIC, 6262*, 8165*
  - VAGOTOMY, 6262*
- MORPHOMETRY
  - ULCER, PEPTIC, 7599
- MOTILIN, 2761
  - SYNTHESIS, 1143
- MOTILITY, 3677, 4531*
  - ACIDS, 81, 3630*, 7940*
  - AMINO ACIDS, 941, 2744*, 3630*, 3631*, 3653, 7940*
  - ANALGESICS AND ANTIPYRETICS, 6552*
  - ANESTHESIA, 6552*
  - ANTI-INFLAMMATORY AGENTS, 7329
  - ANTIEMETICS, 47*, 3633*, 5309*
  - APPENDICITIS, 326
  - ASPIRIN, 2730*
  - BARIUM, 7953
  - CALCIUM, 5306*
  - CERULEIN, 6027
  - CHOLECYSTECTOMY, 6552*
  - CHOLECYSTOKININ, 67, 3648
  - DIABETES, 6224*
  - DIET, 2770
  - DIETARY FACTORS, 81, 2768, 2770

STOMACH (continued)

- MOTILITY (continued)
  - DRUG EFFECTS ON, 2730*, 2761, 3209, 3633*, 5309*, 5323*, 5331, 5332, 7329, 7945, 7949, 7953
  - DRUGS, 4088
  - DUMPING SYNDROME, 4059
  - DUODENUM, 58, 7940*
  - ELECTROPHYSIOLOGY, 68, 920, 3644, 4541, 5190, 7333, 7334
  - ESOPHAGUS, ARTIFICIAL, 295
  - FATS, 3630*, 3647, 7940*
  - FEEDING, 1137
  - FOOD, 7330
  - GASTRECTOMY, 6908, 7593, 7601
  - GASTRIN, 3645
  - GLUCAGON, 67, 3648
  - GLUCOSE, 940, 7940*
  - HORMONE EFFECTS ON, 3645, 3648, 6027
  - HORMONES, 922
  - HORMONES, GASTROINTESTINAL, 3648
  - HYPOXIA, 2771
  - INSULIN, 3645
  - INTESTINE, SMALL, 3631*
  - LIPIDS, 940
  - MARKER STUDY, 248, 2768, 2770, 6224*
  - MORPHOMETRY, 3990
  - MOTILIN, 66
  - NERVOUS CONTROL, 57, 942, 1833*, 1860, 3630*, 3635*, 3695, 6698*, 7332
  - OSMOTIC PRESSURE, 941
  - OXYGEN, 2771
  - PANCREOZYMIN, 3648
  - PARASITES AND PARASITIC DISEASES, 8162*
  - PARASYMPATHOLYTICS, 922
  - PEPTIDES, 4534
  - PHYSIOLOGY, 3990
  - POSTURAL FACTORS, 2276
  - POTASSIUM, 7949
  - PRESSURE STUDY, 1861, 5309*, 7331
  - PRIMATES, 5321*
  - PROSTAGLANDINS, 2743*
  - PROTEINS, 3653
  - RADIOISOTOPES, 3629*
  - RADIOLOGY, 6869
  - REVIEW, 57, 2275, 3990
  - SECRETIN, 67, 3648
  - SOMATOSTATIN, 66
  - STRESS, 6835*
  - SURGERY, 2275, 2764, 6908, 7593
  - TECHNIQUES, 63, 2791*, 3936*, 5319*, 5320*
  - TEMPERATURE, 3634*
  - TRACER STUDY, 63
  - ULCER, PEPTIC, 5319*, 6909
  - VAGOTOMY, 1148, 5324*, 6909, 7322*, 7593, 7940*
  - VASODILATOR AGENTS, 7949
- MUCOPOLYSACCHARIDES
  - DYSPEPSIA, 375
  - ULCER, 375
- MUCUS, 4494
  - AMINO ACIDS, 4566*
  - CARBOHYDRATES, 4566*
  - DRUG EFFECTS ON, 4859

STOMACH (continued)

- MUCUS (continued)
  - KININS, 7355
- MUSCLES
  - CALCIUM, 5306*
  - CELLS, 2692
  - NEOPLASMS, 5223
  - NEOPLASMS, BENIGN, 5223
  - NEOPLASMS, MALIGNANT, 5223
  - NERVOUS CONTROL, 7910
  - ULTRASTRUCTURE, 2692
- MYCOSES, 8173
  - DIAGNOSIS, 3183
  - THERAPY, 3183
- NEONATE
  - RUPTURE, 2262
- NEOPLASM METASTASIS, 8177, 8178
  - DIAGNOSIS, 2242, 6890
  - DRUG THERAPY, 6249
  - MORPHOLOGY, 3129
  - RECURRENCE, 1283*
  - SURGERY, 1283*
  - SURVIVAL, 6252
  - THERAPY, 3129
- NEOPLASMS, 4409, 6244
  - ALPHA FETOPROTEIN, 4803*, 7089*
  - ANEMIA, 3992
  - BIOPSY, 3149, 3156
  - BLOOD, 4055
  - CALCIFICATION, 332
  - CERULOPLASMIN, 5613
  - COPPER, 5613
  - CYTOLOGY, 4065
  - DIAGNOSIS, 330, 3060, 3079, 3081, 3084, 3149, 3156, 4039*, 4054, 4814*, 7568*
  - DIETARY FACTORS, 5600
  - DRUG THERAPY, 6248, 6877*
  - ENDOSCOPY, 1235, 2222, 3149, 3156, 4054, 4807*
  - ENZYMES, 4055
  - EPIDEMIOLOGY, 5600, 7567*
  - ETHNIC FACTORS, 7567*
  - ETIOLOGY, 6881
  - FOOD, 6881
  - GASTRECTOMY, 5597*
  - HIATAL HERNIA, 5573
  - IMMUNOTHERAPY, 6877*
  - KINETICS, 6876*
  - METAPLASIA, 4740*
  - MITOSIS, 6876*
  - NITRATES, 2626
  - NITRITES, 2626, 6881
  - NUTRITION, 5600
  - PATHOLOGY, 4052
  - POLLUTION, 5600
  - PROLAPSE, 3165
  - RADIOLOGY, 330, 2222, 3165, 4977*, 5590*
  - RECURRENCE, 1283*, 6252
  - SCANNING, SCINTILLATION, 3084
  - STRICTURE, 5573
  - SURGERY, 1283*, 3165, 6248, 6252
  - SURVIVAL, 6252, 6877*
  - TECHNIQUES, 1235
  - ULTRASTRUCTURE, 1298
- NEOPLASMS, BENIGN, 4823, 6238
  - CYTOLOGY, 4065
  - DIAGNOSIS, 4039*, 8179

- STOMACH (continued)
  - NEOPLASMS, BENIGN (continued)
    - ENDOSCOPY, 2410*
    - GASTRECTOMY, 5606
    - GASTRIN, 4102*
    - RADIOLOGY, 1325, 2410*
    - SIMULATION, 2410*
    - THERAPY, 8179
  - NEOPLASMS, MALIGNANT, 3129, 4824, 5605, 6886, 6888, 8177, 8178
    - AMINO ACIDS, 4821
    - AMYLOIDOSIS, 5232
    - ANGIOGRAPHY, 3082
    - ANTIBODIES, 5589*
    - ANTIGENS, 5589*
    - BIOCHEMISTRY, 6256
    - BIOPSY, 245, 5587*, 8174, 8175
    - CELLS, 6875*
    - CYTOLOGY, 4065, 5587*
    - DIAGNOSIS, 1297, 3082, 3160, 3161, 4806*, 4808*, 5587*, 6234, 6887, 7573*, 8174, 8175
    - DISEASES ASSOCIATED WITH, 4822, 5232
    - DRUG THERAPY, 328, 3168
    - ENDOSCOPY, 245, 3040*, 3160, 6887, 6901, 8174, 8175
    - ENVIRONMENTAL FACTORS, 335
    - EPIDEMIOLOGY, 334
    - GASTRECTOMY, 3168
    - IMMUNOLOGY, 4806*, 5589*
    - ION TRANSPORT, 8176
    - IRRADIATION, 328
    - METAPLASIA, 5621
    - MORPHOLOGY, 3163
    - NEOPLASM METASTASIS, 329
    - NITROSAMINES, 335
    - PATHOLOGY, 4053, 6901
    - PRECANCEROUS CONDITIONS, 329, 352
    - PROGNOSIS, 3167, 5575, 6901
    - PROLAPSE, 4040*
    - RADIOLOGY, 327, 3161, 8174
    - RADIOTHERAPY, 5575
    - SECRETION, 6256
    - SEQUELAE, 1299
    - SURGERY, 329, 1299, 3163, 5575
    - SURVIVAL, 331, 5575
    - ULTRASTRUCTURE, 6256, 6875*
  - NERVOUS CONTROL
    - ADRENERGIC RECEPTOR BLOCKADERS, 5326
    - CHOLELITHIASIS, 3501*
    - DUODENUM, 3004
    - PATHOLOGY, 2822
    - ULTRASTRUCTURE, 7910
  - NERVOUS SYSTEM
    - REVIEW, 5227
  - NUCLEOTIDES
    - PROSTAGLANDINS, 2743*
  - OBESITY
    - SHUNT, 1308, 5693
    - SURGERY, 2273
  - OBSTRUCTION
    - AGE FACTORS, 2279
    - DIAGNOSIS, 2279
  - ORGAN CULTURE, 866
  - OXIDATION
    - GLUCOSE, 4568*

- STOMACH (continued)
  - OXYGEN
    - ELECTROPHYSIOLOGY, 3006
    - ISCHEMIA, 3006
    - METABOLISM, 1894
    - SECRETAGOGUES, 1894
    - WOUNDS AND INJURIES, 1909
  - PANCREAS
    - CHILD, 5191
    - ECTOPIA, 3157
  - PANCREATIC DISEASES
    - SECRETION, 2415*
  - PANCREOZYMIN
    - ELECTROPHYSIOLOGY, 3632*
    - MANOMETRY, 3632*
  - PARASITES AND PARASITIC DISEASES
    - GASTRIN, 2829
  - PATHOLOGY
    - ANEMIA, PERNICIOUS, 8492
    - BURNS, 1318
    - DISEASES ASSOCIATED WITH, 5221
  - PENTAGASTRIN
    - METABOLISM, 2773*
    - NITRITES, 3085
    - SECRETION, 384, 3085
    - THIOCYANATES, 3085
    - TRACER STUDY, 2991*
  - PEPSIN
    - ANTIDEPRESSIVE AGENTS, 5382
    - ATROPINE, 6729*
    - DRUG EFFECTS ON, 2792*, 5382
    - GASTRIN, 1922
    - PARASYMPATHOMIMETICS, 964
    - PENTAGASTRIN, 964
    - SECRETAGOGUES, 1904, 1923
    - SECRETIN, 79*
    - SEROTONIN, 6729*
    - TECHNIQUES, 1904
    - ULCER, 385
  - PEPSINOGEN
    - IMMUNOLOGY, 6741
    - NEOPLASMS, 1324
    - SYNTHESIS, 1324
  - PEPTIDES
    - ACID SECRETION, 947
  - PERFORATION, 7584
    - COMPLICATIONS, 7621
    - FOREIGN BODIES, 7621
    - SURGERY, 7621
    - SURVIVAL, 5212
  - PERFUSION
    - BLOOD, 47*
  - PERMEABILITY, 1871*, 2713
    - ACIDS, 955
    - ANTI-INFLAMMATORY AGENTS, 1880*
    - ASPIRIN, 1916
    - BILE ACIDS AND SALTS, 35, 37
    - BURNS, 1318
    - CIRCULATION, 35
    - REVIEW, 955
  - PHOSPHATES, 2827
  - PHYSIOLOGY
    - REVIEW, 6259
  - PNEUMATOSIS
    - CYSTS, 1257
    - EMPHYSEMA, 1257
    - HERNIA, 8163*
  - POLYPS, 348, 3314, 6229
    - AMINO ACIDS, 4821

- STOMACH (continued)
  - POLYPS (continued)
    - ANEMIA, 3541, 3992
    - ANEMIA, PERNICIOUS, 3144*
    - CARCINOID TUMOR, 4042*
    - CLASSIFICATION, 4813*
    - CRONKHITE-CANADA SYNDROME, 6241
    - ENDOSCOPY, 2399
    - GASTRIN, 3541
    - PATHOLOGY, 334
    - RADIOLOGY, 2260
    - SURGERY, 2399, 3185
  - PORTACAVAL SHUNT
    - ACID SECRETION, 1905
  - PRECANCEROUS CONDITIONS
    - BIOPSY, 5602
    - ENDOSCOPY, 2222
    - RADIOLOGY, 2222
    - ULTRASTRUCTURE, 1298
  - PRESSURE STUDY, 911*
  - PROLAPSE
    - COMPLICATIONS, 3166
    - RADIOLOGY, 3166
  - PROSTAGLANDINS, 8104*
    - ABSORPTION, 4562*
    - ACID SECRETION, 99, 4562*
    - ADENYL CYCLASE, 1925
    - FATTY ACIDS, 101
    - METABOLISM, 4562*
    - OSMOLARITY, 5362*
    - OSMOTIC PRESSURE, 1924
    - SECRETION, 1924, 5362*
    - SYNTHESIS, 4561*, 5362*
  - PROTEINS
    - DRUG EFFECTS ON, 3154
    - ENZYMES, 94
    - NEOPLASMS, 1324
    - SYNTHESIS, 952*, 1324
  - PYLOROPLASTY
    - SECRETION, 1332
  - RADIATION EFFECTS ON, 3005
  - RADIOIMMUNOASSAY
    - NEOPLASMS, 3935*
  - RADIOISOTOPES
    - TECHNIQUES, 3629*
  - RADIOLOGY, 6227*
    - BARIUM, 6829*
    - BILIARY TRACT DISEASES, 6169
    - HERNIA, 3184
    - INTESTINAL OBSTRUCTION, 3184
    - MORPHOLOGY, 1319
    - PANCREAS, 2179*
    - TECHNIQUES, 2170*, 6170, 6171, 6172, 7548
  - RADIOTHERAPY
    - COMPLICATIONS, 6225*
  - REFLUX
    - ANTI-INFLAMMATORY AGENTS, 7329
    - ASPIRIN, 2730*
    - DIAGNOSIS, 294*
    - DRUG EFFECTS ON, 7329
    - DUODENOSTOMY, 3716
    - DUODENUM, 943
    - ENDOSCOPY, 294*
    - EPIDEMIOLOGY, 2261
    - ETIOLOGY, 2261
    - GASTROSTOMY, 3716
    - MANOMETRY, 1260*
    - PROSTAGLANDINS, 2769

- STOMACH (continued)
  - REFLUX (continued)
    - STATISTICAL STUDY, 2261
    - THERAPY, 1270
    - ULCER, 4811*, 5599
  - REGENERATION
    - GASTRIN, 2801
    - HORMONE EFFECTS ON, 2801
  - RUPTURE, 5594*
    - NEONATE, 2142
  - SALICYLATES, 3698
  - SECRETAGOGUES
    - CHEMICAL COMPOSITION, 88
  - SECRETIN
    - GROWTH FACTORS, 1138, 2115, 3672*
  - SECRETION, 2797, 3709
    - ACIDS, 3140*
    - ADENYL CYCLASE, 967, 6735
    - ADRENERGIC RECEPTOR BLOCKADERS, 6046
    - ALPHA FETOPROTEIN, 4803*
    - AMINO ACIDS, 3700, 7969*
    - ANESTHESIA, 1296
    - ANTIBODIES, 321
    - ANTIGENS, 3058
    - ANTIHORMONES, 3689
    - ANTIHYPERTENSIVE AGENTS, 3713
    - ANTRUM, 104
    - ATROPINE, 1296, 2787*, 6729*
    - BILE, 3701
    - CARBOHYDRATES, 7969*
    - CARBONATES, 7360
    - CARCINOEMBRYONIC ANTIGEN, 3058
    - CATECHOLAMINES, 976
    - CELLS, 5263*, 7978
    - CHEMICAL COMPOSITION, 1752*
    - CHILD, 383, 1296
    - CHOLECYSTOKININ, 2794*, 2852, 3738
    - DISTENTION, 4579
    - DRUG EFFECTS ON, 1296, 2415*, 2787*, 2799, 2808, 3713, 3714, 4068*, 4083, 7360
    - DRUGS, 96
    - DUODENUM, 104, 1874*
    - ELECTRICAL CONTROL, 1875*
    - FETUS, 3002
    - GASTRIN, 95, 103, 959, 971, 3693, 4556*, 4579, 6261*, 7349*, 7350*, 7364, 7972
    - GASTROSTOMY, 6037*
    - GLUCAGON, 2794*
    - GLUCOSE, 6053
    - GLYCOPROTEINS, 1752*, 2792*, 4576, 7969*
    - H2 RECEPTOR ANTAGONISTS, 1882*, 2415*, 2789*, 2799, 6046
    - HIATAL HERNIA, 7559
    - HISTAMINE, 95, 96, 3703, 6053, 6735, 7969*
    - HISTOCHEMISTRY, 7978
    - HORMONE EFFECTS ON, 249, 2264, 2794*, 3671*, 6727*, 7347*, 7375*, 7977
    - HORMONES, GASTROINTESTINAL, 971, 3738, 5262*
    - HUMORAL FACTORS, 4093
    - HYPOCHOLESTEREMIC AGENTS, 1316
    - ILEUM, 5367*
    - IMMUNOGLOBULINS, 85

- STOMACH (continued)
  - SECRETION (continued)
    - INFANT, 3002
    - INSULIN, 103, 1233
    - INTESTINE, SMALL, 5367*
    - INTRINSIC FACTOR, 3711
    - ION TRANSPORT, 1875*
    - JEJUNUM, 5367*
    - MORPHOMETRY, 7978
    - MOTILIN, 1898
    - MUCUS, 4566*, 7905*, 7969*
    - NEONATE, 3002
    - NERVOUS CONTROL, 104, 950*, 976, 2264, 3712, 4093, 4551*, 5263*, 5364*
    - PAIN, 7980
    - PANCREOZYMIN, 2852
    - PARASITES AND PARASITIC DISEASES, 8162*
    - PARASYMPATHOLYTICS, 2789*
    - PARENTERAL ALIMENTATION, 4551*
    - PENTAGASTRIN, 383, 2787*, 7969*
    - PEPSIN, 2787*, 2789*, 2792*, 3616, 3671*, 3677, 3858, 4068*, 5364*, 6925, 7362, 7977, 8171
    - PEPTIDES, 4592*
    - PERFUSION, 6053
    - POTASSIUM, 6017
    - POUCH STUDY, 100, 2137, 2138, 4551*
    - PROSTAGLANDINS, 100, 967, 2799, 4563*
    - RADIOISOTOPES, 3629*
    - REVIEW, 3987
    - SECRETIN, 998, 1874*, 2794*, 3738
    - SEROTONIN, 6729*
    - SHUNT, INTESTINAL, 1307
    - SIMULATION, 971
    - SODIUM, 3678
    - SOMATOSTATIN, 103
    - SOUND, 970
    - SYMPATHOMIMETICS, 1948
    - TECHNIQUES, 3629*, 3676, 6037*
    - THYROID GLAND, 7969*
    - ULCER, 4093, 4831
    - ULCER, PEPTIC, 383, 2264, 6261*
    - VAGOTOMY, 2805, 3717, 6935
    - WATER, ELECTROLYTE BALANCE, 2787*
    - WOUNDS AND INJURIES, 1874*
  - SEROTONIN
    - ACID SECRETION, 1873*
    - ANESTHESIA, 6728*
    - DIET, 6728*
    - FEEDING, 6728*
    - FISTULA, 6728*
  - SERUM
    - ALPHA FETOPROTEIN, 4803*
  - SOMATOSTATIN, 3660*, 3875, 4863
  - SPHINCTER
    - ELECTROPHYSIOLOGY, 6882
    - PATHOLOGY, 6882
    - PHYSICAL PROPERTIES, 6882
  - STASIS
    - DRUG THERAPY, 3145*
  - STRESS
    - NICOTINE, 1149
    - ULTRASTRUCTURE, 1763
  - SURGERY
    - ABSCESS, 8459

- STOMACH (continued)
  - SURGERY (continued)
    - ACID SECRETION, 5494
    - BARIUM, 5536
    - CIRCULATION, 1326
    - COMPLICATIONS, 1321, 2240, 2247, 2250, 2275, 3400, 4810*, 7231, 8459
    - FATS, 7638*
    - FERRITIN, 5614
    - GASTRITIS, 1326, 2247, 4810*
    - GIARDIASIS, 2250
    - HYPERPLASIA, 2693
    - IRON, 5614
    - JAUNDICE, 3400
    - MALABSORPTION SYNDROMES, 7638*
    - METABOLISM, 7638*
    - NEOPLASMS, 2240
    - NEOPLASMS, MALIGNANT, 4808*
    - NITROGEN, 7638*
    - NUTRITION DISORDERS, 7638*
    - PANCREAS, 5494
    - RADIOLOGY, 1321, 3080, 5536
    - REFLUX, 1294, 4810*
    - REVIEW, 1320
    - SECRETION, 5494
    - SEQUELAE, 1321
  - SYMPATHOMIMETICS
    - ULCER, 5374
  - TEMPERATURE
    - ACID SECRETION, 7965*
    - DYES, 5330
    - MOTILITY, 5330
  - THROMBOSIS
    - BLEEDING, 4720
    - PATHOLOGY, 4720
  - TRANSPORT
    - GLYCOPROTEINS, 7352*
    - MEMBRANES, 904
    - POTASSIUM, 4502*
  - TRYPSINOGEN, 3745
  - TUBERCULOSIS
    - PROGNOSIS, 5182
    - SURGERY, 5182
    - THERAPY, 5182
  - ULCER, 979, 3213
    - ACID SECRETION, 3206, 5636, 5647
    - ACIDS, 7516
    - AGE FACTORS, 4076, 6247
    - ANGIOGRAPHY, 8128
    - ANTACIDS, 378
    - ANTI-INFLAMMATORY AGENTS, 350
    - ANTISPASMODICS, 102, 1145
    - ASPIRIN, 2146, 2263, 5371
    - BICARBONATES, 105
    - BIOPSY, 3993, 4076
    - BLEEDING, 5478*, 6733
    - BLOOD GROUPS, 369
    - CALCIUM, 230
    - CHILD, 6279
    - COMPLICATIONS, 4830
    - DIAGNOSIS, 333, 364, 3993
    - DISEASES ASSOCIATED WITH, 3190
    - DRUG EFFECTS ON, 2789*, 7966*
    - DRUG-INDUCED, 1314, 5373, 6050
    - DRUG THERAPY, 350, 354, 378, 3187, 3188, 3189, 3204, 6880, 7979
    - DUODENUM, 5647
    - DYSPEPSIA, 3171

STOMACH (continued)
- ULCER (continued)
  - ELECTRICAL CONTROL, 978
  - ELECTROLYTES, 3206
  - ENDOSCOPY, 1234, 3040*, 3993, 4076, 4812*, 5478*
  - ETIOLOGY, 362, 4830, 6041*
  - FISTULA, 5608
  - GASTRIN, 3532
  - H2 RECEPTOR ANTAGONISTS, 980, 2789*
  - HEALING, 2789*, 4072*, 4076, 4848, 4849, 5643, 6286
  - HEMORRHAGE, 4831
  - HIATAL HERNIA, 3190
  - HISTAMINE, 5130*
  - HYPERTROPHY, 6247
  - HYPOGLYCEMIA, 4862
  - INFANT, 8128
  - ION TRANSPORT, 4574*
  - ISCHEMIA, 1311, 8106*
  - JEJUNUM, 6277
  - MONOAMINE OXIDASE, 7974
  - MORPHOLOGY, 3208, 6251
  - MUCUS, 4859
  - NEOPLASMS, 4075*
  - NERVOUS SYSTEM, 198, 978
  - PATHOLOGY, 334
  - PENTAGASTRIN, 2991*
  - PEPTIDE HYDROLASES, 7975
  - PERFORATION, 351
  - PERFUSION, 105, 8105*
  - PERMEABILITY, 1314
  - PHOTOTHERAPY, 5478*
  - PRECANCEROUS CONDITIONS, 5602
  - PREGNANCY, 3009
  - PREVENTION, 7516
  - PROSTAGLANDINS, 386, 3187
  - PYLORUS, 5603
  - RADIOLOGY, 1234, 3993, 4076, 4812*, 5640
  - RECURRENCE, 390, 6277
  - REGENERATION, 2816
  - SECRETION, 1343*
  - SEX FACTORS, 6247
  - SIMULATION, 198, 231, 1311, 2263, 2823, 6732
  - STARCH, 231
  - STRESS, 980, 3865*, 4066, 4574*, 5371, 6041*, 6730*, 6736, 6835*
  - SURGERY, 3171, 6230, 6251, 6880, 8276
  - TANNIC ACID, 231
  - THERAPY, 333, 362, 4079, 4812*, 6879*, 6880
  - VAGOTOMY, 390, 4812*
  - VITAMIN A, 1152
  - ZINC, 353, 7517
- ULCER, PEPTIC
  - ACID SECRETION, 5356*, 6926, 7976
  - AGE FACTORS, 6913*
  - ALCOHOLISM, 4847
  - ASPIRIN, 4847
  - COMPLICATIONS, 8488
  - DIAGNOSIS, 3081, 6913*
  - L-DOPA, 8189
  - DRUG-INDUCED, 3155
  - DRUG THERAPY, 5595*, 6270, 6915*, 6927, 7573*, 8189

STOMACH (continued)
- ULCER, PEPTIC (continued)
  - ENDOSCOPY, 6913*
  - ETIOLOGY, 4841
  - GASTRECTOMY, 6938
  - GASTROENTEROSTOMY, 6938
  - H2 RECEPTOR ANTAGONISTS, 5595*, 6915*
  - HEALING, 4850
  - HEMORRHAGE, 6897
  - HYPERCHLORHYDRIA, 6926, 7976
  - HYPERPLASIA, 4864
  - MITOSIS, 4576
  - MUCUS, 3155
  - PATHOLOGY, 6921
  - PROTEINS, 8180*
  - PSYCHOLOGICAL FACTORS, 4847, 5596*
  - RECURRENCE, 6271
  - SECRETION, 3203, 4861
  - SMOKING, 4847
  - SOCIOECONOMIC FACTORS, 5596*
  - STRESS, 3715, 4847
  - SURGERY, 6919*
  - THERAPY, 6921, 8186
  - VAGOTOMY, 6271, 6919*, 6938, 7585
- ULTRASONOGRAPHY
  - TECHNIQUES, 7546
- ULTRASTRUCTURE
  - ULCER, PEPTIC, 7599
- VAGOTOMY
  - ACID SECRETION, 2683*, 5494
  - ACIDS, 3140*
  - ELECTROPHYSIOLOGY, 2763, 5189
  - FOOD, 3636*
  - GLUCAGON, 3636*
  - GLUCOSE, 2805
  - MOTILITY, 2276, 5189
  - NECROSIS, 6258
  - PRESSURE STUDY, 2767
  - SECRETION, 1332, 3140*, 3723, 5494
  - STASIS, 3145*
  - SURGERY, 3199*
  - ULCER, 355, 6258
  - ULTRASTRUCTURE, 2683*, 3199*
- VARICES
  - BLEEDING, 5568*, 6900
  - DIAGNOSIS, 3147*, 6900
  - RADIOLOGY, 3147*, 3192
  - SURGERY, 6900
  - THERAPY, 5568*, 6900
- VEINS
  - EMBOLIZATION, 8402*
- VENEREAL DISEASES
  - NEOPLASMS, 6240
- VITAMIN B12
  - BINDING, 2782*
- WOUNDS AND INJURIES
  - ASPIRIN, 2269
  - BURNS, CHEMICAL, 6233
  - DRUG-INDUCED, 1909, 2269
  - GLUCAGON, 2269
  - H1 RECEPTOR ANTAGONISTS, 6834*
  - H2 RECEPTOR ANTAGONISTS, 6834*
  - HEALING, 1291, 1293, 4729
  - HISTAMINE, 6834*
  - OXIDATIVE PHOSPHORYLATION, 1909
  - PERFORATION, 7621
  - PREVENTION, 2270
  - RUPTURE, 6903

TOMACH (continued)
- WOUNDS AND INJURIES (continued)
  - SIMULATION, 1293

TOMACH DISEASES
- ACID SECRETION, 6722*
  - DEFICIENCY, 5618
  - GASTRIN, 345
- ACIDS
  - DIAGNOSIS, 5532
  - THERAPY, 5532
- AMINO ACIDS
  - METABOLISM, 4821
- ANTRUM
  - BIOPSY, 247
- BILE ACIDS AND SALTS
  - PERMEABILITY, 6054
- BIOPSY, 8166
- CELLS
  - MITOSIS, 6722*
- DIAGNOSIS, 4051, 8143
  - CYTOLOGY, 6175
  - GASTRIN, 3060
- DISEASES ASSOCIATED WITH, 8168
- DRUG THERAPY, 317
- DUODENUM
  - REFLUX, 5618
- ENDOSCOPY, 8166
  - CYTOLOGY, EXFOLIATIVE, 246
  - DIAGNOSIS, 243
- NEOPLASMS
  - DIAGNOSIS, 3162
- PATHOLOGY
  - DIAGNOSIS, 243
- PROSTAGLANDINS, 4067*
- RADIOLOGY, 3081
  - CONTRAST MEDIA, 316
  - DIAGNOSIS, 243, 316
- REFLUX
  - BILE ACIDS AND SALTS, 6054
  - DISEASES ASSOCIATED WITH, 6054

STRANGULATION
- INTESTINE, SMALL, 1370
  - ENDOSCOPY, 2319
- INTESTINES
  - CLOSTRIDIUM, 2987*

STRESS
- ACID SECRETION
  - EROSIONS, 6052
- ANTRUM
  - CIRCULATION, 4703*
- BLEEDING
  - DUODENUM, 343
  - STOMACH, 343
- CITRATES
  - METABOLISM, 7450
  - SURGERY, 7450
- DIARRHEA, 1979
- DUODENUM
  - CIRCULATION, 1141
  - HEMORRHAGE, 2237*
- GASTRITIS
  - DIAGNOSIS, 4066
  - ETIOLOGY, 4066
  - PATHOLOGY, 4066
  - THERAPY, 4066

STRESS (continued)
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 2237*
  - ULCER, 2645
- INTESTINE, SMALL
  - HEMORRHAGE, 2237*
- LIVER
  - CHOLANGIOGRAPHY, 5802*
  - CITRATES, 7450
  - GLYCOGEN, 1919, 7457
  - HYPOTHERMIA, 7457
  - PRESSURE STUDY, 7943
  - ULTRASTRUCTURE, 7457
- LIVER CIRRHOSIS
  - BLEEDING, 2563
- LIVER DISEASES
  - BLEEDING, 3483*
- LIVER INJURY
  - CLEARANCE STUDY, 5038*
  - ENZYMES, 6836*
  - LYSOSOMES, 6836*
- PANCREATITIS
  - ETIOLOGY, 4222*
- SERUM
  - FATTY ACIDS, 1919
  - GLUCOSE, 1919
- SIMULATION
  - ULCER, 230
- STOMACH
  - ACID SECRETION, 6052
  - CELLS, 4487*
  - CIRCULATION, 1141, 4703*
  - EPITHELIUM, 1763
  - EROSIONS, 1317, 1919
  - MOTILITY, 6835*
  - NICOTINE, 1149
  - ULCER, 980, 3865*, 4066, 4574*, 6041*, 6736, 6835*
  - ULCER, PEPTIC, 3715, 4847
  - ULTRASTRUCTURE, 1763
- ULCER, 5229
  - ADENOSINE TRIPHOSPHATASE, 6730*
  - ANTI-INFLAMMATORY AGENTS, 979
  - ASPIRIN, 979, 2146, 2812, 2820, 5371
  - CALCIUM, 230
  - CIRCADIAN RHYTHM, 3894
  - CIRCULATION, 3865*, 7857
  - DIAGNOSIS, 2267, 4066
  - DRAINAGE, 1153
  - DRUG EFFECTS ON, 3706, 3894
  - ETIOLOGY, 3865*, 3897, 4066, 4703*, 6041*
  - GASTRIN, 3706
  - H2 RECEPTOR ANTAGONISTS, 1154, 1312
  - HEMORRHAGE, 7857
  - HISTAMINE, 6736
  - HYPERALIMENTATION, 1151
  - HYPOCHOLESTEREMIC AGENTS, 1316
  - ION TRANSPORT, 4574*
  - METABOLISM, 6730*
  - NICOTINE, 1149
  - OXIDATIVE PHOSPHORYLATION, 6730*
  - PATHOLOGY, 2267, 4066
  - PEPSIN, 3706
  - PREVENTION, 1153, 1313, 2108*, 2268, 2813, 4829, 6736
  - REFLUX, 3897

STRESS (continued)
- ULCER (continued)
  - REVIEW, 2267
  - SIMULATION, 1313
  - SOMATOSTATIN, 3706
  - STOMACH, 5371, 6730*
  - SURFACTANTS, 1313
  - THERAPY, 1313, 2267, 4066, 4079
  - VAGOTOMY, 1153
  - VITAMIN A, 1150, 1152
- ULCER, PEPTIC
  - DRUG THERAPY, 2292
  - HEALING, 3191
  - HORMONE EFFECTS ON, 2832
  - MORPHOLOGY, 3191
  - PREVENTION, 3896, 3898, 4816*
  - SECRETIN, 2832
  - THYROCALCITONIN, 2832, 3896
  - VAGOTOMY, 3721

STRICTURE
- BILE DUCTS
  - DILATATION, 2581*
  - REVIEW, 4374
- BILIARY TRACT
  - PANCREATITIS, CHRONIC, 8274*
- CHOLANGIOGRAPHY
  - DIAGNOSIS, 6547*
- COLITIS
  - TUBERCULOSIS, 3277*
- COLON
  - AMEBIASIS, 823
- ESOPHAGUS, 3874
  - COMPLICATIONS, 2235
  - DILATATION, 6214
  - DISEASES ASSOCIATED WITH, 5570
  - ESOPHAGEAL REFLUX, 6865
  - NEOPLASMS, 5573
  - REVIEW, 6865
  - SURGERY, 5570, 6214, 8114, 8153
  - THERAPY, 4724
- INTESTINE, SMALL
  - DIAGNOSIS, 7607*
  - ISCHEMIA, 7607*
- JAUNDICE, OBSTRUCTIVE
  - URINARY SYSTEM, 2579*
- PANCREATITIS
  - COLON, 2431*
- PANCREATITIS, CHRONIC
  - COMPLICATIONS, 8274*
  - SURGERY, 4994
- RADIOTHERAPY
  - PYLORUS, 6225*
- SIGMOID
  - NEOPLASMS, MALIGNANT, 499
- STOMACH
  - NEOPLASMS, 5573

SUCRASE
- DEFICIENCY
  - BREATH TEST, 5556
- ILEUM
  - BILE, 4688
- INTESTINE, SMALL
  - HORMONE EFFECTS ON, 5444*
- INTESTINES
  - IMMUNOCHEMISTRY, 7492*

SUCRASE (continued)
- JEJUNUM, 3847
  - BILE, 4688
  - HORMONE CONTROL, 3831*
  - HORMONE EFFECTS ON, 5444*
  - NERVOUS CONTROL, 3831*
  - SUCROSE, 3831*
- SODIUM
  - BINDING, 8088*
- THYROID GLAND
  - HORMONES, 5444*

SUCROSE
- DIARRHEA
  - DEHYDRATION, 5934*
  - THERAPY, 2644
- DRUG METABOLISM
  - DIET, 5499
- GASTROENTERITIS
  - ELECTROLYTES, 4431
- INTESTINES
  - HYPERLIPEMIA, 2976
  - LIPOPROTEINS, 2976
- JEJUNUM
  - SUCRASE, 3831*
- LIVER
  - LIPIDS, 8020*
- MALABSORPTION SYNDROMES
  - DIARRHEA, 5706
  - EPIDEMIOLOGY, 5706
  - REVIEW, 7649

SUGAR
- SEE CARBOHYDRATES

SULFATES
- BILE ACIDS AND SALTS
  - CHOLESTASIS, 3362*
  - ENZYMES, 1006*
  - SERUM, 3362*
  - SULFHYDRYL COMPOUNDS, 1006*
  - URINE, 3362*
- ILEUM
  - ABSORPTION, 2728
  - SODIUM, 2728
  - TRANSPORT, 6023
- INTESTINE, SMALL
  - ABSORPTION, 2728
  - MARKER STUDY, 2728
  - SODIUM, 2728
  - TRANSPORT, 6023
- JEJUNUM
  - ABSORPTION, 2728
  - SODIUM, 2728
- KIDNEYS
  - BILE ACIDS AND SALTS, 2776
- PANCREAS
  - SECRETION, 4583*

SULFHYDRYL COMPOUNDS
- ANALGESICS AND ANTIPYRETICS
  - DRUG METABOLISM, 2105*
- BILE ACIDS AND SALTS
  - SULFATES, 1006*
- CHOLESTASIS
  - COPPER, 2540*
- LIVER DISEASES, ALCOHOLIC, 6077*
- LIVER INJURY
  - ALCOHOLISM, 6077*

- SULFOBROMOPHTHALEIN
  - ABSORPTION
    - CHOLESTASIS, 1966*
    - HEPATOCYTES, 1774*
    - LIVER FUNCTION TESTS, 1774*
  - BILIARY TRACT
    - ABSORPTION, 1966*
    - CHOLESTASIS, 1966*
    - MARKER STUDY, 7420*
    - SCANNING, SCINTILLATION, 4245*
  - CHOLESTASIS
    - LIVER FUNCTION TESTS, 4274*
    - MORPHOLOGY, 4274*
  - EXCRETION
    - DIURETICS, 258
  - GILBERT'S DISEASE
    - EXCRETION, 4246*
  - HEPATITIS
    - CLEARANCE STUDY, 3094
    - EXCRETION, 4246*
  - HEPATITIS, CHRONIC
    - BINDING, 4659
  - HEPATOCYTES
    - AGE FACTORS, 1774*
    - TRANSPORT, 7930
    - VIABILITY, 1774*
  - INDOCYANINE GREEN
    - EXCRETION, 4246*
  - JAUNDICE, CHRONIC IDIOPATHIC
    - CLEARANCE STUDY, 3094
    - KINETICS, 1507
    - METABOLISM, 1507
  - KINETICS
    - TECHNIQUES, 2775
  - LIVER
    - ABSORPTION, 2865*
    - ADENOSINE TRIPHOSPHATE, 1051
    - BILE, 2954
    - CHOLERESIS, 1051
    - CLEARANCE STUDY, 3793
    - DRUG METABOLISM, 4658
    - EXCRETION, 2865*, 3820
    - HERBICIDES, 1986
    - METABOLISM, 2865*, 3820
    - MITOCHONDRIA, 4613*
    - TRACER STUDY, 2865*
    - TRANSPORT, 41
  - LIVER CIRRHOSIS
    - BINDING, 4659
    - CLEARANCE STUDY, 3094
  - LIVER DISEASES
    - BINDING, 4659
    - CLEARANCE STUDY, 3094
  - LIVER FUNCTION TESTS, 3959
    - BILE ACIDS AND SALTS, 2955
    - COMPLICATIONS, 5823*
    - CONTRACEPTIVES, 597
    - CONTRACEPTIVES, ORAL, 597
    - FLUORIDES, 2956
    - SCANNING, SCINTILLATION, 4245*
  - MITOCHONDRIA
    - ION TRANSPORT, 6007*
    - MEMBRANES, 6007*
    - TRANSPORT, 1077
  - NUCLEOTIDES
    - TRANSPORT, 1077
  - ROTOR'S SYNDROME
    - KINETICS, 1507
    - METABOLISM, 1507

- SULFOBROMOPHTHALEIN (continued)
  - TRANSPORT
    - BILE ACIDS AND SALTS, 906, 2607
    - LIVER, 906, 2607

- SURFACTANTS
  - INTESTINE, SMALL
    - ULTRASTRUCTURE, 8086*
    - WATER, 8086*
  - JEJUNUM
    - ABSORPTION, 876
  - ULCER
    - STRESS, 1313

- SYMPATHOMIMETICS
  - COLON
    - PERISTALSIS, 919
  - ILEUM
    - MOTILITY, 62
  - INTESTINES
    - MUSCLES, 918
  - LIVER
    - CIRCULATION, 1171
    - METABOLISM, 2907
  - PANCREAS
    - CALCIUM, 7369*
    - ENZYMES, 7369*
    - PROTEINS, 7369*
    - SECRETION, 1948, 3730
  - SALIVARY GLANDS
    - AMYLASES, 1869
    - ENZYMES, 1868
    - SECRETION, 73
  - STOMACH
    - SECRETION, 1948
  - ULCER
    - STOMACH, 5374

- SYPHILIS
  - HEPATOCYTES
    - LIPOPROTEINS, 8056
  - PROCTITIS
    - DIAGNOSIS, 6335*
  - RECTUM
    - DIAGNOSIS, 6335*

- TAENIASIS
  - EPIDEMIOLOGY, 8501

- TANNIC ACID
  - STOMACH
    - ULCER, 231

- TEMPERATURE
  - ABSORPTION
    - XYLOSE, 4511
  - AMYLASES, 3981
    - ISOENZYMES, 6358*
  - DYES
    - STOMACH, 5330
  - ESOPHAGUS
    - MOTILITY, 4515*, 4516*, 6704
    - MUSCLES, 1847, 4515*
  - HEIDENHAIN POUCH
    - ACID SECRETION, 7965*
    - PENTAGASTRIN, 7965*
  - INTESTINE, SMALL
    - ENZYMES, 6824, 8097
    - MOTILITY, 7944

TEMPERATURE (continued)
    INTESTINES
        BACTERIA, 211
        EPITHELIUM, 2067
        MITOSIS, 2067
    PEPSIN
        SECRETION, 7965*
    STOMACH
        ACID SECRETION, 7965*
        BACTERIA, 211
        MOTILITY, 3634*, 5330

TERPENES
    INTESTINE, SMALL
        CELLS, 6827
        SECRETION, 6827

THALASSEMIA
    HEPATITIS, CHRONIC
        CHILD, 1544*
        LIVER DISEASES, 1544*
        LIVER FUNCTION TESTS, 1544*

THERMOGRAPHY
    CHOLECYSTITIS
        DIAGNOSIS, 6563*
    LIVER DISEASES
        CHILD, 4770

THIAMINE
    SEE VITAMIN B1

THIOCYANATES
    LIVER
        GLUCURONYLTRANSFERASE, 3813
    STOMACH
        ACID SECRETION, 2785*
        PENTAGASTRIN, 3085

THROMBOSIS
    COLON
        INFLAMMATION, 8262
    HEMORRHOIDS
        ETIOLOGY, 4190
        ULTRASTRUCTURE, 4190
    LIVER
        BACTERIA, 7465
        NECROSIS, 7465
    STOMACH
        BLEEDING, 4720
        PATHOLOGY, 4720

THYMIDINE
    UROGASTRONE
        MITOSIS, 1900

THYMUS GLAND
    LIVER DISEASES, ALCOHOLIC
        DRUG EFFECTS ON, 1550
        EXTRACTS, 1550
    SALIVARY GLANDS
        WASTING SYNDROME, 5355

THYROCALCITONIN
    BILIARY TRACT
        BILE, 126
    ESOPHAGUS
        ACHALASIA, 3135

THYROCALCITONIN (continued)
    HYPOCALCEMIA
        ETIOLOGY, 7076*
    ION TRANSPORT
        ILEUM, 5298
    LIVER
        NEOPLASMS, 8291*
    NEOPLASMS
        SECRETION, 8291*
    PANCREAS
        BICARBONATE SECRETION, 4588*
        SECRETION, 4588*
    SERUM
        GASTRIN, 2788*, 3001
    STOMACH
        ACID SECRETION, 2788*, 4559*
        GASTRIN, 4559*
    ULCER, PEPTIC
        DIETARY FACTORS, 373
        STRESS, 2832, 3896

THYROID GLAND
    BILE
        ADENOSINE TRIPHOSPHATASE, 2909
        PHENOBARBITAL, 2909
    ESOPHAGUS
        VARICES, 5578
    HEPATITIS, CHRONIC, 6503
    HEPATITIS, TOXIC
        IODINE, 700
    HEPATOCYTES
        HORMONE EFFECTS ON, 8053
    HORMONE EFFECTS ON
        KINETICS, 2042
    HORMONES
        BILE, 2111
        LACTASE, 5444*
        PANCREAS, 2111
        SALIVARY GLANDS, 2111
        SUCRASE, 5444*
    INTESTINE, SMALL
        GROWTH FACTORS, 7502
        NEONATE, 7502
    LIVER
        HORMONE EFFECTS ON, 8053
        LIPIDS, 122*
    LIVER CIRRHOSIS, 6503
        AUTOIMMUNE DISEASES, 2544*
        BINDING, 3478*
        HORMONES, 3478*
        IODINE, 700
        PROTEINS, 3478*
        SCLERODERMA, 2544*
    NEOPLASMS
        BLEEDING, 798
    STOMACH
        SECRETION, 7969*
    VARICES
        DISEASES ASSOCIATED WITH, 5578

TISSUE ADHESIVES
    GASTROINTESTINAL SYSTEM
        BLEEDING, 6734
    INTESTINE, SMALL, 3880
    INTESTINES
        NEOPLASMS, 3879
    STOMACH
        BLEEDING, 6733

TISSUE ADHESIVES (continued)
- ULCER
  - BLEEDING, 6733

TISSUE CULTURE
- ALBUMINS
  - LIVER, 134
  - ULTRASTRUCTURE, 134
- DUODENUM
  - ULTRASTRUCTURE, 4
- FIBRINOGEN
  - LIVER, 134
  - ULTRASTRUCTURE, 134
- LIVER
  - HEPATECTOMY, 1975*
  - TECHNIQUES, 4373
- LIVER COMA
  - THERAPY, 5028*
- LIVER INJURY
  - THERAPY, 5028*

TOLERANCE TEST
- HYPERTENSION, PORTAL
  - CHOLIC ACID, 4341
- LACTOSE INTOLERANCE, 3255*
- LIVER CIRRHOSIS
  - CHOLIC ACID, 4341
- MALABSORPTION SYNDROMES
  - LACTOSE, 4000

TOMOGRAPHY
- BILE DUCTS
  - DILATATION, 5546
- CHOLECYSTITIS
  - DIAGNOSIS, 2570*
- COMPUTERS
  - LIVER DISEASES, 5515*
  - NEOPLASMS, 6363*
  - PANCREATIC DISEASES, 6363*
- GALLBLADDER, 6550*
  - RADIOLOGY, 1216, 1631
- GALLBLADDER DISEASES
  - DIAGNOSIS, 6550*
- LIVER, 4746*, 5801*, 6853*
  - COMPUTERS, 6192, 8124*
  - CONTRAST MEDIA, 7741*
  - TECHNIQUES, 7741*
- LIVER DISEASES
  - DIAGNOSIS, 5515*, 6192, 7531*, 7741*
- NEOPLASMS
  - PANCREATIC DISEASES, 6363*
  - PANCREAS, 6367*, 6853*
    - ANALYSIS, 6856*
    - COMPUTERS, 3119, 6192
    - DIAGNOSIS, 6855*
    - NEOPLASMS, 4985
    - TECHNIQUES, 6856*
    - ULTRASONOGRAPHY, 2214
  - PANCREATIC DISEASES
    - ANGIOGRAPHY, 6854*
    - COMPUTERS, 4985
    - DIAGNOSIS, 4985
    - ULTRASONOGRAPHY, 6854*
  - PANCREATIC DUCT, 6367*
  - PANCREATITIS
    - COMPUTERS, 4985, 6382
    - DIAGNOSIS, 4985
    - ULTRASONOGRAPHY, 6382

TOMOGRAPHY (continued)
- ULTRASONOGRAPHY
  - PANCREAS, 6855*

TOXICITY
- ALCOHOLS
  - BIOCHEMISTRY, 6515
  - METABOLISM, 7410*
- ANTI-INFLAMMATORY AGENTS
  - PREVENTION, 7250
- ANTRUM
  - BILE, 3701
- ASPIRIN
  - CHILD, 6442*
- AUTOIMMUNE DISEASES
  - LIVER CIRRHOSIS, 2528
  - LYMPHOCYTES, 2528
- CHENODEOXYCHOLIC ACID, 6771*
- CONTRAST MEDIA, 3090
- DRUG METABOLISM
  - CATECHOLAMINES, 2103*
  - EXCRETION, 7777*
  - URINE, 7777*
- GASTROINTESTINAL SYSTEM
  - INFECTION, 6629
- HEPATITIS
  - LIVER INJURY, 1517*
  - LYMPHOCYTES, 1517*, 2520
  - TECHNIQUES, 2520
- HEPATITIS, CHRONIC
  - AUTOIMMUNE DISEASES, 2528
  - DRUG THERAPY, 2556
  - EPIDEMIOLOGY, 2556
  - LIVER INJURY, 1517*
  - LYMPHOCYTES, 1517*, 2520
- HEPATOCYTES
  - ACIDS, 4629*
  - BILE ACIDS AND SALTS, 4641
  - ULTRASTRUCTURE, 4629*
- INTESTINE, SMALL
  - CATHARTICS, 7484*
  - SECRETAGOGUES, 7484*
- JAUNDICE
  - DRUG-INDUCED, 8344
  - HORMONES, 8344
- LIVER
  - ANDROGENS, 7476
  - ASPIRIN, 2479*, 6442*
  - CATECHOLAMINES, 2103*
  - CHENODEOXYCHOLIC ACID, 4614*
  - CYTOCHROMES, 8022*
  - ENZYMES, 3415*
  - RARE EARTHS, 5826*
  - TANNIC ACID, 7451
  - TISSUE EXTRACTS, 3031
- LIVER CIRRHOSIS
  - DRUG THERAPY, 2556
  - EPIDEMIOLOGY, 2556
- LIVER FUNCTION TESTS
  - MARKER STUDY, 6395*
- LIVER INJURY
  - FUNGI, 7143
- PROTEINS
  - CELL CULTURE, 8477
- STOMACH
  - ASPIRIN, 1309
  - BILE, 3701

- TOXINS
  - CHOLERA
    - PROSTAGLANDINS, 781
    - SODIUM, 1086*
  - COLITIS
    - ETIOLOGY, 4931*
  - DIARRHEA
    - BACTERIAL INFECTIONS, 3525*
  - ILEUM
    - CHOLERA, 2657
    - ION TRANSPORT, 34, 6012
  - INTESTINE, LARGE
    - BACTERIA, 5699*
  - INTESTINE, SMALL
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 3840
    - GLYCOPROTEINS, 3850
    - SECRETION, 3840
  - INTESTINES, 5073
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2131
    - CHOLERA, 3617
    - TRANSPORT, 3617
  - JEJUNUM
    - ION TRANSPORT, 6012
  - LIVER, 5073
    - NEOPLASMS, 7100*
    - POLYSACCHARIDES, 6782*
  - LIVER DISEASES
    - LYMPH, 5829
  - LIVER INJURY
    - DRUG-INDUCED, 7137*
    - TRIGLYCERIDES, 6792
  - PENTAGASTRIN
    - ACID SECRETION, 5376
  - SHIGELLOSIS
    - DIARRHEA, 5171*

- TRACE ELEMENTS
  - LIVER
    - NEOPLASM METASTASIS, 3390

- TRANQUILIZING AGENTS
  - BILE
    - ENZYMES, 2008
    - SECRETION, 7414*
  - CHOLERESIS
    - BILE, 7414*
    - MICROSOMES, 7414*
  - DRUG METABOLISM
    - ENZYMES, 1020*
  - HEPATITIS, TOXIC
    - LYSOSOMES, 7468
  - HEPATOCYTES
    - METABOLISM, 6769*
  - ILEUM
    - MOTILITY, 7948
  - INFLAMMATION
    - LIVER, 8032*
  - INTESTINE, SMALL
    - MOTILITY, 7948
  - INTESTINES
    - BACTERIAL INFECTIONS, 1364
  - LIVER
    - ENZYMES, 2008
    - LYSOSOMES, 7468
    - MICROSOMES, 7414*, 8032*

- TRANQUILIZING AGENTS (continued)
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 7468
    - DRUG-INDUCED, 6126
  - STOMACH
    - ACID SECRETION, 2272

- TRANSAMINASE
  - SEE AMINOTRANSFERASES

- TRANSFERRIN
  - LIVER
    - IRON, 7994*
    - SYNTHESIS, 7994*

- TRANSFORMATION
  - AMEBIASIS
    - ANTIGENS, 5239*

- TRANSFUSION
  - AUSTRALIA ANTIGEN
    - DOWN'S SYNDROME, 655
    - TRANSMISSION, 8362
  - HEPATITIS, 3434*
    - AGE FACTORS, 2525*
    - AUSTRALIA ANTIGEN, 2525*
    - GLOBULINS, 2514
    - IMMUNOGLOBULINS, 5086*
    - JAUNDICE, 2525*
    - LIVER DISEASES, 2514
    - PREVENTION, 5086*
    - REVIEW, 5067*
    - SEX FACTORS, 2525*
  - HEPATITIS, CHRONIC
    - AGE FACTORS, 2525*
    - AUSTRALIA ANTIGEN, 2525*
    - BIOPSY, 2525*
    - JAUNDICE, 2525*
    - LIVER DISEASES, 1544*
    - SEX FACTORS, 2525*
  - HEPATITIS, INFECTIOUS
    - AUSTRALIA ANTIGEN, 2498*
    - CARDIOVASCULAR SYSTEM, 611
    - IMMUNOTHERAPY, 1516*
    - SOCIOECONOMIC FACTORS, 1522*
    - SURGERY, 611
    - TRANSMISSION, 5854*, 8362
  - HEPATITIS, SERUM, 3434*
  - JAUNDICE
    - ETIOLOGY, 5237
  - LIVER COMA
    - HYPOTHERMIA, 8322
    - THERAPY, 3768, 8322
  - LIVER DISEASES, 582

- TRANSPLANTATION
  - CHOLESTASIS
    - KIDNEYS, 1654
  - COLECTOMY
    - ILEUM, 2755
    - INTESTINE, SMALL, 3020
  - COMPLICATIONS
    - HEPATITIS, INFECTIOUS, 3421*
  - DUMPING SYNDROME
    - THERAPY, 3655
  - DUODENUM
    - HYPOTHERMIA, 1130
    - PANCREAS, 5482*
    - SIMULATION, 1129

- TRANSPLANTATION (continued)
  - GASTROINTESTINAL DISEASES
    - KIDNEYS, 5233
  - HEPATOCYTES, 2888*
    - SURVIVAL, 5434*
  - HYPERBILIRUBINEMIA
    - THERAPY, 2888*
  - HYPERBILIRUBINEMIA, HEREDITARY
    - HEPATOCYTES, 1974*
  - INTESTINE, SMALL, 3533
    - ABSORPTION, 2726
    - CIRCULATION, 3889
    - IMMUNOLOGY, 199, 3871*, 3885
    - MESENTERY, 3889
    - METABOLISM, 4699
    - NEONATE, 3018
    - PATHOLOGY, 3871*, 3890
    - SIMULATION, 199, 1128
  - INTESTINES
    - DRUG EFFECTS ON, 2122
    - HYPOTHERMIA, 2122
    - PERFUSION, 2122
    - SIMULATION, 2122
  - JEJUNUM
    - IMMUNOSUPPRESSION, 3884
    - MORPHOLOGY, 3884
  - KIDNEYS
    - CHOLESTASIS, 5176*
    - COMPLICATIONS, 3340*
    - DISEASES ASSOCIATED WITH, 4816*
    - HEMORRHAGE, 1328
    - HEPATITIS, 5176*
    - HEPATITIS, CHRONIC, 5176*
    - LIVER DISEASES, 5176*
    - PANCREATITIS, 3340*
    - ULCER, PEPTIC, 4816*
  - LIVER, 2889*, 3402, 3533, 4272, 8050
    - ANTI-INFLAMMATORY AGENTS, 3035
    - ANTIGENS, 3035
    - BILE, 3909
    - BILE DUCTS, 4656
    - BILIARY TRACT, 5803*
    - CIRCULATION, 6108, 6432
    - CLEARANCE STUDY, 2055
    - CLOTTING, 2056
    - COMA, 1482
    - COMPLICATIONS, 2887*, 4656, 4657, 5803*, 8306*
    - DRAINAGE, 3912, 7117*, 8307*
    - ENZYMES, 3910
    - GENETIC FACTORS, 336
    - HETEROTOPIA, 592
    - LIVER CIRRHOSIS, 4663
    - NEOPLASMS, 3447
    - PATHOLOGY, 1461*, 3910, 3911
    - PHAGOCYTOSIS, 2055
    - PROGNOSIS, 8306*
    - PROTEINS, 167
    - REVIEW, 1461*, 7116*
    - SIMULATION, 167, 2056, 2057, 2158
    - SURVIVAL, 3035, 3805, 3908, 5803*, 5804*, 7116*, 8306*, 8307*
    - TECHNIQUES, 2057, 2158, 3913, 6108, 7117*, 8306*, 8307*
    - THERAPY, 3391
  - LIVER CIRRHOSIS
    - THERAPY, 336
  - LIVER DISEASES, 1493
    - SURVIVAL, 2453*
  - LIVER INJURY
    - HEPATOCYTES, 5434*
    - SURVIVAL, 5434*
    - THERAPY, 5434*
  - NECROSIS
    - SURVIVAL, 2453*
  - PANCREAS, 3533
    - HYPOTHERMIA, 1130
    - INSULIN, 5482*
    - PERFUSION, 1130
    - SECRETION, 5393
    - SIMULATION, 1129
  - SPLEEN, 3533
  - URINARY SYSTEM
    - ACID SECRETION, 5633
    - ULCER, PEPTIC, 5633

- TRANSPORT
  - AGE FACTORS
    - GLUCOSE, 1818
  - ALCOHOLS
    - GLUCOSE, 30
  - ALKALINE PHOSPHATASE
    - DIETARY FACTORS, 5933*
    - TRIGLYCERIDES, 5933*
  - AMINO ACIDS
    - AMINO TRANSFERASES, 6758*
    - INTESTINE, SMALL, 5297
    - JEJUNUM, 2699*
    - KALLIKREIN, 7914*
    - LIVER, 6758*
    - TECHNIQUES, 7929
  - AMYLOIDOSIS
    - LIVER, 1475
    - METALS, 1475
  - BILE
    - BILE ACIDS AND SALTS, 1003*
    - WATER, 1003*
  - BILE ACIDS AND SALTS, 7399*
    - ACID SECRETION, 776
    - CHOLIC ACID, 1007*
    - DEFICIENCY, 4642
    - DIET, 6693*
    - ENTERECTOMY, 7915*
    - HEPATOCYTES, 1007*
    - LIVER, 40, 908, 909
    - MICROORGANISMS, 6693*
    - SODIUM, 908, 909
    - TECHNIQUES, 5420*
  - BILIARY TRACT
    - BILE ACIDS AND SALTS, 4615*, 5420*
    - LIPIDS, 2006
  - BILIRUBIN
    - BINDING, 39
    - LIVER, 39
    - PROTEINS, 39
  - CALCIUM
    - ADRENERGIC RECEPTOR AGONISTS, 7340
    - BINDING, 1802
    - DIURETICS, 883
    - DRUG EFFECTS ON, 45
    - DUODENUM, 5288*
    - ENZYMES, 45
    - GROWTH FACTORS, 6014
    - ILEUM, 5288*
    - INTESTINE, SMALL, 5288*
    - JEJUNUM, 883, 5288*
    - PANCREAS, 45

TRANSPORT (continued)
- CALCIUM (continued)
  - SECRETAGOGUES, 45
  - STARVATION, 1788
  - VITAMIN D, 1802, 6016
- CECUM
  - CALCIUM, 220, 1788, 6016
  - FATTY ACIDS, 5283*
  - STARVATION, 1788
- CELIAC DISEASE
  - ABSORPTION, 5704*
  - OXALATES, 5704*
- CHOLANGIOGRAPHY
  - CONTRAST MEDIA, 4612*
- CHOLERA
  - ILEUM, 1086*
  - SODIUM, 1086*
- CHOLESTASIS
  - BILE, 2049
- COLON
  - CALCIUM, 220, 1788, 6016
  - ELECTROLYTES, 4506*
  - HORMONES, 178
  - OXALATES, 6020
  - POTASSIUM, 7918*
  - PRESSURE STUDY, 3608*
  - SODIUM, 3608*, 4505*, 4506*
  - STARVATION, 1788
  - VITAMIN K, 7314
  - WATER, 3608*, 4506*
- DIABETES
  - PEPTIDES, 6008
- DIURETICS
  - SODIUM, 1812
- DRUGS
  - SIMULATION, 4544*
- DUODENUM
  - CALCIUM, 2722
  - FERRITIN, 7917*
  - GLUCOSE, 5299
  - IMMUNOGLOBULINS, 7917*
  - NOREPINEPHRINE, 2977
  - PHOSPHATES, 2722
- ENTERECTOMY
  - OXALATES, 5703*
- FATTY ACIDS
  - PANCREATIC DISEASES, 7316
- FATTY LIVER
  - LIPIDS, 6802
- GALACTOSE
  - HYPOGLYCEMIC AGENTS, 27
  - INTESTINES, 27
- GALLBLADDER
  - ELECTROPHYSIOLOGY, 1767*
  - EPITHELIUM, 1767*
  - FATTY ACIDS, 2930
  - WATER, ELECTROLYTE BALANCE, 1767*
- GASTROENTERITIS
  - SODIUM, 2962*
- GASTROINTESTINAL SYSTEM
  - VITAMIN B1, 2706*
- GLUCOSE
  - HYPOGLYCEMIC AGENTS, 27
  - INTESTINES, 27
  - SODIUM, 1812
- GLYCOGENOSIS
  - ETIOLOGY, 3396
  - MEMBRANES, 3396

TRANSPORT (continued)
- GLYCOPROTEINS
  - CYSTIC FIBROSIS, 8090*
- HEPATOCYTES
  - AMINO ACIDS, 6024, 6760*
  - BILE ACIDS AND SALTS, 7443*
  - INDOCYANINE GREEN, 4246*
  - SULFOBROMOPHTHALEIN, 7930
- HORMONE EFFECTS ON
  - ANGIOTENSIN, 7932
  - GASTRIN, 4500*
  - NOREPINEPHRINE, 7932
- ILEUM
  - BILE ACIDS AND SALTS, 2720, 2721, 7915*
  - CALCIUM, 2722, 6014
  - CATHARTICS, 1784
  - ELECTROLYTES, 4498*, 4499*, 7313
  - FERRITIN, 7917*
  - GLUCOSE, 6011
  - IMMUNOGLOBULINS, 7917*
  - LYSOSOMES, 6023
  - MOTILITY, 6710
  - NEONATE, 6023
  - NUCLEOSIDES, 5290*
  - NUCLEOTIDES, 5290*
  - PERFUSION, 776
  - PHOSPHATES, 2722
  - SODIUM, 32, 4507*, 6001*
  - SULFATES, 6023
  - VITAMIN K, 7314
  - WATER, 849, 4498*, 4499*, 4507*, 7305*
- INTESTINAL OBSTRUCTION
  - BILE ACIDS AND SALTS, 870*
  - EPITHELIUM, 870*
- INTESTINE, LARGE
  - CALCIUM, 2723, 6016
  - VITAMIN K, 7314
- INTESTINE, SMALL
  - AGE FACTORS, 1818
  - ALKALINE PHOSPHATASE, 8087*
  - AMINO ACIDS, 7914*, 7929
  - ANALGESICS AND ANTIPYRETICS, 2973
  - ANGIOTENSIN, 7303*
  - BILE ACIDS AND SALTS, 2720, 2721
  - CAFFEINE, 4684*
  - CALCIUM, 881, 882, 5287*, 6014
  - CARBOHYDRATES, 4513, 7920*
  - CARDIOVASCULAR SYSTEM, 4507*
  - CHYLOMICRONS, 5439*
  - DIURETICS, 1812
  - DRUG EFFECTS ON, 4542, 7303*
  - ELECTROLYTES, 18*, 4500*
  - ELECTROPHYSIOLOGY, 2695*
  - GLUCOSE, 1812, 3854, 4500*, 6011, 6823
  - HORMONE EFFECTS ON, 4500*, 7303*, 7932
  - IMMUNOGLOBULINS, 7318, 7319
  - IRON, 1805
  - KINETICS, 1789, 2710, 5278*
  - LYSOSOMES, 6023
  - NEONATE, 6023
  - NERVOUS CONTROL, 4542
  - NUCLEOSIDES, 5290*
  - NUCLEOTIDES, 5290*
  - OBSTRUCTION, 2717
  - PEPTIDES, 7499*

- TRANSPORT (continued)
  - INTESTINE, SMALL (continued)
    - PHOSPHATES, 887
    - PRESSURE STUDY, 4542
    - SIMULATION, 4544*
    - SODIUM, 4507*, 4513, 6009
    - SULFATES, 6023
    - VITAMIN B1, 2706*
    - VITAMIN K, 7314
    - WATER, 1815, 1816, 1817, 2712, 4500*, 4507*, 5278*, 7305*, 8086*
    - WATER, ELECTROLYTE BALANCE, 5279*
    - ZINC, 5292*
  - INTESTINES
    - AMINO ACIDS, 4692, 7913*
    - BILE ACIDS AND SALTS, 1793
    - CALCIUM, 880, 2722
    - CHYLOMICRONS, 7302*
    - DRUGS, 875
    - ELECTROLYTES, 3617
    - IMMUNOGLOBULINS, 1776*
    - IRON, 3619
    - KINETICS, 5338
    - LIPIDS, 7302*
    - LYMPH, 3603*
    - NITROGEN, 4407, 7913*
    - PEPTIDES, 4692, 7913*
    - PHOSPHATES, 2722
    - PROTEINS, 3603*
    - TOXINS, 3617
    - ULTRASTRUCTURE, 878
    - VILLI, 878
    - WATER, 7921*
  - IRON
    - PREGNANCY, 3619
  - JEJUNUM
    - ANESTHETICS, 872
    - ANGIOTENSIN, 1791, 7303*
    - BILE ACIDS AND SALTS, 2720, 4497*
    - CALCIUM, 6014
    - CHYLOMICRONS, 5439*
    - DRUG EFFECTS ON, 7303*
    - DRUGS, 1783
    - ELECTROLYTES, 4498*, 7313
    - ELECTROPHYSIOLOGY, 7308*
    - GLUCOSE, 30, 1819, 4497*, 6011
    - HORMONE EFFECTS ON, 7303*, 7932
    - IMMUNOGLOBULINS, 7318, 7319
    - KINETICS, 2710
    - MARKER STUDY, 2096*
    - MOTILITY, 6710
    - PEPTIDES, 7499*
    - SODIUM, 33, 5286*
    - SURVIVAL, 872
    - VITAMIN B1, 893
    - WATER, 4498*, 5286*, 7305*, 7313
  - KINETICS
    - JEJUNUM, 1789
  - LIVER
    - AMINO ACIDS, 7387*
    - BILE, 910, 2027
    - BILE ACIDS AND SALTS, 41, 42, 609
    - BILIRUBIN, 609
    - CONTRAST MEDIA, 7386*
    - DRUG EFFECTS ON, 3816
    - DRUG THERAPY, 1159
    - DRUGS, 42
    - DYES, 5422*

- TRANSPORT (continued)
  - LIVER (continued)
    - FOLIC ACID, 1810
    - HYPOCHOLESTEREMIC AGENTS, 1170
    - LIPIDS, 910, 2006
    - POTASSIUM, 5408*
    - RADIONUCLIDES, 7386*
    - SODIUM, 5408*
    - SULFOBROMOPHTHALEIN, 41
  - LYMPH
    - ALKALINE PHOSPHATASE, 5933*
    - EPITHELIUM, 7514*
    - TRACER STUDY, 7514*
  - MITOCHONDRIA
    - SULFOBROMOPHTHALEIN, 1077
  - MONOSACCHARIDES
    - ELECTROPHYSIOLOGY, 1813
    - INTESTINE, SMALL, 1813
  - NEOPLASMS
    - FATTY ACIDS, 1167
  - NUCLEOTIDES
    - SULFOBROMOPHTHALEIN, 1077
  - NUTRITION DISORDERS
    - SODIUM, 5947
  - PANCREAS
    - AMINO ACIDS, 2841, 7987*
    - GLYCOPROTEINS, 2835*
    - HISTOCHEMISTRY, 4491*
    - MEMBRANES, 4491*
    - ULTRASTRUCTURE, 4491*
  - PHOSPHATES
    - INTESTINE, SMALL, 802
    - NUTRITION DISORDERS, 802
  - POTASSIUM
    - MEMBRANES, 18*
  - PREGNANCY
    - VITAMIN A, 2110
  - PROTEINS
    - METABOLISM, 894
    - PANCREAS, 894
  - RECTUM
    - GLYCOPROTEINS, 8090*
  - ROTOR'S SYNDROME
    - LIVER, 1508
  - SALIVARY GLANDS
    - CALCIUM, 7340
    - POTASSIUM, 2120
  - SECRETION
    - TECHNIQUES, 5420*
  - SODIUM
    - DIURETICS, 883
    - JEJUNUM, 883
    - MEMBRANES, 18*
  - SPRUE
    - OXALATES, 5704*
  - SPRUE, TROPICAL
    - ELECTROLYTES, 6982*
    - WATER, 6982*
  - STOMACH
    - ACID SECRETION, 776
    - GLYCOPROTEINS, 7352*
    - MEMBRANES, 904
    - POTASSIUM, 4502*
  - SULFOBROMOPHTHALEIN
    - BILE ACIDS AND SALTS, 906, 2607
    - LIVER, 906, 2607
  - VITAMIN E
    - DRUGS, 875

TRANSPORT (continued)
    VITAMIN K
        BILE, 7314
        FATTY ACIDS, 7314
    WATER
        DRUG EFFECTS ON, 7921*
        SALMONELLOSIS, 7921*

TRAUMA
    SEE STRESS, WOUNDS AND INJURIES

TRICHINOSIS
    GIARDIASIS
        IMMUNOLOGY, 2988*
        INTESTINE, SMALL, 2988*
    IMMUNOLOGY, 3870*
        ENVIRONMENTAL FACTORS, 2988*
    INFLAMMATION, 3870*
    INTESTINE, SMALL
        LYMPHOCYTES, 4464
    INTESTINES
        MOTILITY, 5486

TRIGLYCERIDES
    SEE ALSO FATS, LIPIDS
    ABSORPTION
        CIRCULATION, 3017
        LYMPH, 3017
        MALABSORPTION SYNDROMES, 6162
        MARKER STUDY, 4532*
    ALCOHOLS
        LIVER DISEASES, 578
    CARBOHYDRATES
        LIVER DISEASES, 578
    CHOLELITHIASIS
        SERUM, 3501*
    CHOLESTASIS, 3385
    DIGESTION
        CIRCULATION, 3017
        LYMPH, 3017
    ENZYMES
        JEJUNUM, 4680*
    FATTY LIVER
        DRUG EFFECTS ON, 2881*
    GLYCOGENOSIS
        THERAPY, 3397
    HEPATITIS
        DEFICIENCY, 4669
        LIPOPROTEINS, 4669
    INTESTINAL ABSORPTION
        EMULSIFIERS, 7493*
        FATS, 7493*
        ULTRASTRUCTURE, 5291*
    INTESTINE, SMALL, 7926
        LYMPHATIC SYSTEM, 7926
    INTESTINES
        ABSORPTION, 2727, 6162
    JEJUNUM
        METABOLISM, 4680*
    LIPOPROTEINS
        SYNTHESIS, 3786
    LIVER
        ACIDS, 6808
        DIETARY FACTORS, 8015*
        GLUCOSE, 2005
        INSULIN, 2005
        METABOLISM, 1066, 1972*, 2005
    LIVER CIRRHOSIS, 3385
        SERUM, 5111*

TRIGLYCERIDES (continued)
    LIVER DISEASES, ALCOHOLIC
        SERUM, 5111*
    LIVER INJURY
        CARBON TETRACHLORIDE, 641
        METALS, 641
        TOXINS, 6792
    LYMPHANGIECTASIS
        DRUG THERAPY, 4105*
    LYMPHATIC SYSTEM, 7926
    MALABSORPTION SYNDROMES
        PLASMA, 3248*
    OBESITY
        LIVER, 2316*
    SOMATOSTATIN
        PANCREAS, 3038
        SERUM, 3038
    TRANSPORT
        ALKALINE PHOSPHATASE, 5933*

TRYPSIN
    ABSORPTION
        VITAMIN B12, 4509*
    CECUM
        METABOLISM, 1929*
    ENZYMES, 1964
    FECES
        ANTIBIOTICS, 7378
        DRUG EFFECTS ON, 7378
    GASTROINTESTINAL SYSTEM
        CHILD, 6621
    INTESTINE, SMALL
        METABOLISM, 1929*
        PANCREAS, 7723*
    INTESTINES
        METABOLISM, 1929*
        TECHNIQUES, 3998
    PANCREAS
        ANTIBIOTICS, 7378
        CHYMOTRYPSINOGEN, 1930*
        DRUG EFFECTS ON, 7378
        FEEDING, 1636
        PHYSICAL FACTORS, 1636
        PROTEINS, 1963
        SECRETION, 2863, 3735, 7723*, 7982*
    PANCREATIC DISEASES
        DIAGNOSIS, 5520*
    ULCER, PEPTIC
        SERUM, 7597

TRYPSIN INHIBITORS
    PANCREAS
        CHEMICAL COMPOSITION, 1000, 1001
        DRUG EFFFECTS ON, 3331
        ENZYMES, 2863
        MORPHOLOGY, 2863
        PROTEINS, 2863
        SECRETION, 521
    SERUM
        MILK, 217

TRYPSINOGEN
    ABSORPTION
        VITAMIN B12, 4509*
    ACID SECRETION
        FEEDING, 2809
    CELIAC DISEASE
        INTESTINES, 448

RYPSINOGEN (continued)
- ENZYMES, 1964
- FEEDING
    - SECRETION, 2809
- PANCREAS
    - ENZYMES, 1930*
    - SECRETION, 1930*
- STOMACH, 3745

TUBERCULOSIS
- ABDOMEN
    - EPIDEMIOLOGY, 6608
- ACID SECRETION
    - MILK, 6626
- COLITIS
    - DIAGNOSIS, 3277*
    - RADIOLOGY, 3277*
    - STRICTURE, 3277*
- COLON
    - RADIOLOGY, 2341
- ESOPHAGUS
    - HEMORRHAGE, 4023*
    - ULCER, 4023*
- GASTROINTESTINAL SYSTEM
    - PROGNOSIS, 5182
    - SURGERY, 5182
    - THERAPY, 5182
- ILEUM
    - CECUM, 434
    - RADIOLOGY, 2341
- INTESTINE, LARGE
    - NEOPLASMS, MALIGNANT, 453*
- INTESTINE, SMALL
    - MALABSORPTION SYNDROMES, 7643
- INTESTINES
    - DIAGNOSIS, 6588*
    - DRUG THERAPY, 6588*
    - PATHOLOGY, 2341
    - PERFORATION, 435
    - PROGNOSIS, 5182
    - RADIOLOGY, 2341
    - REVIEW, 2341
    - SURGERY, 5182
    - THERAPY, 5182
- LEISHMANIASIS
    - EPIDEMIOLOGY, 2666
- LIVER
    - GRANULOMA, 589
- LIVER INJURY
    - DRUG-INDUCED, 7780
- MALABSORPTION SYNDROMES
    - DISEASES ASSOCIATED WITH, 7643
- MILK
    - YEAST, 6626
- OBESITY
    - SHUNT, INTESTINAL, 433
- PERITONITIS, 6597
- SOCIOECONOMIC FACTORS
    - EPIDEMIOLOGY, 2668
- SPLEEN
    - GRANULOMA, 589
- STOMACH
    - PROGNOSIS, 5182
    - SURGERY, 5182
    - THERAPY, 5182

TYPHOID
- SEE SALMONELLOSIS

ULCER
- ACID SECRETION
    - BACTERIA, 6732
    - DRUG EFFECTS ON, 2820
    - DUODENUM, 359, 385, 2304
    - ETHNIC FACTORS, 359
    - PENTAGASTRIN, 5641
    - RISK FACTORS, 5636
    - STOMACH, 385, 5647
    - THERAPY, 5642
    - WATER, 2310
- ALCOHOLS
    - DRUG-INDUCED, 4089
- ANGIOGRAPHY
    - BLEEDING, 2252
- ANTRECTOMY
    - GASTRIN, 6278
- ANTRUM
    - BIOPSY, 3993
    - DIAGNOSIS, 3993
    - ENDOSCOPY, 3993
    - GASTRIN, 4834*, 8181*
    - LYSOSOMES, 1917
    - RADIOLOGY, 3993
    - VAGOTOMY, 6274
- ASPIRIN
    - BLEEDING, 2145
    - DRUG-INDUCED, 1877*
    - PREVENTION, 1878*, 2812, 2813
    - STRESS, 2820, 5371
- BARIUM
    - DIAGNOSIS, 4742*
- BICARBONATE SECRETION
    - SECRETIN, 2287*
- BILE
    - ACIDS, 1917
    - REFLUX, 1878*
- BILE DUCTS
    - SURGERY, 1878*
- BLEEDING
    - DRUG THERAPY, 2290
    - REVIEW, 2290
    - THERAPY, 5478*, 6733
    - TISSUE ADHESIVES, 6733
- CALCIUM
    - ACID SECRETION, 3086
- CECUM
    - ALGAE, 3024
    - CARRAGEENAN, 3024
    - DRUG DEPENDENCE, 2372*
- CHILD
    - PSEUDOTUMORS, 6279
- CIRCULATION
    - PENTAGASTRIN, 2991*
- CLASSIFICATION
    - ATROPINE, 6266
    - TECHNIQUES, 6266
- COMPLICATIONS
    - REVIEW, 2289, 2298
- CONNECTIVE TISSUE
    - DRUG EFFECTS ON, 2814
- CROHN'S DISEASE
    - PERINEUM, 4478
- DIAGNOSIS
    - REVIEW, 2289, 4080
- DRUG EFFECTS ON, 2810
- DRUG-INDUCED
    - AMINO ACIDS, 6050
    - ANTI-INFLAMMATORY AGENTS, 8102*

ULCER (continued)
- DRUG-INDUCED (continued)
  - ASPIRIN, 2820
  - DRUG EFFECTS ON, 2147
  - DRUG THERAPY, 1921
  - HORMONES, ADRENAL CORTEX, 5373
  - PEPSINOGEN, 5373
- DRUG THERAPY
  - REVIEW, 5639
- DRUGS
  - CHEMICAL COMPOSITION, 3007
- DUODENITIS, 4095
  - ETIOLOGY, 4884
- DUODENUM, 3213
  - ACID SECRETION, 374, 1340*, 2804, 3206, 4549, 4580, 4855, 5636, 5641
  - ACIDITY, 5630
  - ACIDS, 4090
  - ALCOHOLS, 4089
  - ALKALINE PHOSPHATASE, 3205
  - AMINES, 6742
  - ANTACIDS, 2291
  - ATROPINE, 4073*, 5634
  - BLEEDING, 355, 2290
  - BLOOD GROUPS, 369
  - BURNS, 415
  - CAFFEINE, 3667*
  - CALCIUM, 3086
  - CHLORIDES, 3207
  - CLASSIFICATION, 6266
  - COMPLICATIONS, 4095, 4830
  - DEFICIENCY, 3174
  - DIAGNOSIS, 3200
  - DIET, 3174
  - DISACCHARIDASES, 370
  - DISEASES ASSOCIATED WITH, 3214, 3215
  - DOPAMINE, 4860
  - DRUG EFFECTS ON, 377, 5631, 5634, 5645
  - DRUG-INDUCED, 97, 377, 2824, 3717, 4089, 6742
  - DRUG THERAPY, 354, 2291, 3195*, 3198*, 3202, 3204, 4073*, 4084, 5639
  - ELECTROLYTES, 3206
  - ENDOSCOPY, 3200, 4846
  - ENZYMES, 3205
  - ETIOLOGY, 2815, 2828, 4088, 4830
  - FERRITIN, 3174
  - GASTRIN, 372, 1334*, 1340*, 2804, 3197*, 3532, 3667*, 4580, 5634
  - GASTROENTEROSTOMY, 4834*
  - GENETIC FACTORS, 2303
  - GLUCAGON, 2309
  - GLUCOSE INTOLERANCE, 2309
  - H2 RECEPTOR ANTAGONISTS, 97, 3195*, 3197*, 3198*, 4073*, 5626*
  - HAPTOGLOBINS, 6284
  - HEALING, 3195*, 4072*, 4834*, 5631
  - HERPESVIRUSES, 2815
  - HISTAMINE, 3194*, 4069*, 4855
  - HORMONE EFFECTS ON, 2300, 3876
  - INSULIN, 2309
  - MORPHOLOGY, 3208
  - MOTILIN, 4858
  - OBSTRUCTION, 2302
  - PARASYMPATHOLYTICS, 4073*

ULCER (continued)
- DUODENUM (continued)
  - PATHOLOGY, 6957
  - PEPSIN, 4092
  - PEPSINOGEN, 3686
  - PEPTIDES, 4578
  - PERFORATION, 6276
  - PROGNOSIS, 3200
  - PROTEINS, 5634
  - PSYCHOLOGICAL FACTORS, 4846, 5645
  - PYLOROPLASTY, 4855, 8181*
  - PYLORUS, 5603
  - RADIOLOGY, 4765
  - RECURRENCE, 382
  - REFLUX, 4811*
  - REVIEW, 2291, 2298
  - SECRETAGOGUES, 2804, 3876
  - SECRETIN, 4070*
  - SECRETION, 384, 387, 1343*, 3207
  - SLEEP, 358*, 5630
  - SMOKING, 2291, 4092
  - SOCIOECONOMIC FACTORS, 4846
  - SOMATOSTATIN, 4863, 7519
  - STATISTICAL STUDY, 809
  - SURGERY, 809, 3199*, 4081, 4839, 6267, 8276
  - TECHNIQUES, 809
  - THERAPY, 2291, 3876, 4079, 4081, 5642
  - VAGOTOMY, 2296, 2824, 3717, 4855, 5189, 6275, 6280, 6281, 6282, 8181*
  - WATER, 2304
- DYSPEPSIA
  - BLOOD GROUPS, 369
  - DIAGNOSIS, 2610
  - DUODENUM, 2610
  - STOMACH, 2610
- ENDOSCOPY
  - DIAGNOSIS, 4742*
- EPIDEMIOLOGY
  - REVIEW, 2298
- ESOPHAGITIS
  - SURGERY, 5599
- ESOPHAGUS
  - TUBERCULOSIS, 4023*
- ETIOLOGY
  - REVIEW, 4080
- GASTRIN
  - ADRENERGIC RECEPTOR BLOCKADERS, 2271
  - BIOCHEMISTRY, 2305
  - CELLS, 2804
  - DUODENUM, 2271, 2602
  - REVIEW, 2305
  - SECRETION, 385, 2305
  - STOMACH, 2602
  - SYNTHESIS, 2305
  - ULTRASTRUCTURE, 8181*
- GASTROINTESTINAL SYSTEM
  - HEMORRHAGE, 4436
  - STRESS, 2645
- GENETIC FACTORS
  - ANTIGENS, 2303
- H2 RECEPTOR ANTAGONISTS
  - ACID SECRETION, 4832*
  - BICARBONATE SECRETION, 4832*
  - DRUG THERAPY, 5626*
  - LIVER FUNCTION TESTS, 4832*

ULCER (continued)

- HEALING
  - DRUG EFFECTS ON, 5631
  - MUCUS, 4849
  - SECRETION, 4849
- HEMORRHAGE
  - ETIOLOGY, 4128
  - POTASSIUM, 4128
  - THERAPY, 6874*
- HEPATITIS, INFECTIOUS
  - DISEASES ASSOCIATED WITH, 8376
- HISTAMINE
  - CALCIUM, 230
  - DRUG THERAPY, 1921
- HORMONES, GASTROINTESTINAL
  - SECRETION, 4836*
- ILEUM
  - ENDOSCOPY, 5657*
  - PERFORATION, 4898
  - SURGERY, 5657*
- INTESTINE, SMALL
  - ANTI-INFLAMMATORY AGENTS, 1132
  - ISCHEMIA, 2990*
  - PERITONITIS, 6304
  - POTASSIUM, 6939*
  - SHOCK, 4727
- INTESTINES
  - ANTI-INFLAMMATORY AGENTS, 8102*
  - BACTERIA, 8102*
  - DRUG-INDUCED, 8102*
  - ISCHEMIA, 2990*
  - PROSTAGLANDINS, 8102*
  - SHOCK, 4727
- JEJUNUM
  - DIAGNOSIS, 3201
  - ENDOSCOPY, 3201, 5657*
  - GASTRECTOMY, 1355
  - HEMORRHAGE, 4128
  - ILEUM, 5657*
  - NEOPLASMS, MALIGNANT, 475
  - PEPSIN, 2793*
  - RECURRENCE, 6277
  - REVIEW, 1870
  - SIMULATION, 1870
  - SURGERY, 1355, 5657*
- LIVER CIRRHOSIS
  - BLEEDING, 2563, 3483*
  - HISTAMINE, 5130*
  - STOMACH, 5130*
- LYSOSOMES
  - BILE, 1917
- MONOAMINE OXIDASE
  - DRUG EFFECTS ON, 7974
- MORPHOLOGY
  - SURGERY, 6251
- NEOPLASMS
  - PROGNOSIS, 4075*
- OBSTRUCTION
  - DIAGNOSIS, 2302
  - REVEIW, 2302
  - SURGERY, 2302
- PANCREAS
  - DUODENUM, 1348
  - SECRETION, 1348
- PATHOLOGY
  - EPIDEMIOLOGY, 2297
- PENTAGASTRIN
  - ACID SECRETION, 2310
  - MOTILITY, 2310

ULCER (continued)

- PEPSIN
  - DUODENUM, 385
  - STOMACH, 385
  - THERAPY, 5642
- PERFORATION
  - DUODENUM, 368
  - ETHNIC FACTORS, 6276
  - LIVER, 368
  - SURGERY, 6273
- PERFUSION
  - ACIDITY, 8105*
  - PEPSIN, 8105*
  - PRESSURE STUDY, 8105*
- PERITONITIS
  - ETIOLOGY, 6304
- PREVENTION
  - ACIDS, 7516
  - ANTACIDS, 4071*
  - ANTI-INFLAMMATORY AGENTS, 1880*
  - ASPIRIN, 2812
  - DRUG EFFECTS ON, 2813
  - DRUGS, 2268
  - SOMATOSTATIN, 2108*
  - URINARY SYSTEM, 4071*
  - VITAMIN A, 2268
- PROCTOCOLITIS, 4956
- PROTEINS
  - SYNTHESIS, 7979
- PSYCHOLOGICAL FACTORS
  - DRUG EFFECTS ON, 5645
- PYLOROPLASTY
  - RECURRENCE, 5646
  - TECHNIQUES, 5646
- PYLORUS
  - BIOPSY, 3993
  - DIAGNOSIS, 3993
  - ENDOSCOPY, 3993
  - ETIOLOGY, 5603
  - RADIOLOGY, 3993
- REFLUX
  - STOMACH, 5599
- SECRETIN
  - HEALING, 4070*
- SECRETION
  - GLUCAGON, 2309
  - GLUCOSE INTOLERANCE, 2309
  - INSULIN, 1233, 2309
  - PENTAGASTRIN, 1233
  - RECURRENCE, 1233
  - TECHNIQUES, 3207
- SIMULATION
  - ASPIRIN, 2145
  - BLEEDING, 2145
  - NEOPLASMS, 2297
  - PREVENTION, 2813, 2814
  - STRESS, 230
- SLEEP
  - ACIDITY, 5630
- STOMACH, 979, 3213
  - ACID SECRETION, 3206, 5636
  - ACIDS, 7516
  - AGE FACTORS, 4076, 6247
  - ANGIOGRAPHY, 8128
  - ANTACIDS, 378
  - ANTI-INFLAMMATORY AGENTS, 350
  - ANTISPASMODICS, 102, 1145
  - ASPIRIN, 2146, 2263, 5371
  - BICARBONATES, 105

ULCER (continued)
  STOMACH (continued)
    BIOPSY, 3993, 4076
    BLEEDING, 5478*, 6733
    BLOOD GROUPS, 369
    CALCIUM, 230
    CHILD, 6279
    COMPLICATIONS, 4830
    DIAGNOSIS, 333, 364, 3993
    DISEASES ASSOCIATED WITH, 3190
    DRUG EFFECTS ON, 2789*, 7966*
    DRUG-INDUCED, 1314, 5373, 6050
    DRUG THERAPY, 350, 354, 378, 3187, 3188, 3189, 3204, 6880, 7979
    DUODENUM, 5647
    DYSPEPSIA, 3171
    ELECTRICAL CONTROL, 978
    ELECTROLYTES, 3206
    ENDOSCOPY, 1234, 3040*, 3993, 4076, 4812*, 5478*
    ETIOLOGY, 362, 4830, 6041*
    FISTULA, 5608
    GASTRIN, 3532
    H2 RECEPTOR ANTAGONISTS, 980
    HEALING, 2789*, 4072*, 4076, 4848, 4849, 5643, 6286
    HEMORRHAGE, 4831
    HIATAL HERNIA, 3190
    HISTAMINE, 5130*
    HYPERTROPHY, 6247
    HYPOGLYCEMIA, 4862
    INFANT, 8128
    ION TRANSPORT, 4574*
    ISCHEMIA, 1311, 8106*
    JEJUNUM, 6277
    MONOAMINE OXIDASE, 7974
    MORPHOLOGY, 3208, 6251
    MUCOPOLYSACCHARIDES, 375
    MUCUS, 4859
    NEOPLASMS, 4075*
    NERVOUS SYSTEM, 198, 978
    PATHOLOGY, 334
    PENTAGASTRIN, 2991*
    PEPTIDE HYDROLASES, 7975
    PERFORATION, 351
    PERFUSION, 105, 8105*
    PERMEABILITY, 1314
    PHOTOTHERAPY, 5478*
    PRECANCEROUS CONDITIONS, 5602
    PREGNANCY, 3009
    PREVENTION, 7516
    PROSTAGLANDINS, 386, 3187
    PYLORUS, 5603
    RADIOLOGY, 1234, 3993, 4076, 4812*, 5640
    RECURRENCE, 390, 6277
    REFLUX, 4811*
    REGENERATION, 2816
    SECRETION, 1343*, 4093, 4831
    SEX FACTORS, 6247
    SIMULATION, 198, 231, 1311, 2263, 2823, 6732
    STARCH, 231
    STRESS, 980, 3865*, 4066, 4574*, 5371, 6041*, 6736, 6835*
    SURGERY, 3171, 6230, 6251, 6880, 8276
    TANNIC ACID, 231

ULCER (continued)
  STOMACH (continued)
    THERAPY, 333, 362, 4079, 4812*, 6879*, 6880
    VAGOTOMY, 355, 390, 4812*, 6258
    VITAMIN A, 1152
    ZINC, 353, 7517
  STRESS, 5229
    ADENOSINE TRIPHOSPHATASE, 6730*
    ANTI-INFLAMMATORY AGENTS, 979
    ASPIRIN, 979, 2146, 2812
    CALCIUM, 230
    CIRCADIAN RHYTHM, 3894
    CIRCULATION, 3865*, 7857
    DIAGNOSIS, 2267, 4066
    DRAINAGE, 1153
    DRUG EFFECTS ON, 3706, 3894
    ETIOLOGY, 3865*, 3897, 4066, 4703*, 6041*
    GASTRIN, 3706
    H2 RECEPTOR ANTAGONISTS, 1154, 1312
    HEMORRHAGE, 7857
    HISTAMINE, 6736
    HYPERALIMENTATION, 1151
    HYPOCHOLESTEREMIC AGENTS, 1316
    ION TRANSPORT, 4574*
    METABOLISM, 6730*
    NICOTINE, 1149
    OXIDATIVE PHOSPHORYLATION, 6730*
    PATHOLOGY, 2267, 4066
    PEPSIN, 3706
    PREVENTION, 1153, 1313, 2108*, 2268, 2813, 4829, 6736
    REFLUX, 3897
    REVIEW, 2267
    SIMULATION, 1313
    SOMATOSTATIN, 3706
    STOMACH, 6730*
    SURFACTANTS, 1313
    SURGERY, 4066
    THERAPY, 1313, 2267, 4066, 4079
    VAGOTOMY, 1153
    VITAMIN A, 1150, 1152
  SURGERY
    COMPLICATIONS, 2240, 6230, 6250, 8276
    GASTRITIS, 6250
    NEOPLASMS, 2240
    PANCREATITIS, 8276
    PROGNOSIS, 1287*
    REFLUX, 6250
    REVIEW, 2289, 4080
    TECHNIQUES, 4839
  SYMPATHOMIMETICS
    STOMACH, 5374
  THERAPY, 4082
    CHOLECYSTOKININ, 3876
    DRUGS, 1347
    PROGNOSIS, 1287*, 6879*
    SECRETIN, 3876
  ULCER, PEPTIC, 2299
    ACIDITY, 5630
    DUODENUM, 3210
    SLEEP, 5630
  VAGOTOMY
    DUMPING SYNDROME, 7322*
    ELECTROPHYSIOLOGY, 6282
    GASTRIN, 6278

LCER (continued)
- VAGOTOMY (continued)
  - PROGNOSIS, 6272, 6280
  - RECURRENCE, 5646
  - REGENERATION, 6282
  - TECHNIQUES, 2296, 5646

LCER, PEPTIC
- ACID SECRETION, 2266, 3212
  - ANTACIDS, 4833*
  - DISTENTION, 2285*
  - DRUG EFFECTS ON, 387, 4833*, 7976, 8183
  - DUODENUM, 1341*
  - EPIDEMIOLOGY, 2265
  - H2 RECEPTOR ANTAGONISTS, 381, 4833*
  - NERVOUS CONTROL, 366
  - REVIEW, 7579
  - RISK FACTORS, 2265
- ACIDITY
  - BICARBONATE SECRETION, 1337*
  - BILE PIGMENTS, 1337*
  - SECRETION, 1337*
- ALKALINE PHOSPHATASE
  - ENZYMES, 3205
- ANTACIDS, 2831
  - HYPERPLASIA, 1876*
  - PAIN, 2283*
- ANTIHORMONES, 380
- ANTRUM
  - ACID SECRETION, 6261*
  - EPITHELIUM, 2286*
  - GASTRIN, 6261*
  - MORPHOLOGY, 2286*, 8165*
  - SECRETION, 6261*
- BICARBONATE SECRETION
  - ACIDITY, 1336*
  - DUODENUM, 1341*
- BILIARY TRACT
  - ADOLESCENCE, 6268
  - CHILD, 6268
- BLEEDING
  - H2 RECEPTOR ANTAGONISTS, 5638
  - HEMODIALYSIS, 5638
- BURNS
  - HYPERCHLORHYDRIA, 3142*
- CHILD
  - FAMILIAL FACTORS, 6924
  - SURGERY, 8185
  - THERAPY, 8185
- CHOLECYSTOKININ
  - ACID SECRETION, 1339*
  - H2 RECEPTOR ANTAGONISTS, 1339*
  - REFLUX, 5632
- CHOLELITHIASIS
  - SURGERY, 5632
- COMPLICATIONS
  - HEMORRHAGE, 7596
  - INFECTION, 8488
- DIAGNOSIS, 3201
  - ENDOSCOPY, 6913*, 7590
  - GASTRIN, 3060
  - PROGNOSIS, 6912*
  - RADIOLOGY, 4063
  - SOCIOECONOMIC FACTORS, 4845
- DISEASES ASSOCIATED WITH, 4086, 5221
  - DIAGNOSIS, 3215
  - ENDOSCOPY, 4453

ULCER, PEPTIC (continued)
- DRUG-INDUCED
  - ALCOHOLS, 3191
  - ASPIRIN, 2827
  - HEALING, 3191
  - MORPHOLOGY, 3191
- DRUG THERAPY, 2831, 3196*, 4083, 4721
  - ANTACIDS, 6914*, 7587, 8187
  - BISMUTH COMPOUNDS, 2811
  - CARBENOXOLONE, 1345, 1346
  - CHEMICAL PROPERTIES, 6928
  - COMPLICATIONS, 6927
  - DIETARY FACTORS, 2292
  - L-DOPA, 8189
  - EDEMA, 6927
  - H2 RECEPTOR ANTAGONISTS, 5595*, 6904, 6916*, 6917*, 7357, 8188
  - HYPERTENSION, 6927
  - PROGNOSIS, 379
  - SECRETION, 2292
  - STRESS, 2292
- DUODENITIS
  - GENETIC FACTORS, 3234
- DUODENUM, 6925
  - ACID SECRETION, 5356*, 5593*, 6926, 7976
  - ACIDITY, 8180*
  - AGE FACTORS, 6913*
  - ANDROGENS, 7582
  - ANOMALY, 7581
  - ANTACIDS, 4833*
  - ANTIGENS, 6911*
  - ANTRECTOMY, 7576
  - COMPLICATIONS, 8488
  - CYTOLOGY, 356*
  - DIAGNOSIS, 6913*
  - DISEASES ASSOCIATED WITH, 7581
  - L-DOPA, 8189
  - DRUG THERAPY, 4833*, 6914*, 6917*, 7572*, 8189
  - DUODENITIS, 4835*
  - ENDOSCOPY, 6913*
  - ETIOLOGY, 6911*
  - FAMILIAL FACTORS, 6923
  - GASTRECTOMY, 6934
  - GASTRIN, 4560*, 4835*, 5593*, 7575, 7598
  - GASTRITIS, 4835*
  - GENETIC FACTORS, 6911*
  - H2 RECEPTOR ANTAGONISTS, 4833*, 6917*, 7572*
  - HEALING, 4850
  - HORMONES, 7598
  - HYPERCHLORHYDRIA, 7976
  - INSULIN, 7598
  - LIPASE, 7594
  - PANCREAS FUNCTION TESTS, 6929
  - PATHOLOGY, 367, 6921
  - PENTAGASTRIN, 8180*
  - PEPSIN, 7594
  - PERFORATION, 4837*, 6920*, 7595
  - PREVENTION, 7585
  - PYLOROPLASTY, 4835*, 6918*
  - SECRETION, 7594
  - SEX FACTORS, 5627*, 7582
  - STEROIDS, 7582
  - STOMACH, 356*
  - SURGERY, 6905, 6918*, 6919*, 6931, 7576

- ULCER, PEPTIC (continued)
  - DUODENUM (continued)
    - THERAPY, 6905, 6921, 6931, 7576, 7580, 8186
    - ULCER, 3210
    - VAGOTOMY, 4835*, 5627*, 6905, 6918*, 6919*, 6934, 7576, 7580, 7585, 7600, 7604
  - DYSPEPSIA, 6919*
  - ELECTROPHYSIOLOGY
    - VAGOTOMY, 363
  - ENDOSCOPY, 3201, 7586
    - AGE FACTORS, 6913*
  - ENTERECTOMY
    - COMPLICATIONS, 7584
  - ENZYMES
    - VITAMINS, 389
  - ESOPHAGUS
    - BIOPSY, 3989
    - DIAGNOSIS, 3989
    - ENDOSCOPY, 3989
    - RADIOLOGY, 3989
    - STENOSIS, 8151
    - SURGERY, 8151, 8154
  - ETIOLOGY, 4086, 6922
    - ACID SECRETION, 3142*
    - ANTIGENS, 6911*
    - BURNS, 3142*
    - DISTENTION, 4841
    - GASTRECTOMY, 4078
    - GASTRIN, 3142*
    - GENETIC FACTORS, 6911*
    - HERPESVIRUSES, 2815
    - HYPERCHLORHYDRIA, 3142*
    - REFLUX, 2819
    - REVIEW, 7579
  - FAMILIAL FACTORS, 4086
    - PEPSINOGEN, 4085
  - FEEDING
    - ACID SECRETION, 2830
  - GASTRECTOMY, 3211
    - COMPLICATIONS, 6934, 7571, 7584, 7589, 7593, 7601
  - GASTRIN
    - CELLS, 1338*
    - CIRCADIAN RHYTHM, 7575
    - DIETARY FACTORS, 373
    - DISTENTION, 2285*
    - DRUG EFFECTS ON, 387
    - DRUG THERAPY, 2294
    - FEEDING, 372
    - H2 RECEPTOR ANTAGONISTS, 2294
    - REVIEW, 371
    - SMOKING, 2308
    - ULTRASTRUCTURE, 1338*
  - GASTRITIS
    - COMPLICATIONS, 1350
    - DISEASES ASSOCIATED WITH, 6878*, 6893
    - IMMUNOLOGY, 6893
    - REFLUX, 2246
  - GASTRODUODENITIS
    - DRUG THERAPY, 6930
  - GASTROINTESTINAL DISEASES
    - SURVIVAL, 360
  - GENETIC FACTORS
    - ANTIGENS, 6911*
    - REVIEW, 7578
  - GENETICS
    - PEPSINOGEN, 2301, 4085

- ULCER, PEPTIC (continued)
  - H2 RECEPTOR ANTAGONISTS
    - COMPLICATIONS, 6916*
    - DRUG THERAPY, 2295
    - RECURRENCE, 382
    - REVIEW, 7357
  - HEALING, 3196*
    - DRUG EFFECTS ON, 5628, 5629
  - HEMODIALYSIS
    - H2 RECEPTOR ANTAGONISTS, 5638
  - HEMORRHAGE
    - ETIOLOGY, 7596
    - PROGNOSIS, 7596
    - THERAPY, 5228, 7596
  - HIATAL HERNIA
    - HEMORRHAGE, 5571
  - HISTAMINE, 3194*
  - HORMONE EFFECTS ON
    - REVIEW, 2300
  - HORMONES, ADRENAL CORTEX, 7592
  - HYPERCHLORHYDRIA
    - DRUG EFFECTS ON, 7976
  - HYPERPLASIA
    - ANTRUM, 2256
    - GASTRIN, 1876*
  - INTUBATION
    - SIMULATION, 2281*
  - ISOENZYMES
    - VITAMINS, 389
  - KIDNEYS
    - TRANSPLANTATION, 4816*
  - LIVER
    - ADOLESCENCE, 6268
    - CHILD, 6268
    - PATHOLOGY, 4091
  - LIVER CIRRHOSIS
    - DISEASES ASSOCIATED WITH, 8418
    - ETIOLOGY, 703
  - METABOLISM
    - CARBOHYDRATES, 6264
  - NEOPLASMS, MALIGNANT
    - SIMULATION, 1349
  - OXIDOREDUCTASES
    - VITAMINS, 389
  - PAIN, 6232
    - THERAPY, 5625*
  - PANCREAS, 7602
    - BICARBONATE SECRETION, 8182
    - NEOPLASM METASTASIS, 5776
    - SECRETION, 6929
  - PARASYMPATHOLYTICS
    - DRUG EFFECTS ON, 376
  - PATHOLOGY, 4087, 6922
  - PEPSIN
    - H2 RECEPTOR ANTAGONISTS, 381
    - NERVOUS CONTROL, 366
  - PEPSINOGEN
    - DIAGNOSIS, 3186
    - SERUM, 3186
    - URINE, 3186
  - PERFORATION, 5637
    - CLASSIFICATION, 4837*
    - PROGNOSIS, 7595
    - SURGERY, 4840, 6920*, 7595
    - SURVIVAL, 7595
    - THERAPY, 4064, 6920*, 7595
  - PLASMA
    - GASTRIN, 2285*

- ULCER, PEPTIC (continued)
  - PREVENTION
    - VAGOTOMY, 4816*
    - VITAMIN A, 3898
  - PROGNOSIS
    - HISTAMINE, 6912*
  - PROSTAGLANDINS, 99, 4067*
    - ACID SECRETION, 2284*
  - PSYCHOLOGICAL FACTORS
    - SOCIOECONOMIC FACTORS, 2595
  - PYLOROPLASTY
    - COMPLICATIONS, 6918*
  - PYLORUS
    - MORPHOLOGY, 8165*
  - RADIOLOGY
    - CLASSIFICATION, 2171*
    - MORPHOLOGY, 2171*
  - RADIOTHERAPY
    - COMPLICATIONS, 6225*
  - RECURRENCE, 4077, 7588
    - DRUG THERAPY, 1350
    - REVIEW, 361
    - SURGERY, 361
    - VAGOTOMY, 6271
  - REFLUX
    - PANCREOZYMIN, 1333*
    - SECRETIN, 1333*
  - REVIEW, 2299
  - SECRETIN
    - ACIDITY, 1336*
    - SMOKING, 2308
    - THERAPY, 1342*
  - SECRETION
    - CHLORIDES, 3207
    - ETIOLOGY, 3203
    - GLYCOPROTEINS, 4576
    - HORMONE EFFECTS ON, 2264
    - LIPASE, 7594
    - NERVOUS CONTROL, 2264
    - PENTAGASTRIN, 8180*
    - PEPSIN, 4092, 6925, 7594
    - TECHNIQUES, 3207
  - SERUM
    - FIBRINOGEN, 7597
    - GASTRIN, 4861, 5221, 7575, 7598
    - HORMONES, 7598
    - INSULIN, 7598
    - KININS, 7597
    - TRYPSIN, 7597
  - SIMULATION
    - BLEEDING, 2281*
    - TECHNIQUES, 2281*
  - SMOKING, 4092
  - STOMACH
    - ACID SECRETION, 365, 5356*, 6261*, 6926, 7976
    - AGE FACTORS, 6913*
    - ALCOHOLISM, 4847
    - ASPIRIN, 4847
    - COMPLICATIONS, 8488
    - DIAGNOSIS, 3081, 6913*
    - L-DOPA, 8189
    - DRUG-INDUCED, 3155
    - DRUG THERAPY, 5595*, 6270, 6915*, 6927, 7573*, 8189
    - ELECTROPHYSIOLOGY, 6909
    - ENDOSCOPY, 6913*
    - ETIOLOGY, 4841
    - GASTRECTOMY, 6938

- ULCER, PEPTIC (continued)
  - STOMACH (continued)
    - GASTRIN, 6261*
    - GASTROENTEROSTOMY, 6938
    - H2 RECEPTOR ANTAGONISTS, 5595*, 6915*
    - HEALING, 4850
    - HEMORRHAGE, 6897
    - HISTAMINE, 3193*
    - HYPERCHLORHYDRIA, 6926, 7976
    - HYPERPLASIA, 4864
    - MITOSIS, 4576
    - MORPHOLOGY, 8165*
    - MOTILITY, 5319*, 6909
    - MUCUS, 3155
    - PATHOLOGY, 6921
    - PROTEINS, 8180*
    - PSYCHOLOGICAL FACTORS, 4847, 5596*
    - RECURRENCE, 6271
    - SECRETION, 383, 2264, 3203, 4861, 6261*
    - SMOKING, 4847
    - SOCIOECONOMIC FACTORS, 5596*
    - STRESS, 3715, 4847
    - SURGERY, 6919*
    - THERAPY, 6921, 8186
    - VAGOTOMY, 6271, 6919*, 6938, 7585
  - STRESS
    - HEALING, 3191
    - HORMONE EFFECTS ON, 2832
    - MORPHOLOGY, 3191
    - PREVENTION, 3896, 3898, 4816*
    - SECRETIN, 2832
    - THYROCALCITONIN, 2832, 3896
    - VAGOTOMY, 3721
  - SURGERY
    - ABSORPTION, 6263*
    - AGE FACTORS, 4838
    - ANTRUM, 2286*
    - CHOLECYSTOKININ, 5632
    - COMPLICATIONS, 391, 4852, 6918*, 7593
    - DUMPING SYNDROME, 6918*
    - GASTRIN, 4856
    - GASTRITIS, 391
    - LIPIDS, 1344*
    - PROGNOSIS, 1287*, 4852
    - PYLOROPLASTY, 6918*
    - REVIEW, 1292
    - VAGOTOMY, 6918*, 6932
  - THERAPY, 3186, 4242, 6269, 8184
    - ANTACIDS, 4851
    - OXIDATION, 6265
    - PROGNOSIS, 1287*
    - REVIEW, 4079, 7577, 7591
    - SECRETIN, 6929
    - VAGOTOMY, 6905
  - THROMBOANGITIS, 3216
  - THYROCALCITONIN
    - DIETARY FACTORS, 373
  - ULCER, 2299
    - ACIDITY, 5630
    - SLEEP, 5630
  - URINARY SYSTEM
    - TRANSPLANTATION, 5633
  - URINE
    - EPINEPHRINE, 5221
    - NOREPINEPHRINE, 5221

ULCER, PEPTIC (continued)
  VAGOTOMY
    COMPLICATIONS, 6918*, 6934, 7600
    DUMPING SYNDROME, 6918*, 6934
    GASTRIN, 1335*, 7600
    PROGNOSIS, 7600
    REVIEW, 6271
    SECRETION, 1332
    SURGERY, 392
    TECHNIQUES, 6905
  VITAMIN A
    DEFICIENCY, 3715
  VITAMIN B1, 7605
  VITAMINS, 7605
    DRUG THERAPY, 388

ULCERATIVE COLITIS
  SEE COLITIS, ULCERATIVE

ULCERATIVE ENTERITIS
  SEE ENTERITIS, ULCERATIVE

ULTRASONOGRAPHY
  ABDOMEN, 7270
    CHILD, 5531
    RADIONUCLIDES, 5531
  BILE DUCTS
    DILATATION, 6410*, 6548*
    TECHNIQUES, 3968
  BILIARY TRACT
    OBSTRUCTION, 7823*, 7845
  BILIARY TRACT DISEASES
    DIAGNOSIS, 3943*, 6575*, 7823*, 8132
    REVIEW, 5156*
  CALCULI
    DIAGNOSIS, 1180*
  CHOLECYSTITIS
    CHOLECYSTOGRAPHY, 8123*
    DIAGNOSIS, 3943*
  CHOLECYSTOGRAPHY
    CALCULI, 1180*
    CHOLELITHIASIS, 1180*
    DIAGNOSIS, 1180*
  CHOLELITHIASIS, 7842
    CHOLECYSTOGRAPHY, 8123*
    DIAGNOSIS, 1180*, 2174*, 3943*
  CHOLESTASIS
    DIAGNOSIS, 7823*
    JAUNDICE, 6574*
  COLON
    CIRCULATION, 5756
  COMMON BILE DUCT
    CYSTS, 5146*
    DILATATION, 7222
    MORPHOMETRY, 1574*
  CYSTS
    LIVER, 2175*
  ESOPHAGUS
    NEOPLASMS, 5756
  GALLBLADDER, 6193, 7842
    ANOMALY, 7219*
    CHOLELITHIASIS, 7845
    MORPHOMETRY, 1574*
    TECHNIQUES, 7543
  GALLBLADDER DISEASES
    DIAGNOSIS, 1245, 6575*
    TECHNIQUES, 5535

ULTRASONOGRAPHY (continued)
  HEMANGIOMA
    DIAGNOSIS, 5030*
  HEPATOMEGALY, 6394*
  INTESTINE, LARGE
    GASES, 7684
    NEOPLASMS, 4814*
    TECHNIQUES, 7684
  INTESTINE, SMALL
    INTUSSUSCEPTION, 7025
    NEOPLASMS, 4814*
  JAUNDICE
    DIAGNOSIS, 3111, 5157*, 6548*, 6575*, 7823*, 8135
  JAUNDICE, OBSTRUCTIVE
    COMMON BILE DUCT CALCULI, 7229
    DIAGNOSIS, 5157* , 7823*
  KIDNEY DISEASES, 8330
  KIDNEYS
    ANOMALY, 7219*
  LIVER, 5801*, 6193, 6394*
    ABSCESS, 3045*
    ANOMALY, 7219*
    BILIARY TRACT, 1212
    CYSTS, 3045*, 7123, 8132
    FIBROSIS, 8330
    NEOPLASM METASTASIS, 266, 7125, 7227
    NEOPLASMS, 1246, 5050, 7227, 8132
    NEOPLASMS, BENIGN, 5011*
    NEOPLASMS, MALIGNANT, 3045*
    REVIEW, 8132
    TECHNIQUES, 3045*, 3969
  LIVER CIRRHOSIS
    DIAGNOSIS, 4749*
  LIVER DISEASES, 2208
    DIAGNOSIS, 1245, 3971, 4749*, 6575*, 7823*
    TECHNIQUES, 5535
  NEOPLASM METASTASIS
    NEOPLASMS, BENIGN, 5011*
  NEOPLASMS, MALIGNANT
    NEOPLASMS, BENIGN, 5011*
  PANCREAS, 6151*, 6181, 6359*
    CONTRAST MEDIA, 286
    CYSTS, 1231
    MORPHOLOGY, 284
    NEOPLASMS, 1231, 3050*, 6180
    NEOPLASMS, MALIGNANT, 6361*
    PANCREATITIS, CHRONIC, 1231
    PSEUDOCYSTS, 6182, 6372, 8269
    REVIEW, 8132
    TECHNIQUES, 7547
    TOMOGRAPHY, 2214
  PANCREATIC DISEASES, 6181
    DIAGNOSIS, 285, 6151*, 6180, 6182, 6359*, 7070, 7547, 8132
    PANCREATIC DUCT, 2215
    PANCREATOGRAPHY, 3330
    TECHNIQUES, 5535
    TOMOGRAPHY, 6854*
  PANCREATITIS, 4220*
    DIAGNOSIS, 285, 3050*, 6182
    TOMOGRAPHY, 6382
  PANCREATITIS, CHRONIC, 4220*
    DIAGNOSIS, 6180, 7082
  REVIEW, 7542
  SALIVARY GLANDS
    INFLAMMATION, 6635

ULTRASONOGRAPHY (continued)
- SALIVARY GLANDS (continued)
  - NEOPLASMS, MALIGNANT, 6635
- STOMACH
  - DIAGNOSIS, 4814*
  - TECHNIQUES, 7546
- TOMOGRAPHY
  - PANCREAS, 6855*

ULTRASOUND
- BILE DUCTS
  - CALCULI, 7224
- CHOLELITHIASIS
  - CHOLECYSTOGRAPHY, 3046*
- COMMON BILE DUCT CALCULI, 7224
- CYSTS
  - DIAGNOSIS, 4456*
- JAUNDICE
  - ETIOLOGY, 3504*
- JAUNDICE, OBSTRUCTIVE, 3504*
- LIVER, 4746*
  - PORTACAVAL SHUNT, 1553*
  - SCANNING, SCINTILLATION, 3970
- LIVER FUNCTION TESTS
  - PORTACAVAL SHUNT, 1553*
- PYLORUS
  - STENOSIS, 4741*

UREA
- HEPATITIS, CHRONIC
  - DIAGNOSIS, 4316
- INTESTINE, SMALL
  - ENZYMES, 183
- LIVER
  - BILIARY TRACT DISEASES, 730
  - ENZYMES, 8009*
  - PROTEINS, 8009*
- LIVER CIRRHOSIS
  - DIAGNOSIS, 4316
- REYE'S SYNDROME
  - ENZYMES, 1501
  - METABOLISM, 588

UREMIA
- ALBUMINS
  - METABOLISM, 6611
- AMMONIA
  - BLOOD, 4734
- COLITIS
  - DISEASES ASSOCIATED WITH, 4154*
- COLITIS, ULCERATIVE
  - CHILD, 519
- LIVER
  - GLUCONEOGENESIS, 6795
  - LYSOSOMES, 7453
  - MITOCHONDRIA, 1049
  - SIMULATION, 1049
- LIVER INJURY
  - DISEASES ASSOCIATED WITH, 6452*
- PROTEINS
  - DEFICIENCY, 6611

URIC ACID
- HEPATITIS, INFECTIOUS, 3450
- LIVER
  - ALCOHOLS, 6079*
  - DRUG EFFECTS ON, 6079*
  - SYNTHESIS, 6079*

URINARY SYSTEM
- COLITIS, ULCERATIVE
  - COMPLICATIONS, 3578*
  - FIBROSIS, 4967*
  - STENOSIS, 4967*
- COLON
  - NEOPLASMS, 4153*
- CROHN'S DISEASE
  - CALCULI, 4475*
  - COMPLICATIONS, 3578*
  - OXALATES, 4475*
- DISEASE
  - ALBUMINS, 2546
  - POTASSIUM, 7271
- DIVERTICULITIS
  - COMPLICATIONS, 3578*
- ENTERITIS, REGIONAL
  - COMPLICATIONS, 6677*
- HEPATOMEGALY
  - DISEASES ASSOCIATED WITH, 2461*
- INFLAMMATORY BOWEL DISEASES
  - COMPLICATIONS, 3578*
- JAUNDICE, OBSTRUCTIVE
  - CHOLELITHIASIS, 2579*
  - NEOPLASMS, 2579*
  - STRICTURE, 2579*
- LIVER
  - DRUG METABOLISM, 4451
- LIVER CIRRHOSIS
  - COMPLICATIONS, 2543*
- LIVER DISEASES
  - REVIEW, 2461*
- LIVER FUNCTION TESTS
  - DISEASES ASSOCIATED WITH, 2461*
- NEOPLASM METASTASIS
  - DISEASES ASSOCIATED WITH, 2461*
- NEOPLASMS
  - ALPHA FETOPROTEIN, 7131
- PANCREATITIS
  - COMPLICATIONS, 1448*, 4236
- SURGERY
  - COMPLICATIONS, 4153*
  - NEOPLASMS, 4153*
- TRANSPLANTATION
  - ACID SECRETION, 5633
  - ULCER, PEPTIC, 5633
- ULCER
  - PREVENTION, 4071*

URINE
- ACID SECRETION
  - GLYCOPROTEINS, 214
- AMINO ACIDS
  - ANALYSIS, 1554*
- AMYLASES
  - AGE FACTORS, 6744*
  - CHILD, 6744*
  - INFANT, 6744*
  - TECHNIQUES, 7550
- BILE ACIDS AND SALTS
  - CHOLESTASIS, 3362*
  - EXCRETION, 2577*
  - SULFATES, 3362*
- CELIAC DISEASE
  - SEROTONIN, 6996
- CHOLAGOGUES AND CHOLERETICS
  - CHROMATOGRAPHY, 6098
  - METABOLISM, 6097, 6098

- URINE (continued)
  - CHOLELITHIASIS
    - ENZYMES, 1457*
  - CHOLESTASIS
    - BILE ACIDS AND SALTS, 2577*
  - CROHN'S DISEASE
    - OXALATES, 4258*
  - DRUG METABOLISM, 2601
    - TOXICITY, 7777*
  - EXCRETION
    - ENZYMES, 268
  - GASTRECTOMY
    - ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 5615
  - HARTNUP'S SYNDROME
    - DIAGNOSIS, 5208
  - HEPATITIS
    - ENZYMES, 6464*
  - HEPATITIS, INFECTIOUS
    - ENZYMES, 6464*
  - HYDROCARBONS, CHLORINATED
    - PORPHYRINS, 6785
  - JAUNDICE
    - BILIRUBIN, 5063*, 5064*
    - ENZYMES, 1457*
  - LIVER CIRRHOSIS
    - AFLATOXINS, 1567
    - OXALATES, 4258*
    - SEROTONIN, 706
  - LIVER COMA
    - DOPAMINE, 5123*
    - NOREPINEPHRINE, 5123*
  - LIVER DISEASES
    - ANALGESICS AND ANTIPYRETICS, 2467
    - DIAGNOSIS, 6431
    - ISOENZYMES, 6431
  - MALABSORPTION SYNDROMES
    - OXALATES, 4258*, 6320
  - OXALATES
    - ANTIBIOTICS, 5658*
    - BILE ACIDS AND SALTS, 5658*
    - CALCIUM, 5658*
    - DRUG EFFECTS ON, 5658*
  - PANCREATITIS, CHRONIC
    - OXALATES, 4258*
  - PERMEABILITY
    - EXCRETION, 5276*
  - PORPHYRIA
    - PORPHYRINS, 587
  - PORPHYRINS
    - EXCRETION, 8025*
  - RADIONUCLIDES
    - DIAGNOSIS, 6828*
  - SCHISTOSOMIASIS
    - DIAGNOSIS, 3573
  - SPRUE
    - OXALATES, 4258*
  - ULCER, PEPTIC
    - EPINEPHRINE, 5221
    - NOREPINEPHRINE, 5221
    - PEPSINOGEN, 3186

- UROGASTRONE
  - ACID SECRETION, 1900
  - GROWTH SUBSTANCES
    - CELLS, 2117
  - THYMIDINE
    - MITOSIS, 1900

- UROGENITAL SYSTEM
  - AMYLASES
    - DISEASE, 4247*
  - AUSTRALIA ANTIGEN
    - GEOGRAPHICAL FACTORS, 649
  - CECUM
    - NEOPLASMS, 5728
  - COLON
    - FISTULA, 7705
    - PERFORATION, 7705
  - COLONIC DISEASES
    - SURGERY, 1417
  - CROHN'S DISEASE
    - NEOPLASMS, 7285
    - WOUNDS AND INJURIES, 2674
  - DISEASE, 4165
  - ENTERECTOMY
    - COMPLICATIONS, 7714
  - ENTEROCOLITIS, NECROTIZING
    - SURGERY, 8246
  - FISTULA
    - COLITIS, 490
  - HEPATITIS, INFECTIOUS
    - TRANSMISSION, 8360*
  - HERNIA
    - STOMACH, 5611
  - ILEUM
    - ANOMALY, 6970
  - INFLAMMATION
    - DIAGNOSIS, 6194
  - INFLAMMATORY BOWEL DISEASES
    - COMPLICATIONS, 6676*
    - OBSTRUCTION, 6676*
  - LIVER FUNCTION TESTS
    - SURGERY, 1510*
  - NEOPLASMS
    - COMPLICATIONS, 6595
    - SURGERY, 6595
  - NEOPLASMS, MALIGNANT
    - DIAGNOSIS, 6890
  - PARASITES AND PARASITIC DISEASES
    - PATHOLOGY, 6668
  - RECTUM
    - COMPLICATIONS, 8250
    - FISTULA, 5730
    - SURGERY, 4937
  - SIGMOID
    - FISTULA, 7705
    - PERFORATION, 7705
  - SURGERY
    - INTESTINAL OBSTRUCTION, 6302
    - NUTRITION, 5780

- URTICARIA PIGMENTOSA
  - COLON
    - COLITIS, 8242
  - H2 RECEPTOR ANTAGONISTS
    - THERAPY, 1693

- VACCINES
  - CHOLERA
    - ANTIBODIES, 777
  - HEPATITIS
    - REVIEW, 6480*
  - HEPATITIS, INFECTIOUS, 7160
    - AUSTRALIA ANTIGEN, 1537
    - REVIEW, 6480*
  - SALMONELLOSIS
    - SIMULATION, 1701

VAGOTOMY
  ABDOMEN
    DRAINAGE, 318
  ACID SECRETION, 3150, 3718
    DRUG EFFECTS ON, 2795*
  AMINO ACIDS
    ANALYSIS, 5635
  ANTRUM
    GASTRIN, 3719
    NERVOUS CONTROL, 8120
    ULCER, 6274
  BILE ACIDS AND SALTS
    CHOLERESIS, 8108*
    METABOLISM, 4842
    SECRETIN, 8108*
  BONES
    DISEASE, 4853
  CELIAC DISEASE, 2358
  CELLS
    GASTRIN, 3720
  COLON, 3628*
    PRESSURE STUDY, 3628*
  COMPLICATIONS, 4853, 5644
    DIARRHEA, 1289*, 2591*, 4044*, 4094, 6936
    DUMPING SYNDROME, 5598*
    ETIOLOGY, 4843
    HYPOGLYCEMIA, 5598*
    NAUSEA, 6936
    OBSTRUCTION, 1288*
    PAIN, 6936
    RADIOLOGY, 6933
    REVIEW, 1288*
    THERAPY, 4048, 4844, 6936
    VOMITING, 6936
  DIARRHEA
    BILE ACIDS AND SALTS, 7854*
    DRUG THERAPY, 2591*, 7854*
    ETIOLOGY, 4842, 7854*
    ION-EXCHANGE RESINS, 2591*
  DRAINAGE
    COMPLICATIONS, 4048
  DUODENITIS, 4835*
  DUODENUM
    ELECTROPHYSIOLOGY, 2763, 2765, 5189, 5324*
    GASTRIN, 4074*
    MOTILITY, 1148, 5189, 5324*
    ULCER, 2824, 3717, 4855, 5189, 6280, 6281
    ULCER, PEPTIC, 4835*, 5627*, 6905, 6918*, 6919*, 6934, 7576, 7580, 7585, 7600, 7604
    ULTRASTRUCTURE, 2686
  ELECTROPHYSIOLOGY
    DRUG EFFECTS ON, 3658
    HYPOGLYCEMIA, 3658
    TECHNIQUES, 6243
  ENDOSCOPY, 6154
  ESOPHAGUS
    MOTILITY, 7574*
    SPHINCTER, 7574*
  FATS
    ANALYSIS, 5635
  FEEDING
    MOTILITY, 1148
  GASES
    STASIS, 6933

VAGOTOMY (continued)
  GASTRECTOMY
    HEMORRHAGE, 392
    SURGERY, 392
  GASTRIN, 4835*, 4856
    ANTRUM, 2238*
    CELLS, 3719
    SECRETION, 1335*, 3638*
    SEQUELAE, 2238*
    ULTRASTRUCTURE, 8181*
  GASTRITIS, 4835*
  GASTROINTESTINAL SYSTEM
    ELECTROPHYSIOLOGY, 363
  GLUCOSE
    ANALYSIS, 5635
  HIATAL HERNIA
    COMPLICATIONS, 293*
  HISTAMINE, 3194*
    ACID SECRETION, 973
  HYPERCHLORHYDRIA, 4573*
  HYPOGLYCEMIA
    GASTRIN, 6285
    PREVENTION, 5598*
  JEJUNUM
    MORPHOLOGY, 2688
    ULTRASTRUCTURE, 2688
  LIVER
    MITOCHONDRIA, 6105
    REGENERATION, 3752*
  MOTILIN, 4858
  ODDI'S SPHINCTER
    ELECTROPHYSIOLOGY, 2745*
    MOTILITY, 6848
  PANCREAS
    BICARBONATE SECRETION, 2287*
    PEPTIDES, 1928*
    SECRETION, 1746*, 5494
    SIMULATION, 1746*
    ULTRASTRUCTURE, 1746*
  PEPSIN
    DRUG EFFECTS ON, 2795*
  PEPTIDES, 4578
  PLASMA
    GASTRIN, 3717
  PROGNOSIS
    REVIEW, 1320
  PROSTAGLANDINS, 3722
  PYLOROPLASTY
    TECHNIQUES, 6245
  PYLORUS
    NERVOUS CONTROL, 8120
  SECRETION
    CHOLECYSTOKININ, 3738
    GASTRIN, 4573*, 7364
    HORMONES, GASTROINTESTINAL, 3738
    SECRETIN, 3738
  SERUM
    GASTRIN, 3718, 3719, 5623*, 7603
  STASIS
    DRUG THERAPY, 3145*
  STOMACH
    ACID SECRETION, 2683*, 4854, 5494, 5624*, 6271, 6743, 7364, 7603
    ACIDS, 3140*
    DISTENTION, 6933
    ELECTROPHYSIOLOGY, 2763, 2765, 3636*, 5189, 5324*, 6909
    EROSIONS, 4812*
    FOOD, 3636*

- VAGOTOMY (continued)
  - STOMACH (continued)
    - GASTRIN, 3594, 4074*, 7364
    - GLUCAGON, 3636*
    - GLUCOSE, 2805
    - MORPHOLOGY, 6262*
    - MOTILITY, 1148, 2276, 5189, 5324*, 6909, 7322*, 7593, 7940*
    - NECROSIS, 6258
    - PRESSURE STUDY, 2767
    - SECRETION, 1332, 2805, 3140*, 3717, 3723, 5494, 6935
    - STASIS, 3145*
    - SURGERY, 3199*
    - ULCER, 355, 390, 4812*, 6258
    - ULCER, PEPTIC, 6271, 6919*, 6938, 7585
    - ULTRASTRUCTURE, 2683*, 3199*
  - TECHNIQUES
    - ACID SECRETION, 7353*
    - ANALYSIS, 6245
    - MOTILITY, 7353*
    - REVIEW, 6271
    - ULCER, 5646
  - ULCER
    - DUMPING SYNDROME, 7322*
    - DUODENUM, 6275, 6282, 8181*
    - ELECTROPHYSIOLOGY, 6282
    - GASTRIN, 6278
    - PROGNOSIS, 6272, 6280
    - RECURRENCE, 5646
    - REGENERATION, 6282
    - STRESS, 1153
  - ULCER, PEPTIC
    - COMPLICATIONS, 6918*, 6934, 7600
    - DUMPING SYNDROME, 6918*, 6934
    - ELECTROPHYSIOLOGY, 363
    - GASTRIN, 1335*, 7600
    - PREVENTION, 4816*
    - PROGNOSIS, 7600
    - RECURRENCE, 6271
    - REVIEW, 6271
    - SECRETION, 1332
    - STRESS, 3721
    - SURGERY, 392, 6918*, 6932
    - TECHNIQUES, 6905
    - THERAPY, 6905

- VARICES
  - BLEEDING
    - DUODENUM, 4126
    - ESOPHAGUS, 311, 4802
    - PROSTHESIS, 4802
    - SURGERY, 4126
    - THERAPY, 311
  - CIRCULATION
    - OBSTRUCTION, 6291*
  - COLOSTOMY
    - BLEEDING, 1565
  - DIAGNOSIS
    - DYES, 8155
  - DUODENUM
    - ANGIOGRAPHY, 6291*
    - BLEEDING, 6900
    - CIRCULATION, 6291*
    - DIAGNOSIS, 6900
    - OBSTRUCTION, 6291*
    - SURGERY, 6900
    - THERAPY, 6900

- VARICES (continued)
  - EDEMA
    - LIVER CIRRHOSIS, 1556*
  - ESOPHAGUS, 3213, 8159
    - BARIUM, 5231
    - BLEEDING, 798, 3474*, 5568*, 7558
    - CHILD, 8157
    - DIAGNOSIS, 4024*, 8155
    - DISEASES ASSOCIATED WITH, 5578
    - DRUG EFFECTS ON, 4024*
    - DYES, 8155
    - ENDOSCOPY, 4024*
    - ETIOLOGY, 3474*
    - HEMORRHAGE, 3137, 6200*, 6897, 8156, 8157
    - HYPERTENSION, PORTAL, 4608*, 6200*
    - MUSCLE RELAXANTS, 4024*
    - PRESSURE STUDY, 3474*
    - PROGNOSIS, 6200*
    - RADIOLOGY, 4024*
    - SCLEROSIS, 4037
    - SHUNT, 574
    - SPLENORENAL SHUNT, 8158
    - SURGERY, 312, 4608*, 8158
    - THERAPY, 5568*, 7558, 8156, 8157, 8158
    - THYROID GLAND, 5578
  - GASTROINTESTINAL SYSTEM
    - LIVER CIRRHOSIS, 5902*
    - THERAPY, 5902*
    - VASOPRESSIN, 5902*
  - HEMORRHAGE
    - HYPERTENSION, PORTAL, 6200*
    - PROGNOSIS, 6200*
  - HYPERTENSION, PORTAL
    - BLEEDING, 4352
  - ILEOSTOMY
    - BLEEDING, 1565
  - LIVER CIRRHOSIS
    - BLEEDING, 2563, 3483*, 7185*
    - ESOPHAGUS, 7185*
  - STOMACH
    - BLEEDING, 5568*, 6900
    - DIAGNOSIS, 3147*, 6900
    - RADIOLOGY, 3147*, 3192
    - SURGERY, 6900
    - THERAPY, 5568*, 6900
  - THYROID GLAND
    - DISEASES ASSOCIATED WITH, 5578

- VASOACTIVE INTESTINAL PEPTIDE
  - SEE HORMONES, GASTROINTESTINAL

- VASOCONSTRICTOR AGENTS
  - LIVER
    - ARTERIES, 1175
  - PANCREAS
    - NOREPINEPHRINE, 4586*
    - SECRETION, 4586*
  - STOMACH
    - CIRCULATION, 1142

- VASODILATOR AGENTS
  - INTESTINE, LARGE
    - ELECTROPHYSIOLOGY, 7951
    - MOTILITY, 7949, 7951
  - INTESTINES
    - HYPOXIA, 2125
    - ISCHEMIA, 2125

VASODILATOR AGENTS (continued)
- PANCREAS
  - ADRENERGIC RECEPTOR AGONISTS, 4586*
  - DOPAMINE, 4587*
  - SECRETION, 4586*
- STOMACH
  - MOTILITY, 7949

VASOPRESSIN
- GASTROINTESTINAL SYSTEM
  - BLEEDING, 5902*
  - HEMORRHAGE, 7186*
  - VARICES, 5902*
- HEMORRHAGE
  - ANESTHESIA, 6874*
  - TECHNIQUES, 5579
- LIVER
  - CIRCULATION, 6756*, 8006*
- MESENTERY
  - CIRCULATION, 2118
- PRIMATES
  - ARTERIES, 2118
  - CIRCULATION, 2118
  - MESENTERY, 2118
- REVIEW, 7186*
- STOMACH
  - ACID SECRETION, 4572*

VATER'S AMPULLA
- CALCULI
  - ENDOSCOPY, 3512
  - RADIOLOGY, 3512
- CARCINOID TUMOR
  - RADIOLOGY, 740
- DRUG EFFECTS ON
  - PRESSURE STUDY, 739
- ENDOSCOPY, 4775
  - DIAGNOSIS, 6857
  - DISEASE, 6857
  - GASTRECTOMY, 2317*
  - SURGERY, 6857
- ETIOLOGY, 2748
- GARDNER'S SYNDROME
  - NEOPLASMS, 5654*
- NARCOTICS
  - PRESSURE STUDY, 739
- NEOPLASMS
  - RADIOLOGY, 4359*
- NEOPLASMS, MALIGNANT, 4198
  - DIAGNOSIS, 3083
  - ENDOSCOPY, 3083
- STENOSIS
  - ASCARIASIS, 7894
  - HORMONE EFFECTS ON, 2748
  - PANCREATIC DUCT, 4982

VEINS
- ACIDS
  - SEROTONIN, 2116
- BILE DUCTS
  - ANOMALY, 8440
  - DILATATION, 5546
- CHEMICAL COMPOSITION
  - GASES, 6418*
- DUODENUM
  - ENDOSCOPY, 429
- EMBOLIZATION
  - TECHNIQUES, 8402*

VEINS (continued)
- ENTEROCOLITIS, NECROTIZING
  - GASES, 1689
  - LIVER, 1689
- ESOPHAGUS
  - EMBOLIZATION, 8402*
  - NEOPLASMS, MALIGNANT, 1258*
- HEPATITIS, CHRONIC
  - NECROSIS, 689
- HEPATOCYTES
  - OBSTRUCTION, 3032
- HYPERTENSION, PORTAL
  - EMBOLIZATION, 8402*
  - MOTILITY, 2885*
  - MUSCLES, 2885*
- HYPOPLASIA
  - HYPERTENSION, PORTAL, 7464
- INTESTINAL OBSTRUCTION
  - ANOMALY, 7661*
- INTESTINE, SMALL
  - SECRETION, 2058*
- LIVER
  - HYPOPLASIA, 7464
  - MORPHOLOGY, 1465, 3923
  - NECROSIS, 689
  - NEOPLASMS, 584
  - OBSTRUCTION, 584, 5040*
  - SEROTONIN, 2116
- LIVER CIRRHOSIS
  - EMBOLIZATION, 8402*
- LIVER DISEASES
  - GASES, 6418*
- LIVER DISEASES, ALCOHOLIC
  - NECROSIS, 689
- NEOPLASMS, MALIGNANT
  - ANGIOGRAPHY, 3105
- PANCREAS
  - FETUS, 5998
  - ULTRASTRUCTURE, 5998
- PORTACAVAL SHUNT
  - MORPHOLOGY, 2537*
- SHUNT
  - CRYOPROBE, 6076*
  - TECHNIQUES, 6076*
- STOMACH
  - EMBOLIZATION, 8402*

VENEREAL DISEASES
- AMEBIASIS, 6641*
- ANTIBODIES, 6422*
- STOMACH
  - NEOPLASMS, 6240

VIBRIO
- DIARRHEA
  - ETIOLOGY, 2640
- GASTROINTESTINAL DISEASES
  - SERODIAGNOSIS, 805

VILLI
- ATROPHY
  - ANTIGENS, 4914
  - DISEASES ASSOCIATED WITH, 4914
  - HYPERSENSITIVITY, 4914
- CELIAC DISEASE
  - REGENERATION, 3252*
- CHILD
  - ATROPHY, 3257*

VILLI (continued)
- CIRCULATION
  - TECHNIQUES, 2124
- COLECTOMY, 2966*
- COLON
  - NEOPLASMS, 7676
  - SURGERY, 2966*
- DRUG EFFECTS ON
  - CERULEIN, 2738*
  - GLUCAGON, 2738*
  - PROSTAGLANDINS, 2738*
- ENZYMES
  - INTESTINE, SMALL, 1088
- ILEUM
  - ALBUMINS, 1773*
  - PROTEINS, 1773*
- INTESTINE, SMALL
  - ALBUMINS, 1773*
  - ALKALOIDS, 1852
  - ATROPHY, 8099*
  - CIRCULATION, 1120, 2124
  - DRUG EFFECTS ON, 6833*
  - ENTEROKINASE, 7490*
  - GALACTOSE, 1852
  - ISCHEMIA, 2100*
  - MORPHOMETRY, 3010
  - MOTILITY, 2738*
  - PROTEINS, 1773*, 4682*
  - RADIATION EFFECTS ON, 6833*
- INTESTINES
  - TRANSPORT, 878
- INTRINSIC FACTOR
  - PROTEINS, 2062*
- ISCHEMIA
  - WOUNDS AND INJURIES, 2100*
- JEJUNUM
  - COLON, 5990*
- LACTOSE INTOLERANCE
  - INFANT, 2364
- MALABSORPTION SYNDROMES
  - INTESTINE, SMALL, 8226*
- MOTILITY
  - DRUG EFFECTS ON, 2738*
- OBESITY
  - SHUNT, INTESTINAL, 4107*
- PROTEIN-LOSING ENTEROPATHIES
  - HYPOPROTEINEMIA, 3257*
- RECTUM
  - NEOPLASMS, 7676
- SHUNT, INTESTINAL
  - MORPHOLOGY, 3868*
- SURGERY
  - INTESTINE, SMALL, 1088

VIRUS DISEASES
- COLITIS, ULCERATIVE, 7279
- CROHN'S DISEASE, 7279
- DISEASES ASSOCIATED WITH
  - GASTROENTERITIS, 8481
- ENTERITIS
  - INTESTINE, SMALL, 2962*
  - JEJUNUM, 2962*
- GASTROENTERITIS
  - CHILD, 4392*, 7251, 8455*
  - EPIDEMIOLOGY, 7251
  - INFANT, 7251, 8460
  - INTESTINE, SMALL, 2962*
  - JEJUNUM, 2962*
  - SEASONAL FACTORS, 8455*

VIRUS DISEASES (continued)
- GASTROENTERITIS (continued)
  - TRANSMISSION, 4392*
- HEPATITIS, INFECTIOUS
  - IMMUNOLOGY, 2494*
- LIVER
  - NEOPLASMS, MALIGNANT, 7248
- TRANSMISSION, 1704

VIRUSES
- ANTIBODIES
  - CATHARTICS, 632
- COLITIS, ULCERATIVE
  - BIOCHEMISTRY, 2406*
- COLON
  - CROHN'S DISEASE, 5255*
- CROHN'S DISEASE, 6673*
  - BIOCHEMISTRY, 2406*
  - ETIOLOGY, 5255*
  - FECES, 2671*
  - PARTICLES, 2671*
  - ULTRASTRUCTURE, 2671*, 5255*
- DIARRHEA
  - EPIDEMIOLOGY, 5200
  - ETIOLOGY, 2640
  - NEONATE, 785
- ENTERITIS
  - NEONATE, 229
  - SIMULATION, 229
  - ULTRASTRUCTURE, 229
- GASTROENTERITIS, 8456*
  - AGE FACTORS, 5935*
  - CHILD, 790, 791, 5935*, 7872
  - DEHYDRATION, 5935*
  - DIAGNOSIS, 5935*, 7863
  - EPIDEMIOLOGY, 5200, 5935*
  - ETIOLOGY, 4429, 5205
  - IMMUNOGLOBULINS, 1110, 1703
  - INFANT, 791, 5935*
  - INTERFERON, 420
  - SEASONAL FACTORS, 5935*
  - VOMITING, 5935*
- HEPATITIS, 5098
  - AGE FACTORS, 7469
  - REVIEW, 6456*
  - SIMULATION, 1166, 7472
- HEPATITIS, CHRONIC
  - PARTICLES, 1539
- HEPATITIS, INFECTIOUS
  - ANTIGENS, 8349*
  - CELL CULTURE, 1540
  - EPIDEMIOLOGY, 6481*
  - FECES, 5090*, 5873*
  - IMMUNOLOGY, 8349*
  - PARTICLES, 1539
- HEPATITIS, TOXIC
  - NECROSIS, 6786
  - SIMULATION, 6786
- IMMUNOGLOBULINS
  - COLOSTRUM, 1111
  - GASTROENTERITIS, 1111
  - TRANSMISSION, 1111
- INFLAMMATORY BOWEL DISEASES
  - BIOCHEMISTRY, 2406*
  - TECHNIQUES, 2406*
- INTESTINE, SMALL
  - PARTICLES, 228
  - SCLEROSIS, 7877, 7891

VIRUSES (continued)
- INTESTINES
  - IMMUNOGLOBULINS, 1110
- JEJUNUM
  - SCLEROSIS, 7877, 7891
- LIVER CIRRHOSIS
  - PARTICLES, 1539
- LIVER DISEASES
  - ANTIBODIES, 1470
- PANCREATITIS
  - ETIOLOGY, 3341*
- REYE'S SYNDROME
  - ETIOLOGY, 1500
  - PARTICLES, 1500
- SALIVARY GLANDS
  - IMMUNOGLOBULINS, 1110

VITAMIN A
- ABSORPTION
  - NUTRITION, 899
  - REVIEW, 899
- ASCARIASIS
  - ABSORPTION, 2663
- DEFICIENCY
  - ALCOHOLS, 6078*
- ENTEROCOLITIS, NECROTIZING
  - NEONATE, 5201
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 1657
  - METABOLISM, 1657
- LIPOGENESIS, 6774*
- LIVER
  - DEFICIENCY, 6078*
  - LIPOGENESIS, 6773*
- LIVER INJURY, 7779
- MICELLES
  - SOLUBILITY, 898
- PREGNANCY
  - TRANSPORT, 2110
- STOMACH
  - ULCER, 1152
- STRESS
  - ULCER, 1150, 1152
- ULCER
  - PREVENTION, 2268
- ULCER, PEPTIC
  - DEFICIENCY, 3715
  - PREVENTION, 3898

VITAMIN B1
- GASTROINTESTINAL SYSTEM
  - ABSORPTION, 2706*
  - TRANSPORT, 2706*
- INTESTINE, SMALL
  - ABSORPTION, 2706*
  - TRANSPORT, 2706*
- JEJUNUM
  - TRANSPORT, 893
- LIVER
  - BIOCHEMISTRY, 2014
  - ENZYMES, 2014
- LIVER CIRRHOSIS, 7190
- LIVER DISEASES, ALCOHOLIC, 7190
  - ALCOHOLISM, 5112*
- LIVER INJURY
  - THERAPY, 8295*
- ULCER, PEPTIC, 7605

VITAMIN B2
- INTESTINE, SMALL
  - ABSORPTION, 1814
- LIVER DISEASES, ALCOHOLIC
  - ALCOHOLISM, 5112*
- MITOCHONDRIA
  - OXIDATION, 2013

VITAMIN B6
- HEPATITIS
  - METABOLISM, 2448*
- INTESTINE, SMALL
  - ABSORPTION, 6021
- JEJUNUM
  - ABSORPTION, 6021
- LIVER DISEASES
  - METABOLISM, 2448*
  - OBSTRUCTION, 2448*
- LIVER DISEASES, ALCOHOLIC
  - ALCOHOLISM, 5112*
  - METABOLISM, 2448*

VITAMIN B12
- ABSORPTION
  - BICARBONATE SECRETION, 1441*
  - COLITIS, ULCERATIVE, 4963*
  - INTESTINES, 1779*
  - PANCREAS, 1779*
  - PREGNANCY, 3610*
  - TRYPSIN, 4509*
  - TRYPSINOGEN, 4509*
- ACID SECRETION
  - AGE FACTORS, 5622
- ANEMIA
  - DEFICIENCY, 8482
- ANEMIA, PERNICIOUS
  - ABSORPTION, 6609, 6989
  - RADIONUCLIDES, 6609, 6989
- BILE
  - BINDING, 2419
- BILE ACIDS AND SALTS
  - COLITIS, ULCERATIVE, 4963*
- CYSTIC FIBROSIS
  - ABSORPTION, 8268*
- DEFICIENCY
  - FOLIC ACID, 7473
- FATTY ACIDS
  - LIVER, 138
- GASTRECTOMY
  - MALABSORPTION SYNDROMES, 3270
- GASTRITIS
  - MALABSORPTION SYNDROMES, 2245
- GIARDIASIS
  - MALABSORPTION SYNDROMES, 7892*
- HEPATITIS, CHRONIC
  - CHILD, 5890
  - DIAGNOSIS, 5890
  - PROGNOSIS, 5890
  - SERUM, 5890
- HEPATITIS, INFECTIOUS
  - THERAPY, 5852*
- ILEUM
  - SURGERY, 5663
- INTESTINE, SMALL
  - ABSORPTION, 400, 3610*, 4509*, 4510*
  - INTRINSIC FACTOR, 3014
  - PANCREATITIS, CHRONIC, 4510*

VITAMIN B12 (continued)
    INTESTINES
        ABSORPTION, 897
    INTRINSIC FACTOR
        ABSORPTION, 871*
        BINDING, 963
        CHROMATOGRAPHY, 3014
        IRRADIATION, 963
        STOMACH, 963
    LIVER
        ALCOHOLISM, 695
        BINDING, 130
        METABOLISM, 2015
    MALABSORPTION SYNDROMES, 7640
        BACTERIA, 2367
        BACTERIAL INFECTIONS, 4924
        CHILD, 6985
        STASIS SYNDROME, 2367
    METABOLISM
        SURGERY, 5663
    PANCREAS, 897
        BINDING, 3835*
        ENZYMES, 2419
        SECRETION, 1779*
    PANCREATECTOMY
        ABSORPTION, 1780*
    PANCREATIC DISEASES
        ABSORPTION, 1441*, 5783
        MALABSORPTION SYNDROMES, 871*
    PANCREATITIS, CHRONIC
        SERUM, 3358
    SERUM
        BINDING, 2782*
    STOMACH
        BINDING, 2782*

VITAMIN C
    CHOLELITHIASIS
        PREVENTION, 6780*
    ESOPHAGEAL REFLUX
        DEFICIENCY, 6208
    HEMOCHROMATOSIS
        DEFICIENCY, 3399
    LIVER
        ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6765*
    LIVER CIRRHOSIS, OBSTRUCTIVE
        DEFICIENCY, 5008*
    LIVER DISEASES
        DEFICIENCY, 5008*
        LEUKOCYTES, 633
    LIVER DISEASES, ALCOHOLIC
        DEFICIENCY, 5008*
    NUTRITION DISORDERS
        ENTERITIS, REGIONAL, 853

VITAMIN D
    ABSORPTION
        CALCIUM, 1362
        PHOSPHORUS, 1362
    BINDING
        INTESTINES, 5458
        PROTEINS, 5458
    CALCIUM
        BINDING, 5451
    CIRCULATION
        DIABETES, 5294
    DIABETES
        SIMULATION, 5294

VITAMIN D (continued)
    DUODENUM
        BINDING, 2974
        PROTEINS, 5447
    ENTERECTOMY
        OSTEOMALACIA, 7641
    GASTRECTOMY
        BONES, 6254
        MINERALS, 6254
        PLASMA, 5615
    INTESTINAL ABSORPTION
        PLASMA, 7609*
        SURGERY, 7609*
    INTESTINE, SMALL
        MITOCHONDRIA, 6839
        NUCLEIC ACIDS, 6839
        PROTEINS, 6839
        SURGERY, 7609*
    INTESTINES
        ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2075
        CHROMATIN, 2088
        ORGAN CULTURE, 2075
    JAUNDICE, CHOLESTATIC
        DEFICIENCY, 3386
    LIVER
        ADENOSINE TRIPHOSPHATASE, 142
        MITOCHONDRIA, 6839
        NUCLEIC ACIDS, 6839
        OXIDATIVE PHOSPHORYLATION, 142
        PROTEINS, 6839
    LIVER CIRRHOSIS
        DEFICIENCY, 3386
    LIVER CIRRHOSIS, OBSTRUCTIVE
        ABSORPTION, 3479*
        DEFICIENCY, 3386
        METABOLISM, 2542*
    LIVER DISEASES
        DEFICIENCY, 3386
    LIVER DISEASES, ALCOHOLIC
        DEFICIENCY, 3386
        METABOLISM, 5900
    METABOLISM
        HEPATITIS, 3363*
        LIVER CIRRHOSIS, 3363*
        LIVER DISEASES, 3363*
        LIVER DISEASES, ALCOHOLIC, 3363*
    PROTEINS
        BINDING, 1115
        DIETARY FACTORS, 5451
        DUODENUM, 2079
        GROWTH FACTORS, 5451
        INTESTINES, 2081
    SHORT BOWEL SYNDROME
        OSTEOMALACIA, 7641
    SHUNT, INTESTINAL
        CIRCULATION, 3223*
        OBESITY, 3223*
    TRANSPORT
        CALCIUM, 1802, 6016

VITAMIN E
    GASTRITIS
        DRUG THERAPY, 6228
    INTESTINAL ABSORPTION, 5280*
    INTESTINES
        ABSORPTION, 4116
    LIPIDS
        PEROXIDATION, 2040

VITAMIN E (continued)
- LIVER
  - DYSTROPHY, 8078
- TRANSPORT
  - DRUGS, 875

VITAMIN K
- COLON
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- ILEUM
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- INTESTINE, LARGE
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- INTESTINE, SMALL
  - ABSORPTION, 7314
  - TRANSPORT, 7314
- TRANSPORT
  - BILE, 7314

VITAMINS
- ABSORPTION
  - ANTACIDS, 7359
- DEFICIENCY
  - THERAPY, 3374*
- HEPATITIS, INFECTIOUS
  - THERAPY, 5852*
- JEJUNUM
  - ABSORPTION, 890
- LIVER
  - METABOLISM, 4351
  - REGENERATION, 8079
- LIVER CIRRHOSIS
  - METABOLISM, 4351
- LIVER DISEASES
  - DEFICIENCY, 3374*
- LIVER DISEASES, ALCOHOLIC
  - METABOLISM, 4351
- LIVER INJURY
  - COENZYMES, 8295*
  - THERAPY, 8295*
- ULCER, PEPTIC, 7605
  - DRUG THERAPY, 388
  - ENZYMES, 389
  - ISOENZYMES, 389
  - OXIDOREDUCTASES, 389

VOLVULUS
- SEE INTESTINAL OBSTRUCTION

VOMITING
- DISEASES ASSOCIATED WITH
  - CARDIOVASCULAR SYSTEM, 4452
- DRUG THERAPY
  - REVIEW, 8479
- ESOPHAGEAL REFLUX
  - SURGERY, 7521
- ETIOLOGY
  - REVIEW, 8479
- GASTROENTERITIS
  - VIRUSES, 5935*
- GASTROINTESTINAL DISEASES
  - INFANT, 7878
- MALLORY-WEISS SYNDROME, 7563
- PYLOROPLASTY
  - COMPLICATIONS, 6936
- VAGOTOMY
  - COMPLICATIONS, 6936

WATER
- ABSORPTION
  - CAFFEINE, 6025
  - DRUG EFFECTS ON, 3611*, 6025
  - INTESTINES, 900
  - REVIEW, 900
- ACID SECRETION
  - ULCER, 2310
- BILE
  - SYNTHESIS, 1003*
  - TRANSPORT, 1003*
- CHOLERA
  - TRANSMISSION, 4419
- COLON
  - ABSORPTION, 4506*
  - TRANSPORT, 3608*, 4506*
- DIARRHEA
  - TRANSMISSION, 5170*
- FECES
  - FIBERS, 2588*
- GALLBLADDER
  - ABSORPTION, 1769*
- GASTROENTERITIS
  - TRANSMISSION, 789, 5170*
- GASTROINTESTINAL DISEASES
  - EPIDEMIOLOGY, 1673
  - TRANSMISSION, 6619
- GIARDIASIS
  - TRANSMISSION, 3558*
- ILEUM
  - ABSORPTION, 4499*, 7305*
  - CROHN'S DISEASE, 849
  - SECRETION, 4499*
  - TRANSPORT, 849, 4498*, 4499*, 4507*, 7305*
- INTESTINAL ABSORPTION
  - MOTILITY, 6694*
- INTESTINE, SMALL
  - ABSORPTION, 3611*, 4500*, 7305*
  - PERMEABILITY, 2712
  - SECRETION, 2961*
  - SURFACTANTS, 8086*
  - TRANSPORT, 1815, 1816, 1817, 2712, 4500*, 4507*, 5278*, 7305*, 8086*
- INTESTINES
  - ABSORPTION, 3622
  - TRANSPORT, 7921*
- JEJUNUM
  - ABSORPTION, 6012, 6025, 7305*
  - SECRETION, 2961*
  - TRANSPORT, 4498*, 5286*, 7305*, 7313
- LIVER CIRRHOSIS
  - ABSORPTION, 8044*
- PANCREAS
  - SECRETION, 4590*
- PANCREATIC DISEASES
  - ABSORPTION, 4391*
  - SECRETION, 4391*
- SHIGELLOSIS
  - TRANSMISSION, 789
- SPRUE, TROPICAL
  - TRANSPORT, 6982*
- TRANSPORT
  - DRUG EFFECTS ON, 7921*
  - SALMONELLOSIS, 7921*
- ULCER
  - DUODENUM, 2304

- WATER, ELECTROLYTE BALANCE
  - CHOLERA
    - ENTEROTOXINS, 2085
    - INTESTINE, SMALL, 2085
  - COLON
    - POTASSIUM, 3833*
  - CROHN'S DISEASE
    - BILE ACIDS AND SALTS, 3577*
    - ILEUM, 3577*
  - DIARRHEA
    - HORMONES, GASTROINTESTINAL, 4427
  - ENTERITIS, REGIONAL
    - BILE ACIDS AND SALTS, 3577*
    - DIARRHEA, 3577*
    - ILEUM, 3577*
  - GALLBLADDER, 44
    - ION TRANSPORT, 1769*
    - TRANSPORT, 1767*
  - GASTROENTERITIS
    - THERAPY, 2612
  - HEMORRHAGE
    - THERAPY, 6874*
  - ILEUM, 6134
  - INTESTINE, SMALL
    - CALCIUM, 2078
    - COBALT, 1804
    - DRUGS, 5342
    - EPITHELIUM, 5279*
    - IRON, 1804
    - SEROTONIN, 1781*
    - TRANSPORT, 5279*
  - JEJUNUM, 5286*, 6134
    - ANTI-INFLAMMATORY AGENTS, 2059*
    - CHOLERA, 2059*
    - ENTEROTOXINS, 2059*
    - POTASSIUM, 3833*
  - LIVER
    - CIRCULATION, 4706*
    - OSMOTIC PRESSURE, 135
  - NUTRITION DISORDERS
    - CHILD, 5947
  - PANCREAS
    - SECRETION, 1926*
  - STOMACH
    - SECRETION, 2787*

- WHIPPLE'S DISEASE
  - SEE LIPODYSTROPHY, INTESTINAL

- WILSON'S DISEASE
  - AMINO ACIDS
    - LIVER FUNCTION TESTS, 8314
    - METABOLISM, 8314
  - BILE
    - COPPER, 6072*
  - CERULOPLASMIN
    - FAMILIAL FACTORS, 3375*
  - CHROMOSOMES
    - ULTRASTRUCTURE, 3404
  - COPPER
    - DRUG EFFECTS ON, 4262*
    - EXCRETION, 6072*
    - METABOLISM, 6072*
  - DIAGNOSIS, 7145*
    - DRUG THERAPY, 5822*
  - DISEASES ASSOCIATED WITH
    - HEPATITIS, 7145*
    - HEPATITIS, CHRONIC, 7769
    - LIVER CIRRHOSIS, 7769

- WILSON'S DISEASE (continued)
  - EPIDEMIOLOGY
    - AGE FACTORS, 5041*
    - FAMILIAL FACTORS, 5041*
    - GENETIC FACTORS, 5041*
    - SEX FACTORS, 5041*
  - FAMILIAL FACTORS, 594
  - GENETICS
    - REVIEW, 543*
  - HEMOLYSIS, 2465*
    - GLUTATHIONE, 8304*
  - INTESTINE, SMALL
    - COPPER, 3404
    - ETIOLOGY, 3404
  - LIVER
    - COPPER, 595
  - LIVER CIRRHOSIS
    - REVIEW, 8397*
  - PREGNANCY
    - REVIEW, 8305*
  - THERAPY, 549

- WOLMAN'S DISEASE
  - DIET
    - CHOLESTEROL, 4653
    - FATS, 4653

- WOUNDS AND INJURIES
  - ABDOMEN
    - SCANNING, SCINTILLATION, 1215
  - ARTERIES
    - ANESTHESIA, 1469
    - LIVER, 1469
  - ASPIRIN
    - BURNS, CHEMICAL, 5610
    - GASTRITIS, 5610
  - BLEEDING
    - GASTROINTESTINAL SYSTEM, 343
  - COLON
    - AMINO ACIDS, 1398
    - COMPLICATIONS, 7005
    - HEALING, 1398, 8122
    - IATROGENESIS, 7713
    - REVIEW, 7029
    - SURGERY, 7027
    - SURVIVAL, 7005
    - THERAPY, 7028
  - COLOSTOMY
    - COLON, 2404
  - COMMON BILE DUCT
    - IATROGENESIS, 7589
  - CROHN'S DISEASE
    - INTEGUMENTARY SYSTEM, 2674
    - UROGENITAL SYSTEM, 2674
  - DIAPHRAGM
    - HERNIA, 2616
  - DUODENUM
    - ENDOSCOPY, 2320
    - OBSTRUCTION, 426
    - SECRETION, 1751*
    - STOMACH, 2107*
    - SURGERY, 2107*
    - THERAPY, 4872*
  - ESOPHAGUS
    - BURNS, 4791*
    - DIAGNOSIS, 5576
    - EPIDEMIOLOGY, 5576
    - THERAPY, 5576

WOUNDS AND INJURIES (continued)
- FIBROSIS
  - HEALING, 1291
- GASTROINTESTINAL SYSTEM
  - MOTILITY, 2645
  - PERFORATION, 7621
- INTESTINE, SMALL
  - ALKALINE PHOSPHATASE, 6135
  - ANTI-INFLAMMATORY AGENTS, 4127
  - ASPIRIN, 2324
  - DRUG-INDUCED, 4127
  - ENDOSCOPY, 2320
  - PREVENTION, 4127
  - PROSTAGLANDINS, 4127
- INTESTINES
  - COMPLICATIONS, 7620
  - HEALING, 808, 6296
  - IMMUNOGLOBULINS, 6296
  - LYSOZYMES, 6296
  - PERFORATION, 7621
  - RUPTURE, 6903
- ISCHEMIA
  - VILLI, 2100*
- JAUNDICE
  - ETIOLOGY, 5237
- JEJUNUM
  - ASPIRIN, 2324
- LIVER
  - ARTERIOGRAPHY, 4773
  - ASPIRIN, 2479*
  - COMPLICATIONS, 4273
  - COPPER, 2480*
  - DIAGNOSIS, 7530*
  - EPIDEMIOLOGY, 591
  - HEALING, 2893
  - HEMATOBILIA, 4268
  - HEMORRHAGE, 5819*, 6454*
  - LIVER FUNCTION TESTS, 6455
  - OCCUPATIONAL FACTORS, 2480*
  - PRESSURE STUDY, 7943
  - PROGNOSIS, 4273
  - REVIEW, 6455
  - SCANNING, SCINTILLATION, 1215, 7530*
  - SIMULATION, 2893
  - SURGERY, 4273, 6454*
  - THERAPY, 4273, 6454*
- LIVER DISEASES
  - INFECTION, 2645
- LIVER DISEASES, ALCOHOLIC
  - BIOCHEMISTRY, 4320*
- LIVER INJURY
  - CLEARANCE STUDY, 5038*
- MORPHOLOGY
  - HEALING, 808
- PANCREAS
  - ALCOHOLS, 2441
  - DIAGNOSIS, 6195
  - FISTULA, 7729
- PANCREATIC DUCT
  - IATROGENESIS, 7589
- PERINEUM
  - THERAPY, 7899
- PREVENTION
  - DRUG EFFECTS ON, 2270
- RECTUM
  - IATROGENESIS, 7713
- SIGMOID
  - IATROGENESIS, 7713

WOUNDS AND INJURIES (continued)
- SPLEEN
  - DIAGNOSIS, 7530*
  - SCANNING, SCINTILLATION, 1215, 7530*
- STOMACH
  - ADENOSINE TRIPHOSPHATE, 1909
  - ANALGESICS AND ANTIPYRETICS, 1884*
  - ASPIRIN, 1281*, 1877*, 1916, 2269
  - BURNS, CHEMICAL, 6233
  - DRUG-INDUCED, 1909, 2269
  - EPITHELIUM, 1751*, 2269
  - GLUCAGON, 2269
  - GLUTAMINE, 2270
  - H1 RECEPTOR ANTAGONISTS, 6834*
  - H2 RECEPTOR ANTAGONISTS, 6834*
  - HEALING, 1291, 1293, 4729
  - HISTAMINE, 6834*
  - ION TRANSPORT, 1551*
  - OXIDATIVE PHOSPHORYLATION, 1909
  - OXYGEN, 1909
  - PERFORATION, 7621
  - PREVENTION, 2270
  - RUPTURE, 6903
  - SECRETION, 1874*
  - SIMULATION, 1293
- SURGERY
  - HEALING, 808

XYLOSE
- ABSORPTION
  - CHILD, 4511
  - HEMOGLOBINS, 901
  - INTESTINE, SMALL, 901
  - TECHNIQUES, 4511
  - TEMPERATURE, 4511
- ANEMIA
  - INTESTINE, SMALL, 4413
- CELIAC DISEASE
  - ABSORPTION, 3251*
  - DIAGNOSIS, 6163
- CHILD
  - CELIAC DISEASE, 4003
- INTESTINE, SMALL
  - ABSORPTION, 2188, 2725, 4454
- INTESTINES
  - ABSORPTION, 4511
- MALABSORPTION SYNDROMES
  - CHILD, 4003
  - SOCIOECONOMIC FACTORS, 4135
- PELLAGRA
  - ABSORPTION, 2366
  - IMMUNOGLOBULINS, 2366

YERSINIA
- BACTERIAL INFECTIONS
  - APPENDIX, 3247
  - COMPLICATIONS, 3245
  - DIAGNOSIS, 3246, 3247
  - EPIDEMIOLOGY, 3246
  - FECES, 3247
  - SEPSIS, 3245
- CECUM
  - PSEUDOTUMORS, 8223
- COMPLICATIONS
  - ARTHRITIS, 8201

- YERSINIA (continued)
  - CROHN'S DISEASE
    - RADIOLOGY, 3220*
  - DIAGNOSIS, 8476
  - DIARRHEA
    - CHILD, 8202
    - COMPLICATIONS, 8201
    - DISEASES ASSOCIATED WITH, 8202
    - ETIOLOGY, 2640
  - DISEASES ASSOCIATED WITH
    - ANEMIA, 8202
    - PSEUDOTUMORS, 8202
  - ENDOSCOPY
    - MORPHOLOGY, 2313*
  - ENTERITIS
    - BACTERIAL INFECTIONS, 4900
    - DIAGNOSIS, 4900
  - ENTERITIS, REGIONAL
    - RADIOLOGY, 3220*
  - ENTEROCOLITIS
    - ANTIBIOTICS, 2388
    - ENDOSCOPY, 2313*
    - MORPHOLOGY, 2313*
    - PATHOLOGY, 2388
    - RADIOLOGY, 2313*
  - EPIDEMIOLOGY, 6647
  - GASTROENTERITIS
    - ETIOLOGY, 8203
  - GASTROINTESTINAL SYSTEM
    - BACTERIAL INFECTIONS, 8203
  - HEPATITIS
    - ETIOLOGY, 8203
  - HYPERTHERMIA, 8476
  - ILEITIS, 5665
    - DIAGNOSIS, 2342
  - ILEUM
    - BACTERIAL INFECTIONS, 5665
    - PSEUDOTUMORS, 8223
  - INTESTINES
    - BACTERIAL INFECTIONS, 3246
  - RADIOLOGY
    - DIAGNOSIS, 2313*
    - MORPHOLOGY, 2313*
  - SURGERY
    - COMPLICATIONS, 6648

- ZENKER'S DIVERTICULUM
  - ESOPHAGUS
    - BLEEDING, 2228

- ZIEVE'S SYNDROME
  - DIAGNOSIS, 696
  - ERYTHROCYTES
    - MEMBRANES, 8390*
    - METABOLISM, 8390*

- ZINC
  - ABSORPTION
    - TECHNIQUES, 3612*
  - ACRODERMATITIS
    - CHILD, 465
    - DEFICIENCY, 7633*
    - DIAGNOSIS, 4412
    - DRUG THERAPY, 6974
    - INFANT, 2351
    - THERAPY, 465, 1662, 2351, 2352, 2608, 4938
    - ULTRASTRUCTURE, 7633*
  - CLEARANCE STUDY, 8134

- ZINC (continued)
  - COLITIS, ULCERATIVE
    - PLASMA, 3317*
    - THERAPY, 3317*
  - FECES
    - TECHNIQUES, 3612*
  - HEPATITIS, INFECTIOUS
    - DIAGNOSIS, 6465*
  - INTESTINE, SMALL
    - ABSORPTION, 5292*
    - ACRODERMATITIS, 8225*
    - TRANSPORT, 5292*
  - LIVER, 8134
    - BINDING, 7434*
    - ENDOTOXINS, 2957
    - FETUS, 6805
    - NEOPLASM METASTASIS, 560
    - NEOPLASMS, 560
  - LIVER CIRRHOSIS
    - SERUM, 3480*
  - LIVER INJURY
    - CARBON TETRACHLORIDE, 6087*
    - PREVENTION, 6087*
    - SALMONELLOSIS, 8040*
  - MILK, 5292*
  - NEOPLASMS
    - NUCLEIC ACIDS, 158
  - PANCREAS, 8134
  - STOMACH
    - ULCER, 353, 7517

- ZOLLINGER-ELLISON SYNDROME
  - ACID SECRETION
    - PEPTIDES, 4549
  - AGE FACTORS
    - DIAGNOSIS, 6602
    - DISEASES ASSOCIATED WITH, 6602
    - THERAPY, 6602
  - ANTRUM
    - GASTRIN, 5177*
  - DIAGNOSIS
    - ACID SECRETION, 3988
    - GASTRIN, 4395*, 6591*
    - PATHOLOGY, 5225
  - DISEASES ASSOCIATED WITH
    - HYPERPLASIA, 5181
    - PARATHYROID GLANDS, 5181
  - ESOPHAGUS
    - MOTILITY, 4449
    - PRESSURE STUDY, 4396*
  - ETHNIC FACTORS
    - DIAGNOSIS, 6602
    - DISEASES ASSOCIATED WITH, 6602
    - THERAPY, 6602
  - GASTRECTOMY
    - SURVIVAL, 5225
  - GASTRIN, 4396*
    - CALCIUM, 1192
    - GASTRECTOMY, 5940*
    - NEOPLASMS, 2625
    - REVIEW, 5940*
    - SECRETION, 5175*, 5940*
    - SERUM, 2624
  - H2 RECEPTOR ANTAGONISTS
    - DRUG THERAPY, 5224
  - MITOSIS, 4495
  - PANCREAS
    - DIARRHEA, 1686
    - IMMUNOGLOBULINS, 2857

ZOLLINGER-ELLISON SYNDROME (continued)
- PANCREAS (continued)
  - NEOPLASMS, 1706
- PANCREATECTOMY
  - THERAPY, 1705
- PEPSINOGEN, 3686
- RADIOIMMUNOASSAY
  - GASTRIN, 5225
- RADIOLOGY, 7266
- SECRETIN
  - DIAGNOSIS, 5941*
- SERUM
  - GASTRIN, 3532
- SEX FACTORS
  - DIAGNOSIS, 6602
  - DISEASES ASSOCIATED WITH, 6602
  - THERAPY, 6602
- STOMACH
  - GASTRIN, 5177*
- THERAPY
  - GASTRIN, 5940*

ZYMOGENS
- PANCREATIC DISEASES
  - SIMULATION, 2418*
  - ULTRASTRUCTURE, 2417*, 2418*

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